

**ECODYNE** Limited

4475 Corporate Drive  
Burlington, Ontario  
Canada L7L 5T9

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Tel (905) 332-1404  
Fax (905) 332-6726  
[www.ecodyne.com](http://www.ecodyne.com)

# **MANUFACTURER'S RECORD BOOK**

**AFTER FILTER VESSEL**

**3A-F-208 A-G**

**MEG Energy Corporation**

**Christina Lake Phase 3A**

**c/o SNC-Lavalin**

**PO No. P-5675-02**

32125-A-4911-01  
Rev A

PROJECT: MEG Energy - Christina Lake Phase 3A

ECODYNE JOB: 32125

REFERENCE: PO P-5675-02

# MANUFACTURER'S RECORD BOOK

## AFTER FILTER VESSEL

### 3A-F-208 A-G

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PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## A56 – Commercial Data

PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Un-priced Copies of Major Sub-Contractor PO

## PURCHASE ORDER

## ECODYNE LIMITED

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

BRI007

QA2

TO: BRIGHTON TRU-EDGE HEADS  
4955 SPRING GROOVE AVE.  
CINCINNATI OH  
45232  
U.S.A.

513 771-2300

P/O NUMBER	AMEND NUMBER	PAGE
321253501		1
P/O DATE	DESCRIPTION	CURRENCY
12/10/12	Normal	1 - USA

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

S LESENA STEEL LTD.  
H 1060 BIRCHMOUNT ROAD,  
I SCARBOROUGH, ON  
P M1K 1S4  
CANADA

T  
O

BUYER	TERMS	ORDER TYPE	INCO TERMS	SHIP VIA		
S.POYTON	0.0%-0/30	E-MAIL	DDP	BY BRIGHTON		
LINE/RE	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
		***** ATTN: KIM ORTMAN. ORIGINAL ORDER SENT VIA EMAIL TO KIM ON JANUARY 2,2012. NO MAILED COPIES WILL BE SENT. REFERENCE PO# 321253501 ON ALL DOCUMENTATION. ***** HEADS TO BE DELIVERED IN SETS OF TWO TOP HEADS AND TWO BOTTOM HEADS. ***** REQUIRED DELIVERY: STAGGERED, (4) FOR FEBRUARY 15,2013 (4) FOR MARCH 1,2013 (4) FOR MARCH 15,2013 AND (2) FOR MARCH 29, 2013. ***** INCO TERMS: DDP TO LESENA. ***** ECODYNE LIMITED STANDARD TERMS AND CONDITIONS, FORM No.: OSTFP-A-1017 Rev.A, 2010-12-20 IS INCORPORATED BY REFERENCE INTO & APPLIES TO THIS ORDER. THIS DOCUMENT IS AVAILABLE FOR VIEWING AT: www.ecodyne.com				

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APPROVED BY

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## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

BRI007 QA2

TO: BRIGHTON TRU-EDGE HEADS  
4955 SPRING GROOVE AVE.  
CINCINNATI OH  
45232  
U.S.A.

513 771-2300

P/O NUMBER	AMEND NUMBER	PAGE
321253501		2
P/O DATE	DESCRIPTION	CURRENCY
12/10/12	Normal	1 - USA

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
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S LESENA STEEL LTD.  
H 1060 BIRCHMOUNT ROAD,  
I SCARBOROUGH, ON  
P M1K 1S4  
CANADA  
T  
O

BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		DDP		BY BRIGHTON	
LINE/REV	QUANTITY	DATE REQUIRED	DATE PROMISED	ROOM	UNIT PRICE	EXTENDED PRICE			
001		UNDER PROFILE. *****							
		Part: WXXX>DOCS Desc: DOCUMENTATION REQUIREMENTS							
		DOCUMENTATION REQUIRED PER 32125-A-1020. FOR HEADS SEND DOCUMENTS TO: vendordoccontrol@ecodyne.com REFERRING TO THE APPLICABLE PURCHASE ORDER. EA 05/15/13 05/15/13							
.001	1								
002		Part: WXXX>SPECSHEADS Desc: SPECIAL REQUIREMENTS FOR HEADS							
		UNITS: UNITS ON NAMEPLATE & DOCUMENTS SHALL BE CONSISTENTLY SI (METRIC) *****							
		MATERIAL: ALL MATERIAL MUST COMPLY WITH THE FOLLOWING SPECIAL REQUIREMENTS FOR THIS PROJECT.							

TOTAL EXTENDED PRICE

Continued

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## PURCHASE ORDER

## ECODYNE LIMITED

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

BRI007 QA2

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TO: BRIGHTON TRU-EDGE HEADS  
4955 SPRING GROOVE AVE.  
CINCINNATI OH  
45232  
U.S.A.

S LESENA STEEL LTD.  
H 1060 BIRCHMOUNT ROAD,  
I SCARBOROUGH, ON  
P M1K 1S4  
T CANADA  
O

513 771-2300

BUYER	TERMS	ORDER TYPE	INCO TERMS	SHIP VIA		
S.POYTON	0.0%-0/30	E-MAIL	DDP	BY BRIGHTON		
SHIP/HEAD	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
		TECHNICAL REQUIREMENTS (EG. CARBON CONTENT): N/A  COMMERCIAL REQUIREMENTS (EG. APPROVED MANUFACTURERS): PLATES FOR HEADS SHALL BE SOURCED FROM US, CANADA, WESTERN EUROPE OR JAPAN ONLY FROM REPUTABLE SUPPLIERS ***** HEAT TREATING REQUIREMENTS: (FOR VESSELS NOT SUBJECT TO PWHT) THE HEAD FABRICATOR IS TO PWHT HEADS AS REQUIRED BY ASME VIII DIV 1, UCS-79(d) FOR RELIEF OF HEAD FORMING STRESSES. THIS APPLIES TO VESSELS/HEADS TAGGED: AFTER FILTER HEADS (TOP & BOTTOM) ***** MATERIAL CERTIFICATION: (FOR VESSELS NOT SUBJECT TO PWHT) HEAD MATERIAL TO BE CERTIFIED IN ACCORDANCE WITH ASME CODE REQUIREMENTS FOR SPECIFIED				

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

APPROVED BY \_\_\_\_\_

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## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

BRI007 QA2

P/O NUMBER	AMEND NUMBER	PAGE
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P/O DATE	DESCRIPTION	CURRENCY
12/10/12	Normal	1 - USA

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
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TO: BRIGHTON TRU-EDGE HEADS  
4955 SPRING GROOVE AVE.  
CINCINNATI OH  
45232  
U.S.A.

S LESENA STEEL LTD.  
H 1060 BIRCHMOUNT ROAD,  
I SCARBOROUGH, ON  
P M1K 1S4  
CANADA  
T  
O

513 771-2300

BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		DDP		BY. BRIGHTON	
LINE/REV	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE			
		HEAD MATERIAL. THIS APPLIES TO VESSELS/HEADS TAGGED: AFTER FILTER HEADS (TOP & BOTTOM) ***** INSPECTION: ALL COMPONENTS ARE SUBJECT TO INSPECTION BY ECODYNE, ITS CUSTOMER/AGENT. REQ'D INSPECTION NOTICE:7 DAYS NOTIFY: ECODYNE Q.A. DEPT. REFER TO PROJECT QUALITY REQUIREMENTS PER DWG: 32125-A-4200 FOR APPLICABLE ITP & INSPECTION POINTS. EA 05/15/13 05/15/13							
001	1								
003		Part: WXXXHDXXXEXXXXXX Desc: VESSEL HEAD-ELLIPTICAL Ship to: PRESSURE VESSEL SHOP Application: ACTIVATED CARBON FILTER  VESSEL HEADS - ELLIPTICAL 2:1 3962mm (156") OD MATERIAL SPEC. SA-516 70 N MAT'L NORMALIZED BEFORE							

TOTAL EXTENDED PRICE

Continued

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## PURCHASE ORDER

## ECODYNE LIMITED

4475 CORPORATE DRIVE  
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L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

BRI007

QA2

P/O NUMBER	AMEND NUMBER	PAGE
321253501		5
P/O DATE	DESCRIPTION	CURRENCY
12/10/12	Normal	1 - USA

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
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TO: BRIGHTON TRU-EDGE HEADS  
4955 SPRING GROOVE AVE.  
CINCINNATI OH  
45232  
U.S.A.

S LESENA STEEL LTD.  
H 1060 BIRCHMOUNT ROAD,  
I SCARBOROUGH, ON  
P M1K 1S4  
CANADA

T  
O

513 771-2300

BUYER		TERMS	ORDER TYPE	INCO TERMS	SHIP VIA	
S.POYTON		0.0%-0/30	E-MAIL	DDP	BY BRIGHTON	
LINE/REV	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
		FORMING: YES CODE:ASME SEC.VIII DIV.1 MIN.THK.AFTER FORMING:19.05mm NOM.PL.THK: 25.4mm (1") SINGLE PIECE HEAD: NO 2-PIECE HEAD W/ XRAY: YES SEAM OFFSET FR. CENTRE 610mm (24") COLD SIZED: YES HEAD I.D.D. = I.D./4 STRAIGHT FLANGE: 102mm (4") WELD PREP.BEVEL: NONE PER ECODYNE ITP#: TAG: FOR AFTER FILTER BOTTOM HEAD EA 05/15/13 05/15/13				
001	7					
004		Part: WXXXHDXXXEXXXXXX Desc: VESSEL HEAD-ELLIPTICAL Ship to: PRESSURE VESSEL SHOP Application: ACTIVATED CARBON FILTER  VESSEL HEADS - ELLIPTICAL 2:1 3962mm (156") OD MATERIAL SPEC: SA-516 70 N MAT'L NORMALIZED BEFORE FORMING: YES				

TOTAL EXTENDED PRICE

Continued

ORDERED BY

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## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

BRI007

QA2

P/O NUMBER	AMEND NUMBER	PAGE
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P/O DATE	DESCRIPTION	CURRENCY
12/10/12	Normal	1 - USA

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
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TO: BRIGHTON TRU-EDGE HEADS  
4955 SPRING GROOVE AVE.  
CINCINNATI OH  
45232  
U.S.A.

S LESENA STEEL LTD.  
H 1060 BIRCHMOUNT ROAD,  
I SCARBOROUGH, ON  
P M1K 1S4  
CANADA

T  
O

513 771-2300

BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		DDP COTON		BY BRIGHTON	
S. LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE			
.001	7	CODE:ASME SEC.VIII DIV.1 MIN.THK.AFTER FORMING: 18.22mm (0.7165") NOM.PLATE THK.: 22.22mm (7/8") SINGLE PIECE HEAD: NO 2-PIECE HEAD W/ XRAY: YES SEAM OFFSET FR. CENTRE 610mm I.D.D. = I.D./4 COLD SIZED: YES STRAIGHT FLANGE: 51mm (2") WELD PREP.BEVEL: NONE PER ECODYNE ITP#: LATER TAG:FOR AFTER FILTER TOP HEAD EA 05/15/13 05/15/13							

TOTAL EXTENDED PRICE

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ORIGINAL



## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

CAN042

P/O NUMBER	AMEND NUMBER	PAGE
321253502		1
P/O DATE	DESCRIPTION	CURRENCY
12/10/12	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: CANADIAN PLATE & PROFILES INC.  
920 KAMATO ROAD  
MISSISSAUGA, ON  
L4W 2R6  
CANADA

905-206-9226

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LESENA STEEL LTD.,  
1060 BIRCHMOUNT ROAD,  
SCARBOROUGH, ON  
M1K 1S4  
CANADA

BUYER	TERMS	ORDER TYPE	INCO TERMS	SHIP VIA		
S.POYTON	0.0%-0/30	E-MAIL	DAP	BY CDN PLATE		
S LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
		***** ATTN: MR. ROBERT CEFARATTI. ORIGINAL ORDER SENT VIA EMAIL TO ROBERT ON DEC 11,2012. NO MAILED COPIES WILL BE SENT. REFERENCE PO# 321253502 ON ALL DOCUMENTATION. ***** REQUIRED DELIVERY: STAGGERED. MARCH 9, 2013 FOR THE STRAINER PLATES. APRIL 15, 2013 FOR THE SHELL PLATES. ***** ECODYNE LIMITED STANDARD TERMS AND CONDITIONS, FORM No.: OSTFP-A-1017 Rev.A, 2010-12-20 IS INCORPORATED BY REFERENCE INTO & APPLIES TO THIS ORDER. THIS DOCUMENT IS AVAILABLE FOR VIEWING AT: www.ecodyne.com UNDER PROFILE. *****				

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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		DAP		BY CDN PLATE	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE		EXTENDED PRICE	
	001		Part: WXXX>DOCS Desc: DOCUMENTATION REQUIREMENTS  DOCUMENTATION REQUIRED PER 32125-A-1020 FOR PLATE SEND DOCUMENTS TO: vendordoccontrol@ecodyne.com REFERRING TO THE APPLICABLE PURCHASE ORDER  IF ANY DOCUMENTS ARE NOT APPLICABLE OR NOT AVAILABLE, NOTIFY VENDOR DOCUMENT CONTROL OF THIS, WITH EXPLANATIONS, PRIOR TO THE REQUIRED DATE.  IF ANY DOCUMENTS ARE ALREADY SUBMITTED TO ECODYNE AND WILL BE USED UNCHANGED FOR THIS PROJECT (eg. WELDING PROC.), THEN SEND NOTICE WITH DETAILS, PRIOR TO THE REQUIRED DATE EA 04/15/13 04/15/13						
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TOTAL EXTENDED PRICE

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920 KAMATO ROAD  
MISSISSAUGA, ON  
L4W 2R6  
CANADA

905-206-9226

S LESENA STEEL LTD.  
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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		DAP		BY CDN PLATE	
S	LINE/REF	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE		
	002		<p>Part: WXXX&gt;SPECSPLATE</p> <p>Desc: SPECIAL REQUIREMENTS FOR PLATE</p> <p>*****</p> <p>UNITS:</p> <p>UNITS ON NAMEPLATE &amp; DOCUMENTS</p> <p>SHALL BE CONSISTENTLY</p> <p>SI (METRIC)</p> <p>*****</p> <p>MATERIAL:</p> <p>ALL MATERIAL MUST COMPLY</p> <p>WITH THE FOLLOWING SPECIAL</p> <p>REQUIREMENTS FOR THIS PROJECT.</p> <p>.</p> <p>TECHNICAL REQUIREMENTS (EG.</p> <p>CARBON CONTENT):N/A</p> <p>.</p> <p>COMMERCIAL REQUIREMENTS (EG.</p> <p>APPROVED MANUFACTURERS):</p> <p>PLATES FOR SHELL SHALL BE</p> <p>FROM US, CANADA, WESTERN</p> <p>EUROPE OR JAPAN FROM</p> <p>REPUTABLE SUPPLIERS</p> <p>*****</p> <p>MATERIAL CERTIFICATION:</p> <p>(FOR VESSELS NOT SUBJECT TO</p> <p>PWHT)</p>						

TOTAL EXTENDED PRICE

Continued

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		PLATE MATERIAL TO BE CERTIFIED IN ACCORDANCE WITH ASME CODE REQUIREMENTS FOR THE SPECIFIED MATERIAL. THIS APPLIES TO VESSELS TAGGED: AFTER FILTER ***** INSPECTION: ALL COMPONENTS ARE SUBJECT TO INSPECTION BY ECODYNE, ITS CUSTOMER/AGENT. REQ'D INSPECTION NOTICE: 7 DAYS NOTIFY: ECODYNE Q.A. DEPT. REFER TO PROJECT QUALITY REQUIREMENTS PER DWG: 32125-A-4200 FOR APPLICABLE ITP & INSPECTION POINTS EA 04/15/13 04/15/13				
.001	1					
003		Part: WXXXPL0750A001 Desc: VESS.PL,0.750" THK, SA516-70 Ship to: PRESSURE VESSEL SHOP Application: ACTIVATED CARBON FILTER  VESSEL PLATES NOMINAL THICKNESS-19.05mm (3/4"				

TOTAL EXTENDED PRICE

Continued

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To: CANADIAN PLATE & PROFILES INC.  
920 KAMATO ROAD  
MISSISSAUGA, ON  
L4W 2R6  
CANADA

905-206-9226

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LESENA STEEL LTD.  
1060 BIRCHMOUNT ROAD,  
SCARBOROUGH, ON  
M1K 1S4  
CANADA

BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		DAP		BY CDN PLATE	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE		EXTENDED PRICE	
	.001	7	MATERIAL - SA516-70 N SIZE SUFFICIENT FOR TRIMMING & SQUARING TO: 2388mm WIDE X 12446mm LONG MILL TEST CERTIFICATE: YES SPECIAL REQUIREMENTS PER WXXX>SPECSPLATE NORMALIZED: YES FOR AFTER FILTER SHELL EA 04/15/13 04/15/13						
	004		Part: WXXXPL1500A Desc: VESSEL, PL, 1.500"THK, SA-516-70 Ship to: PRESSURE VESSEL SHOP Application: ACTIVATED CARBON FILTER  VESSEL PLATES NOMINAL THICKNESS- 38.1mm MATERIAL - SA-516-70N SIZE SUFFICIENT FOR TRIMMING TO 3048mm WIDE X 3937mm LG  MILL TEST CERTIFICATE: YES SPECIAL REQUIREMENTS PER WXXX>SPECSPLATE NORMALIZED: YES FOR AFTER FILTER STRAINER PL						

TOTAL EXTENDED PRICE

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PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
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TO: CANADIAN PLATE & PROFILES INC.  
920 KAMATO ROAD  
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L4W 2R6  
CANADA

S LESENA STEEL LTD.  
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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		DAP		BY CDN PLATE	
S. LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE			
.001	7	EA	03/09/13	03/09/13					
005		Part: WXXXPL1500A Desc: VESSEL, PL, 1.500"THK, SA-516-70  VESSEL PLATES NOMINAL THICKNESS- 38.1mm MATERIAL - SA-516-70N SIZE SUFFICIENT FOR TRIMMING TO 915mm WIDE X 3327mm LG  MILL TEST CERTIFICATE: YES SPECIAL REQUIREMENTS PER WXXX>SPECSPLATE NORMALIZED: YES FOR AFTER FILTER STRAINER PL							
.001	7	EA	03/09/13	03/09/13					

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 BURLINGTON, ONTARIO, CANADA  
 L7L5T9  
 Phone: (905) 332-1404

Email: [info@ecodyne.com](mailto:info@ecodyne.com)

LES001 QA1

TO: LESENA STEEL LTD.,  
 1060 BIRCHMOUNT ROAD,  
 SCARBOROUGH, ON  
 M1K 1S4  
 CANADA

416-751-1834

P/O NUMBER	AMEND NUMBER	PAGE
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PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
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BRANT CORROSION CONTROL IN  
 30 GARNET ROAD  
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 BRANTFORD, ON  
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 CANADA

BUYER		TERMS	ORDER TYPE	INCO TERMS	SHIP VIA		
S.POYTON		0.0%-0/30	E-MAIL	EX WORKS	BLASTECH		
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
			***** ATTN: MR. TOM PATRZALEK. EMAIL ORDER IS THE ORIGINAL ORDER, SENT ON JAN 10, 2013. NO MAILED COPIES WILL BE SENT. REFERENCE PO# 321253503 ON ALL DOCUMENTATION. ***** REQUIRED DELIVERY: (2) JUNE 7, (2) JUNE 21, (2) JULY 5 AND JULY 19 FOR THE LAST VESSEL. ***** ECODYNE LIMITED STANDARD TERMS AND CONDITIONS, FORM No.: OSTFP-A-1017 Rev.A, 2010-12-20 IS INCORPORATED BY REFERENCE INTO & APPLIES TO THIS ORDER. THIS DOCUMENT IS AVAILABLE FOR VIEWING AT: www.ecodyne.com UNDER PROFILE. *****				

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LES001 QA1

TO: LESENA STEEL LTD.,  
1060 BIRCHMOUNT ROAD,  
SCARBOROUGH, ON  
M1K 1S4  
CANADA

416-751-1834

P/O NUMBER	AMEND NUMBER	PAGE
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BRANT CORROSION CONTROL IN  
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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		EX WORKS		BLASTECH	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE		
	001		<p>Part: WXXX&gt;SPECS-ASME Desc: SPECIAL REQ'TS ASME EQUIP.</p> <p>UNITS UNITS ON NAMEPLATE &amp; DOCUMENTS SHALL BE CONSISTENTLY SI (METRIC) TAGGING VESSELS:3A-F-208 A,B,C,D,E,F,G STAMPED ON ASME NAMEPLATE</p> <p>MATERIAL ALL MATERIAL MUST COMPLY WITH THE FOLLOWING SPECIAL REQUIREMENTS FOR THIS PROJECT.</p> <p>TECHNICAL REQUIREMENTS (EG. CARBON CONTENT):</p> <p>COMMERCIAL REQUIREMENTS (EG. APPROVED MANUFACTURERS):</p> <p>FLANGES &amp; FITTINGS REGISTERED BY PROV.AUTHORITIES MARKED WITH ANSI/ASME MARKINGS PER MILL TEST REPORTS NO VISIBLE DEFECTS</p>						

TOTAL EXTENDED PRICE

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S.POYTON	0.0%-0/30	E-MAIL	EX WORKS	BLASTECH		
S. LINE/REF	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
		ASME PRESSURE VESSELS IRRESPECTIVE OF INTERPRETATION VIII-1-98-53 (SPOT RT), UNACCEPTABLE DEFECTS OUTSIDE THE "AREA OF INTEREST" ARE TO BE TREATED THE SAME AS UNACCEPTABLE DEFECTS IN THE "AREA OF INTEREST" (I.E. REPAIR, RT PLUS 2 ADDITIONAL SPOTS)  INSPECTION ALL COMPONENTS ARE SUBJECT TO INSPECTION BY ECODYNE, ITS CUSTOMER/AGENT. REQ'D INSPECTION NOTICE: 7 DAYS NOTIFY: ECODYNE Q.A. DEPT. REFER TO PROJECT QUALITY REQUIREMENTS PER DWG: 32125-A-4200 <sup>A</sup> (ITP: 4351 to 4356) <i>Rev 13</i> FOR APPLICABLE ITP & INSPECTION POINTS  FOR SHIPPING LISTS REFER TO: 32125-A-2453 <sup>A</sup> EA 07/19/13 07/19/13				
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TOTAL EXTENDED PRICE

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BUYER		TERMS	ORDER TYPE	INCO TERMS	SHIP VIA	
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S. LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
003		Part: W135BW156C15FS Desc: FILTER, BW, 156", 150PSIG, FS Application: ACTIVATED CARBON FILTER  PRESSURE FILTER VESSEL PROCESS- FILTRATION BACKWASH VESSEL MAT'L- BARE CS FLOOR TYPE- FLAT STRAINER OUTSIDE DIA: 3962mm STRAIGHT LENGTH: 2540mm DESIGN PRESSURE: 1034KPa (g) LINING: BARE ✓ DWG NO: 32125-D-2202-01 <sup>B</sup> ASSY ✓ 32125-D-2212-01 <sup>A</sup> VESSEL DETAILS CODE: ASME VIII DIV 1 2010 ED + All REGISTRATION: YES, CRN FOR PROVINCE OF ALBERTA "U" STAMP: YES CORROSION ALLOWANCE: 3.2mm INSIDE PRESSURE VESSEL SPEC: ✓ 32125-A-2015 <sup>A</sup> ✓ WELDING SPEC: 32125-A-2016 <sup>A</sup> ✓ INSULATION SPEC: 32125-A-2017 <sup>A</sup> ✓ SUPPLEMENTARY DWGS: 32125-A-2025 <sup>A</sup> PREP FOR SHIPMENT				

TOTAL EXTENDED PRICE

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BUYER		TERMS	ORDER TYPE	INCO TERMS	SHIP VIA	
S.POYTON		0.0%-0/30	E-MAIL	EX WORKS	BLASTECH	
S. LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
.001	7	✓ 32125-C-2219-01 <sup>A</sup> SIGHTWINDOW ✓ 32125-C-2220-01 <sup>A</sup> TOP MW DAVIT ✓ 32125-C-2221-01 <sup>A</sup> BTM MW DAVIT ✓ 32125-B-2213-01 <sup>A</sup> N.P. BRAKET ECODYNE TO FREE ISSUE HEADS, SHELL PLATE & STRAINER PLATES (NO DRILLING) EA 07/19/13 07/19/13				
004		Desc: PROGRESS PAYMENT#1 Your Part:  PROGRESS IS FOR THE WORK TO BE PERFORMED AS LISTED ON LINE 1-03 OF THIS PO. PROGRESS PAYMENT # 1 (30%) UPON PROOF OF THE FOLLOWING: 1. LESENA'S MATERIAL: FLANGES, SADDLE MATERIAL, REPADS, ETC.. 2. APPROVAL TO FABRICATE. 3. COPY OF THE CRN APPLICATION STAMPED BY A P.ENG.. TERMS: N30. EA 03/16/13 03/16/13				
.001	7					

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

APPROVED BY \_\_\_\_\_

Ecodyne Limited Standard Terms & Conditions, Form No. OSTFP-A-1017 REV A, 2010-12-20 is incorporated into and applies to this order  
This document is available for viewing at: www.ecodyne.com

ORIGINAL

## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

LES001 QA1

P/O NUMBER	AMEND NUMBER	PAGE
321253503		7
P/O DATE	DESCRIPTION	CURRENCY
01/09/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: LESENA STEEL LTD.,  
1060 BIRCHMOUNT ROAD,  
SCARBOROUGH, ON  
M1K 1S4  
CANADA

416-751-1834

S BRANT CORROSION CONTROL IN  
H 30 GARNET ROAD  
I R.R. 8  
P BRANTFORD, ON  
N3T 5M1  
T CANADA  
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BUYER		TERMS	ORDER TYPE		INCO TERMS	SHIP VIA		
S.POYTON		0.0%-0/30	E-MAIL		EX WORKS	BLASTECH		
S	LINE/REF	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE	
	005		Desc: FINAL PAYMENT- VESSELS Your Part:  FINAL PAYMENT- VESSEL COMPLETION AS OUTLINED ON LINES ONE TO THREE OF THIS PO. PAYMENT IS 60% ON SHIPMENT & FINAL SIGN OFF BY Q.A. INVOICE TO BE SUPPORTED WITH COPIES OF PACKING SLIP AND BILL OF LADING. NET 30 DAYS EA 07/19/13 07/19/13					
	.001	7						
	006		Desc: FINAL PAYMENT- DOCS Your Part:  FINAL PAYMENT (10%) FOR DOCUMENTATION AS OUTLINED ON LINE ONE TO THREE OF THIS PURCHASE ORDER AND VENDOR DOCUMENTATION REQUIREMENT (VDR) ACCEPTANCE BY ECODYNE QA AS COMPLETE.					

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

APPROVED BY \_\_\_\_\_

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ORIGINAL

## PURCHASE ORDER

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4475 CORPORATE DRIVE  
 BURLINGTON , ONTARIO, CANADA  
 L7L5T9  
 Phone: (905) 332-1404

Email: info@ecodyne.com

LES001 QA1

TO: LESENA STEEL LTD.,  
 1060 BIRCHMOUNT ROAD,  
 SCARBOROUGH, ON  
 M1K 1S4  
 CANADA

416-751-1834

P/O NUMBER	AMEND NUMBER	PAGE
321253503		8
P/O DATE	DESCRIPTION	CURRENCY
01/09/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
 AND CONTRACT NUMBER ON ALL DOCUMENTS

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BRANT CORROSION CONTROL IN  
 30 GARNET ROAD  
 R.R. 8  
 BRANTFORD, ON  
 N3T 5M1  
 CANADA

BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		EX WORKS		BLASTECH	
S	LINE/REF	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE		EXTENDED PRICE	
	.001	7	NET 30 DAYS EA 07/19/13 07/19/13						

TOTAL EXTENDED PRICE

ORDERED BY

APPROVED BY

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ORIGINAL

## PURCHASE ORDER

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4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

BRA001 QA1

P/O NUMBER	AMEND. NUMBER	PAGE
321253504		1
P/O DATE	DESCRIPTION	CURRENCY
05/08/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: BRANT CORROSION CONTROL INC.,  
30 GARNET ROAD  
R.R. 8  
BRANTFORD, ON  
N3T 5M1  
CANADA  
1-519-759-7334

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TO BE ARRANGED

BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/20		E-MAIL		EX WORKS		TBA	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM		UNIT PRICE	EXTENDED PRICE	
			***** ATTN: Mr. Ted MacMillan ORIGINAL ORDER EMAILED MAY 10, 2013. EMAIL ORDER IS THE ORIGINAL ORDER, NO MAILED COPY WILL BE SENT. ***** REFERENCE PO # 321253504 ON ALL DOCUMENTATION. ***** REQUIRED DELIVERY: 2 WEEKS AFTER RECEIPT OF EACH TANK. MAY 20 TO JUNE 28, TO BCC. INCO: EX WORKS WITH LOADING. ***** ECODYNE LIMITED STANDARD TERMS AND CONDITIONS, FORM No.: OSTFP-A-1017 Rev.A, 2010-12-20 IS INCORPORATED BY REFERENCE INTO & APPLIES TO THIS ORDER. THIS DOCUMENT IS AVAILABLE FOR VIEWING AT: <a href="http://www.ecodyne.com">www.ecodyne.com</a> *****						

TOTAL EXTENDED PRICE

Continued

ORDERED BY

APPROVED BY

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## ECODYNE LIMITED

4475 CORPORATE DRIVE  
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L7L5T9

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BRA001 QA1

P/O NUMBER	AMEND NUMBER	PAGE
321253504		2
P/O DATE	DESCRIPTION	CURRENCY
05/08/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: BRANT CORROSION CONTROL INC.,  
30 GARNET ROAD  
R.R. 8  
BRANTFORD, ON  
N3T 5M1  
CANADA  
1-519-759-7334

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TO BE ARRANGED

BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/20		E-MAIL		EX WORKS		TBA	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE		
	001		<p>Part: WXXX&gt;DOCS Desc: DOCUMENTATION REQUIREMENTS</p> <p>DOCUMENTATION REQUIRED PER 32125-A-1020. FOR PAINTING &amp; INTERNALS INSTN SEND DOCUMENTS TO: vendordoccontrol@ecodyne.com REFERRING TO THE APPLICABLE PURCHASE ORDER</p> <p>IF ANY DOCUMENTS ARE NOT APPLICABLE OR NOT AVAILABLE, NOTIFY VENDOR DOCUMENT CONTROL OF THIS, WITH EXPLANATIONS, PRIOR TO THE REQUIRED DATE.</p> <p>IF ANY DOCUMENTS ARE ALREADY SUBMITTED TO ECODYNE AND WILL BE USED UNCHANGED FOR THIS PROJECT (eg. WELDING PROC.), THEN SEND NOTICE WITH DETAILS, PRIOR TO THE REQUIRED DATE</p>						
	.001	1	EA 07/26/13 07/26/13						

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

APPROVED BY \_\_\_\_\_

Ecodyne Limited Standard Terms & Conditions, Form No. OSTFP-A-1017 REV A, 2010-12-20 is incorporated into and applies to this order  
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## PURCHASE ORDER

## ECODYNE LIMITED

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

BRA001 QA1

P/O NUMBER	AMEND NUMBER	PAGE
321253504		3
P/O DATE	DESCRIPTION	CURRENCY
05/08/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: BRANT CORROSION CONTROL INC.,  
30 GARNET ROAD  
R.R. 8  
BRANTFORD, ON  
N3T 5M1  
CANADA  
1-519-759-7334

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BUYER		TERMS	ORDER TYPE		INCO TERMS	SHIP VIA	
S.POYTON		0.0%-0/20	E-MAIL		EX WORKS	TBA	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
	002		Part: WXXX>INSTALL Desc: SPEC. REQ., INSTALLATION, (INT)  GENERAL AND SPECIAL REQUIREMENTS FOR INSTALLATION OF INTERNALS INCLUDING STRAINERS GROUT IN VESSELS OR TANKS. IF APPLICABLE.  THE FOLLOWING GENERAL DOCUMENTS SPECIFY THE INSTALLATION OF INTERNALS AND GROUT FOR THIS PROJECT (AS APPLICABLE) - INSTRUCTIONS FOR INSTALLATION OF VESSEL INTERNALS: OST38-A-2030-01 - SPECIFICATION FOR PLACEMENT OF GROUT INTO THE UNDERDRAIN OF A PRESSURE VESSEL: OST38-A4-2048 NOTES: - FOR BOLTING AND STRAINER INSTALLATION A CALIBRATED TORQUE WRENCH WITH SUITABLE RANGE SHALL BE USED				

TOTAL EXTENDED PRICE

Continued

ORDERED BY

APPROVED BY

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ORIGINAL

## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON , ONTARIO, CANADA  
L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

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P/O NUMBER	AMEND NUMBER	PAGE
321253504		4
P/O DATE	DESCRIPTION	CURRENCY
05/08/13	Normal	5 - BFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: BRANT CORROSION CONTROL INC.,  
30 GARNET ROAD  
R.R. 8  
BRANTFORD, ON  
N3T 5M1  
CANADA  
  
1-519-759-7334

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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/20		E-MAIL		EX WORKS		TBA	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE		EXTENDED PRICE	
			- INTERNAL COATING/LINING MUST BE INSPECTED AFTER INSTALLATION AND INSPECTION OF INTERNALS LINING MUST BE INSPECTED AFTER INSTALLATION OF INTERNALS  INSPECTION ALL COMPONENTS ARE SUBJECT TO INSPECTION BY ECODYNE, IT'S CUSTOMER/AGENT REQ'D INSPECTION NOTICE:7 DAYS NOTIFY: ECODYNE Q.A. DEPT. REFER TO PROJECT QUALITY REQUIREMENTS PER DWG. 32125-A-4200 FOR APPLICABLE ITP AND INSPECTION POINTS FOR SHIPPING LISTS REFER TO: 32125-A -2451 EA 07/26/13 07/26/13						
	.001	1							

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

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ORIGINAL

## PURCHASE ORDER

## ECODYNE LIMITED

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

BRA001 QA1

P/O NUMBER	AMEND. NUMBER	PAGE
321253504		5
P/O DATE	DESCRIPTION	CURRENCY
05/08/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: BRANT CORROSION CONTROL INC.,  
30 GARNET ROAD  
R.R. 8  
BRANTFORD, ON  
N3T 5M1  
CANADA  
  
1-519-759-7334

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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/20		E-MAIL		EX WORKS		TBA	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE		EXTENDED PRICE	
	003		Part: W135III156--S Desc: INT.INST,DIA,SS Ship to: LINING SHOP Application: ACTIVATED CARBON FILTER  FILTER INTERNALS MATERIAL- 316L SS VESSEL: 32125-D-2202-01 32125-D-2212-01 DWG.NO: 32125-C-2222-01 32125-A-2223-01 LO 07/26/13 07/26/13						
	.001	1							
	004		Part: WXXX>PAINT(EXT) Desc: SPEC. REQ., PAINTING, (EXTERNAL)  GENERAL AND SPECIAL REQUIREMENTS FOR EXTERNAL PAINTING OR COATING OF EQUIPMENT, (INCLUDING VESSELS, TANKS, PIPE, STRUCTURAL STEEL ETC.) THE FOLLOWING GENERAL DOCUMENTS ARE APPLICABLE TO ALL PAINTING AND COATING FOR THIS PROJECT:						

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

APPROVED BY \_\_\_\_\_

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ORIGINAL

## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON , ONTARIO, CANADA  
L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

BRA001 QA1

P/O NUMBER	AMEND. NUMBER	PAGE
321253504		6
P/O DATE	DESCRIPTION	CURRENCY
05/08/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: BRANT CORROSION CONTROL INC.,  
30 GARNET ROAD  
R.R. 8  
BRANTFORD, ON  
N3T 5M1  
CANADA  
1-519-759-7334

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BUYER		TERMS	ORDER TYPE		INCO TERMS	SHIP VIA	
S.POYTON		0.0%-0/20	E-MAIL		EX WORKS	TBA	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE
			PAINTING SPEC:32125-A-2013 NACE SPECS:				
			CUSTOMER SPECIFICATIONS:				
			INSPECTION ALL WORK IS SUBJECT TO INSPECTION BY ECODYNE, ITS CUSTOMER/AGENT REQ'D INSPECTION NOTICE:7 DAYS NOTIFY: ECODYNE Q.A. DEPT REFER TO PROJECT QUALITY REQUIREMENTS PER DWG. 32125-A-4200 FOR APPLICABLE ITP AND INSPECTION POINTS PAINTED EQUIPMENT WHENEVER PAINTED EQUIPMENT IS SHIPPED TO ECODYNE ASSEMBLY SHOP, TOUCH-UP PAINT SHALL BE PROVIDED IN EACH COLOUR. QUANTITY PROPORTIONAL TO PROJECT SIZE: 1% OF VOLUME USED TO A MAXIMUM OF 8 LITRES AND A MINIMUM OF 1/2 LITRE.				
	.001	1	EA 07/26/13 07/26/13				

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

APPROVED BY \_\_\_\_\_

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ORIGINAL

## PURCHASE ORDER

## ECODYNE LIMITED

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

BRA001 QA1

P/O NUMBER	AMEND. NUMBER	PAGE
321253504		7
P/O DATE	DESCRIPTION	CURRENCY
05/08/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: BRANT CORROSION CONTROL INC.,  
30 GARNET ROAD  
R.R. 8  
BRANTFORD, ON  
N3T 5M1  
CANADA  
1-519-759-7334

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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/20		E-MAIL		EX WORKS		TBA	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE		EXTENDED PRICE	
	005		Part: WXXXEP156-08400 Desc: EXT.PREP,156" DIA,MULTICOAT Ship to: LINING SHOP Application: ACTIVATED CARBON FILTER  EXTERNAL PREPARATION & PAINT TYPE- BLAST & MULTICOAT EQUIP.TYPE: FILTER VESSELS DIAMETER: 13 FT DWG NO: 32125-D-2202-01 SPEC 32125-A-2013						
	.001	7	EA 07/26/13 07/26/13						
	006		Desc: LOT PRICE Your Part:  LOT PRICE FOR THE SCOPE OF WORK AS OUTLINED ON LINE 1-5 OF THIS PURCHASE ORDER.						
	.001	7	EA 07/26/13 07/26/13						

TOTAL EXTENDED PRICE

GST Reg: 100625227RT

ORDERED BY

APPROVED BY

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ORIGINAL

## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON, ONTARIO, CANADA  
L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

PRO033

QA-2

P/O NUMBER	AMEND NUMBER	PAGE
321252801		1
P/O DATE	DESCRIPTION	CURRENCY
06/17/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: PRO INSUL LIMITED  
468 ARVIN AVENUE  
STONE CREEK ON  
L8E 2M1  
CANADA

(905)662-6161

S ECODYNE LIMITED  
H 4475 CORPORATE DRIVE  
I BURLINGTON ON  
P L7L 5T9  
CANADA

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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		ECODYNE		PRO INSUL	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM		UNIT PRICE	EXTENDED PRICE	
			***** ATTN: MR. JOSHUA BRENNERMAN. REF. QUOTE SC-13-085 REV#1 EMAIL COPY IS THE ORIGINAL ORDER SENT TO JOSHUA ON JUNE 18, 2013. INSUATION EXPECTED TO BE DONE IN THE MONTHS OF JULY/AUG 2013 REFERENCE PO#321252801 ON ALL DOCUMENTATION. ***** REQUIRED DELIVERY: 2 WEEKS AFTER START PER VESSEL. ALL LABOUR AND MATERIAL BY PRO INSUL. JOB SITE TO BE CLEANED DAILY. ***** ECODYNE LIMITED STANDARD TERMS AND CONDITIONS, FORM No.: OSTFP-A-1017 Rev.A, 2010-12-20 IS INCORPORATED BY REFERENCE INTO & APPLIES TO THIS ORDER. THIS DOCUMENT IS AVAILABLE FOR VIEWING AT: <a href="http://www.ecodyne.com">www.ecodyne.com</a> UNDER PROFILE. *****						

TOTAL EXTENDED PRICE

Continued

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APPROVED BY

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ORIGINAL

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L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

PRO033 QA-2

P/O NUMBER	AMEND NUMBER	PAGE
321252801		2
P/O DATE	DESCRIPTION	CURRENCY
06/17/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: PRO INSUL LIMITED  
468 ARVIN AVENUE  
STONE CREEK ON  
L8E 2M1  
CANADA

(905)662-6161

S ECODYNE LIMITED  
H 4475 CORPORATE DRIVE  
I BURLINGTON ON  
P L7L 5T9  
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BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		ECODYNE		PRO INSUL	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE		
	001		Part: WXXX>DOCS Desc: DOCUMENTATION REQUIREMENTS  DOCUMENTATION REQUIRED PER 32125-A-1020.  SEND DOCUMENTS TO: vendordoccontrol@ecodyne.com REFERRING TO THE APPLICABLE PURCHASE ORDER EA 08/15/13 08/15/13						
	.001	1							
	002		Part: W128>SPECS Desc: SPECIAL REQM'TS - INSULATION  UNITS UNITS ON NAMEPLATE & DOCUMENTS MUST MATCH THOSE ON P.O.  INSPECTION ALL COMPONENTS ARE SUBJECT TO INSPECTION BY ECODYNE, ITS CUSTOMER/AGENT. REQ'D INSPECTION NOTICE:7 DAYS NOTIFY: ECODYNE Q.A. DEPT. REFER TO PROJECT QUALITY						

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

APPROVED BY \_\_\_\_\_

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ORIGINAL

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4475 CORPORATE DRIVE  
BURLINGTON , ONTARIO, CANADA  
L7L5T9  
Phone: (905) 332-1404

Email: info@ecodyne.com

PRO033 QA-2

P/O NUMBER	AMEND. NUMBER	PAGE
321252801		3
P/O DATE	DESCRIPTION	CURRENCY
06/17/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: PRO INSUL LIMITED  
468 ARVIN AVENUE  
STONE CREEK ON  
L8E 2M1  
CANADA

(905)662-6161

S ECODYNE LIMITED  
H 4475 CORPORATE DRIVE  
I BURLINGTON ON  
P L7L 5T9  
CANADA

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BUYER		TERMS		ORDER TYPE		INCO. TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		ECODYNE		PRO INSUL	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE	EXTENDED PRICE		
	.001	7	REQUIREMENTS PER DWG: 32125-A-4502 FOR APPLICABLE ITP & INSPECTION POINTS. EA 08/15/13 08/15/13						
	003		Part: W128XXX-XXXX1 Desc: INSULATION-VESSEL Ship to: SKID ASSEMBLY SHOP Application: PRESSURE FILTER  INSULATION TYPE- PER SPEC FOR HEAT CONSERVATION PER THE FOLLOWING JOB SPECIFIC INFORMATION EQUIP.TYPE: AFTER FILTER DIAMETER: 13'-0" HEIGHT: 8'-4" STR INSULATING MATERIAL: PER SPEC INSULATION THICKNESS: PER SPEC INSULATION JACKETING: PER SPEC DWG NO: REF. DWG: 32125-D-2202-01  SPECIFICATION: 32125-A4-2017						

TOTAL EXTENDED PRICE

Continued

ORDERED BY \_\_\_\_\_

APPROVED BY \_\_\_\_\_

Ecodyne Limited Standard Terms & Conditions, Form No. OSTFP-A-1017 REV A, 2010-12-20 is incorporated into and applies to this order.  
This document is available for viewing at: www.ecodyne.com

ORIGINAL



## PURCHASE ORDER

**ECODYNE LIMITED**

4475 CORPORATE DRIVE  
BURLINGTON , ONTARIO, CANADA  
L7L5T9

Phone: (905) 332-1404

Email: info@ecodyne.com

PRO033

QA-2

P/O NUMBER	AMEND NUMBER	PAGE
321252801		4
P/O DATE	DESCRIPTION	CURRENCY
06/17/13	Normal	5 - EFT

PLEASE SHOW ECODYNE'S PURCHASE ORDER NUMBER  
AND CONTRACT NUMBER ON ALL DOCUMENTS

TO: PRO INSUL LIMITED  
468 ARVIN AVENUE  
STONE CREEK ON  
L8E 2M1  
CANADA

S ECODYNE LIMITED  
H 4475 CORPORATE DRIVE  
I BURLINGTON ON  
P L7L 5T9  
CANADA

(905)662-6161

T  
O

BUYER		TERMS		ORDER TYPE		INCO TERMS		SHIP VIA	
S.POYTON		0.0%-0/30		E-MAIL		ECODYNE		PRO INSUL	
S	LINE/REL	QUANTITY	DATE REQUIRED	DATE PROMISED	UOM	UNIT PRICE		EXTENDED PRICE	
	.001	7	EA	08/15/13	08/15/13				
	004		Part:	W128XXX-XXXX					
			Desc:	INSULATION-COVERS					
			INSULATION COVERS:						
			TYPE- MANWAY BLANKETS-REMOVAL						
			PER SPECIFCATION						
			REF. DWG: 32125-D-2202-01						
			.						
			SPECIFICATION: 32125-A4-2017						
			TWO PER VESSEL X 7 = 14 TOTAL						
	.001	14	EA	08/15/13	08/15/13				

TOTAL EXTENDED PRICE

ORDERED BY

APPROVED BY

Ecodyne Limited Standard Terms & Conditions, Form No. OSTFP-A-1017 REV A, 2010-12-20 is incorporated into and applies to this order  
This document is available for viewing at: www.ecodyne.com

ORIGINAL

PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **C56 – Spare Parts, Consumables, Special Tools**



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **Lubrication, Chemicals & Catalyst Schedule**

**Not Applicable**



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Special Tools List

**Not Applicable**

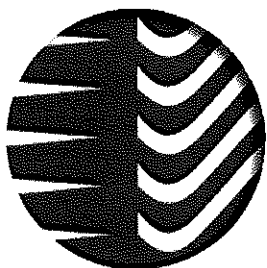


PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **Q56 – Quality Management**

PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Quality Management Program Registration Certificate



# CERTIFICATE OF REGISTRATION

This is to certify that

## **Ecodyne Limited**

4475 Corporate Drive, Burlington, Ontario L7L 5T9 Canada

operates a

## **Quality Management System**

which complies with the requirements of

## **ISO 9001:2008**

for the following scope of registration

**The registration covers the Quality Management System for design, manufacture and servicing of custom water treatment systems including deaerators and cooling towers.**

Certificate No.: CERT-0066196  
File No.: 002404  
Issue Date: October 16, 2012

Original Certification Date: December 23, 2003  
Current Certification Date: December 21, 2012  
Certificate Expiry Date: December 20, 2015

Chris Jouppi  
President,  
QMI-SAI Canada Limited

Guillaume Gignac, ing.f  
Vice President, Corporate Operations, Accreditation & Quality  
QMI-SAI Canada Limited



ISO 9001



Registered by:  
SAI Global Certification Services Pty Ltd, 286 Sussex Street, Sydney NSW 2000 Australia with QMI-SAI Canada Limited, 20 Carlson Court, Suite 200,  
Toronto, Ontario M9W 7K6 Canada (SAI GLOBAL). This registration is subject to the SAI Global Terms and Conditions for Certification. While all due care  
and skill was exercised in carrying out this assessment, SAI Global accepts responsibility only for proven negligence. This certificate remains the property  
of SAI Global and must be returned to them upon request.  
To verify that this certificate is current, please refer to the SAI Global On-Line Certification Register: [www.qmi-saiglobal.com/qmi\\_companies/](http://www.qmi-saiglobal.com/qmi_companies/)



**SAI GLOBAL**

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# CERTIFICATE OF AUTHORIZATION

The named company is authorized by the American Society of Mechanical Engineers (ASME) for the scope of activity shown below in accordance with the applicable rules of the ASME Boiler and Pressure Vessel Code. The use of the certification mark and the authority granted by this Certificate of Authorization are subject to the provisions of the agreement set forth in the application. Any construction stamped with this certification mark shall have been built strictly in accordance with the provisions of the ASME Boiler and Pressure Vessel Code.

**COMPANY:**

**Lesena Steel Ltd.  
1060 Birchmount Road  
Scarborough, Ontario, M1K 1S4  
Canada**

**SCOPE:**

**Manufacture of pressure vessels at the above location only**

**AUTHORIZED: March 28, 2012**

**EXPIRES: April 24, 2015**

**CERTIFICATE NUMBER: 15,066**

A handwritten signature in cursive script.

**Vice President, Conformity Assessment**

A handwritten signature in cursive script.

**Director, Conformity Assessment**



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## M51 – Procedures



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Forming/PWHT Procedure



**Not Applicable**







PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

**WPS/PQR**

 <b>MEG ENERGY</b>	<b>CHRISTINA LAKE REGIONAL PROJECT</b> <b>Phase 3A EPC for Central Plant Facilities</b> <b>SLI Project No. 511036</b>	 <b>SNC-LAVALIN</b>

 <b>SNC-LAVALIN</b>	<input type="checkbox"/> A1 Not suitable to initiate fabrication. modify as noted, resubmit for review
	<input type="checkbox"/> B1 Suitable to initiate fabrication as noted. modify as noted, resubmit for review.
Vendor's drawing review for conformity with specifications and design drawing.	<input type="checkbox"/> C1 Suitable to fabricate to completion as noted. submit final documents including as-builts as required
This review does not relieve the vendor of his responsibility for errors in design and detailing as detailed in his contract.	<input type="checkbox"/> D1 Suitable to fabricate to completion. submit final documents including as-built documents as required
	<input type="checkbox"/> E1 Not suitable as final documents as noted. modify as noted and resubmit.
	<input checked="" type="checkbox"/> F1 Suitable as final documents. no further resubmittal required (unless revised by Vendor).
Vendor: Ecodyne Limited ( Canada ) - 12123      No.: 32125-A-2912      Rev: B      Date Rec'd 2013-02-22	
Doc. Title: M00.05- WELD MAP & WELD PROCEDURES After Filters - Tag:3A-F-208 A/B/C/D/E/F/G	
Client Code:	Project: MEG Phase 3A EPC
Reviewed by: 	Document No
Date: Feb 27, 2013	P-5675-02-0034
	Submittal 02

AFTER FILTERS  
3A-F-208 A to G  
**Weld Procedures**  
**ASME Vessels**



### Contents:

**Weld Procedures:**

WPS 45 rev 2	SAW	P1-to-P1	6 pages
WPS 16 rev 7	SMAW	P1-to-P1	6 pages
WPS 16-2 rev 1	SMAW	P1-to-P1	4 pages
WPS 40 rev 4	FCAW	P1-to-P1	4 pages

Notes:

1. Fabrication using FCAW shall meet the following conditions:
  - a. Shall not be used for open root pass
  - b. Maximum wire diameter for vertical up pass shall not exceed 0.045"
  - c. Inverted power source shall be used
  - d. Shall not be used for category D welds and branch connections less than NPS 6
2. Group F4 filler metal shall not be used for the root pass of groove welds made from one side; in addition, E7018 shall not be used for an open root pass
3. Double-welded groove joints shall have root passes gouged to sound metal on reverse side prior to proceeding with welding on that side.

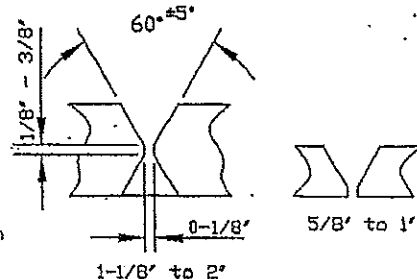
			Title			Customer				
			Weld Procedures			MEG ENERGY CORP.				
			After Filters			CALGARY, ALBERTA				
			3A-F-208 A to G			CHRISTINA REGIONAL PROJ.				
			P.O.# P-5675-02			PHASE 3A- CPF				
						ENG.: SNC- LAVALIN				
					SCALE -			  A Maxxam Water/Berkshire Hathaway Company		
B	FEB 20 2013	Modified notes per client comments	TB	AV	DRN	VEN	JAN 17 2013	DWG. NO.  32125-A-2912		REV.  B
A	JAN 17 2013	FIRST ISSUE	VEN	TB	CHKD	TB	JAN 17 2013			
REV	DATE	REMARKS	BY	CHKD	APPD	AV	JAN 17 2013			

**QW-482 WELDING PROCEDURE SPECIFICATION (WPS)**  
(See QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)

Company Name Lesana Steel By T.P.  
 Welding Procedure Specification No. 45 Date June, 1999 Supporting PQR No.(s) 45  
 Revision No. 2 Date Aug. 9/02 C, R, N. WP-R5855.5  
 Welding Process(es) SAW Type(s) Semi-Automatic  
 (Automatic, Manual, Machine, or Semi-Auto)

**JOINTS (QW-402)**

Joint Design Single Vee, Dbl Vee, Fillet  
 Backing (Yes) YES (No) (No Retainers)  
 Backing Material (Type) Base Metal or Weld Material  
☒ Metal ☐ Nonfusing Metal  
☐ Nonmetallic ☐ Other



Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of the weld groove may be specified.

(At the option of the Mfr., sketches may be attached to illustrate joint design, weld layes and bead sequence, e.g. for notch toughness procedures, for multiple process procedures, ect.)



**\*BASE METALS (QW-403)**

P-No. 1 Group No. 1 OR 2 to P-No. 1 Group No. 1 OR 2  
 OR  
 Specification type and grade SA 516, SA 106, SA 105, SA 285, SA 36, SA 181 - All Grades  
 to Specification type or grade SAME  
 OR  
 Chem. Analysis and Mech. Prop. Per ASME Code Section II.  
 to Chem. Analysis and Mech. Prop. Thickness Range:  
 Base Metal Groove 3/16" to 2" Fillet All  
 Pipe Dia. Range Groove 2.875" O.D. and UP Fillet All  
 Other All Single Passes to be less than 3/8"

**\*FILLER METALS (QW-404)**

Spec. No. (SFA)	<u>SFA 5.17</u>	
AWS No. (Class)	<u>EM12K</u>	
F-No.	<u>6</u>	
A-No.	<u>1</u>	
Size of Filler Metals	<u>3/32", 1/8", 5/32", 3/16"</u>	
Deposited Weld Metal		
Thickness Range:		
Groove	<u>TO 2"</u>	
Fillet	<u>All</u>	
Electrode-Flux (Class)	<u>F7A2-EM12K</u>	
Flux Trade Name	<u>Lincoln 860</u>	<u>Neutral Flux</u>
Consumable Insert	<u>None</u>	
Other	<u>L-61 (LINCOLN)</u>	<u>No Supplemental Filler Metal</u>
		<u>No flux from recrushed slag to be used</u>

QW-482 (Back)

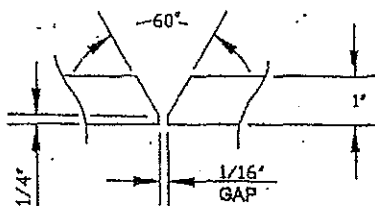
WPS No. 45 Rev. 2

<b>POSITION (QW-405)</b> Position(s) of Groove <u>IG</u> Welding Progression Up <u>Flat</u> Down _____ Position(s) of Fillet <u>IG</u>				<b>POSTWELD HEAT TREATMENT (QW-407)</b> Temperature Range <u>None</u> Time Range <u>N/A</u>																		
<b>PREHEAT (QW-406)</b> Preheat Temp. Min. <u>100°F (3/4" - 1 3/8")</u> <u>150°F (1 1/4" over)</u> Interpass Temp. Max. <u>300 °F</u> Preheat Maintenance <u>Min. Maintained</u> (Continuous or special heating where applicable should be recorded)				<b>GAS (QW-408)</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">Percent Composition</th> </tr> <tr> <th>Gas(es)</th> <th>(Mixture)</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td>Shielding</td> <td><u>None</u></td> <td><u>None</u></td> </tr> <tr> <td>Trailing</td> <td><u>None</u></td> <td><u>None</u></td> </tr> <tr> <td>Backing</td> <td><u>None</u></td> <td><u>None</u></td> </tr> </tbody> </table>				Percent Composition			Gas(es)	(Mixture)	Flow Rate	Shielding	<u>None</u>	<u>None</u>	Trailing	<u>None</u>	<u>None</u>	Backing	<u>None</u>	<u>None</u>
Percent Composition																						
Gas(es)	(Mixture)	Flow Rate																				
Shielding	<u>None</u>	<u>None</u>																				
Trailing	<u>None</u>	<u>None</u>																				
Backing	<u>None</u>	<u>None</u>																				
<b>ELECTRICAL CHARACTERISTICS (QW-409)</b> Current AC or DC <u>DC</u> Polarity <u>Reverse</u> Amps (Range) <u>See Below</u> Volts (Range) <u>See Below</u> (Amps and volts range should be recorded for each electrode size, position, and thickness, ect. This information may be listed in a tabular form similar to that shown below)  Tungsten Electrode Size and Type <u>None</u> (Pure Tungsten, 2% Thoriated, etc.) Mode of Metal Transfer for GMAW <u>None</u> (Spray arc, short circuiting arc, globular) Electrode Wire feed speed range <u>3.75 ft/min</u>																						
<b>TECHNIQUE (QW-410)</b>  String or Weave Bead <u>String</u> Orifice or Gas Cup Size <u>None</u> Initial and Interpass Cleaning (Brushing, Grinding, ect.) <u>Machining, Grinding, Wire brushing</u>  Method of Gauging <u>Air Carbon, ARC</u> Oscillation <u>None</u> Contact Tube to Work Distance <u>None</u> Multiple or Single Pass (per side) <u>Multipass</u> Multiple or Single Electrodes <u>Single</u> Travel Speed (Range) <u>See below</u> <u>12-20 in/min.</u> Peening <u>None &amp; not permitted</u> <u>None</u> Other <u>None</u>																						
Weld Layer(s)	Process	Filler Metal		Current		Volt Range	Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire Addition, Technique, Torch Angle, Ect)														
		Class	Dia.	Type Polar	Amp. Range																	
All	SAW	EM12K	3/32"	DC/REV.	375-450	28-30	12-20	None														
	SAW	EM12K	1/8"	DC/REV.	400-500	28-30	14-20	None														
	SAW	EM12K	5/32"	DC/REV.	500-600	30-31	16-20	None														
	SAW	EM12K	3/16"	DC/REV.	600-700	30-32	14-20	None														

**QW-483 PROCEDURE QUALIFICATION RECORD (PQR)**  
 (SEE QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code)  
 Record Actual Conditions Used to Weld Test Coupon.

Company Name Lasana Steel A Division of Bothwell-Accurate Co. Ltd  
 Address 1080 Birchmount Road, Scarborough, Ontario M1K 1S4  
 Procedure Qualification Record No. 45 Date JUNE 22, 1999  
 WPS No. 45  
 Welding Process(es) SAW  
 Types (Manual, Automatic, Semi-Auto.) AUTOMATIC

**JOINTS (QW-402)**



**Groove Design of Test Coupon**

For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used.

**BASE METAL (QW-403)**

Material Spec. SA-516 to SA-516  
 Type or Grade Gr. 70 to Gr. 70  
 P-No. 1 Gr.-No. 2 to P-No. 1 Gr.-No. 2  
 Thickness of Test Coupon 1"  
 Diameter of Test Coupon NONE  
 Other \_\_\_\_\_  
 Backing BASE METAL or WELD METAL  
 Min. Tensile of Base Metal 70,000 psi

**POSTWELD HEAT TREATMENT (QW-407)**

Temperature NONE  
 Time \_\_\_\_\_  
 Other \_\_\_\_\_

**GAS (QW-408)**

	Percent Composition		
	Gas(es)	(Mixture)	Flow Rate
Shielding	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>
Trailing	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>
Backling	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>

**FILLER METALS (QW-404)**

SFA Specification SFA 5.17  
 AWS Classification E70T2-EM12K  
 Filler Metal F-No. 8  
 Weld Metal Analysis A-No. 1.1  
 Size of Filler Metal 3/32"  
 Other Flux Trademark LINCOLN 880  
 Electrode Trade Name L 81 (Lincoln)  
 Deposited Weld Metal 1"

**Electrical Characteristics (QW-409)**

Current DC  
 Polarity REV.  
 Amps. 450 Volts 30  
 Tungsten Electrode Size NONE  
 Other NONE

**POSITION (QW-405)**

Position of Groove 1G  
 Weld Progression (Uphill, Downhill) FLAT  
 Other NONE

**TECHNIQUE (QW-410)**

Travel Speed 20 in./min.  
 String or Weaver Bead STRING  
 Oscillation NONE  
 Multipass or Single Pass MULTIPASS  
 Single or Multiple Electrodes SINGLE  
 Other NONE

**PREHEAT (QW-406)**

Preheat Temp. 60 °F Min.  
 Interpass Temp. 300 °F  
 Other NONE

QW-483 (Back)

Tensile Test (QW-150)

PQR No. 45

Specimen No.	Width	Thickness	Area	Ultimate Total Load lb	Ultimate Unit Stress psi	Type of Failure & Location
T2	0.751"	0.096"	0.7480	80,490	80,675	DUCTILE, WELD
T5	0.756"	0.096"	0.7530	81,030	81,054	DUCTILE, BASE METAL

Guided-Bend Tests (QW-160)

Type and Figure No.	Result
1. SIDE BEND QW 462.2	ACCEPTABLE
2. SIDE BEND QW 462.2	ACCEPTABLE
3. SIDE BEND QW 462.2	ACCEPTABLE
4. SIDE BEND QW 462.2	ACCEPTABLE

Toughness Tests (QW-170)

Specimen No.	Notch Location	Specimen Size	Test Temp.	Impact Values			Drop Weight Break ( Yes or No)
				Ft.lbs.F	% Shear	Mils	

Comments:

Fillet-Weld Test (QW-180)

Result - Satisfactory: Yes ☒ No ☐ Penetration Into Base: Yes ☒ No ☐


Macro-Results

Other Tests

Type of Test

Deposit Analysis

Other: HARDNESS TEST, WELD, HRB: 78.9, 83.4, 82.8

	Boilers and Pressure Vessels Safety Division
	REGISTERED
	W.P.S. WP-25255.5
	Signed: <i>[Signature]</i> Date: August-12-99

Welder's Name ROBERT SHEODIAL

Class No. 9

Stamp No. 14

Tensile Tests Conducted by: Cambridge Materials Testing Limited

Laboratory Test No. 227201-1999

We certify that the statements in this record are correct and that the test welds were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Code.

Manufacturer: LESANA STEEL

Date: JUNE 25, 1999

By: Tom Patrzalek

(Detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by the Code.)





# Cambridge

materials testing limited

1177 Franklin Boulevard,  
Cambridge, Ontario N1R 7W4  
Tel: (519) 621-6600 Fax: (519) 621-6082  
www.cambridgematerials.com  
ISO Accredited (1989)

Report for: Lesena Steel  
A Div. of Bothwell-Accurate Co. Ltd.  
1060 Birchmount Road  
SCARBOROUGH, Ontario  
M1K 1S4  
Phone: 1-416-751-1834  
Fax: 1-416-751-5158

Laboratory No. 227203-1999

Report Date: June 25, 1999  
Received Date: June 23, 1999

Customer P.O.#: S3484

Attention: Tom Patrzalek

Specimen: 1" Thick Weld Plate, WP-45, SA-516 Grade 70

## HARDNESS TEST REPORT

Hardness Result	Approximate Conversion	Hardness Location
78.9 HRB	147 HB	Weld
83.4 HRB	160 HB	Weld
82.6 HRB	158 HB	Weld
93.5 HRB	202 HB	HAZ
92.4 HRB	197 HB	HAZ
94.5 HRB	208 HB	HAZ
82.4 HRB	157 HB	Base
82.3 HRB	157 HB	Base
84.2 HRB	163 HB	Base

Testing performed according to ASTM E18-97a & ASTM E140-97.

Page 1 of 1

This report is subject to the following terms and conditions: 1. This report relates only to the specimen provided and there is no representation or warranty that it applies to any other substances or materials or the bulk of which the specimen is a part. 2. The content of this report is for the information of the customer identified above only and it shall not be reprinted, published or disclosed to any other party except in full. Prior written consent from Cambridge Materials Testing Limited is required. 3. The name Cambridge Materials Testing Limited shall not be used in connection with the specimen reported on or any substance or materials similar to that specimen without the prior written consent of Cambridge Materials Testing Limited. 4. Neither Cambridge Materials Testing Limited nor any of its employees shall be responsible or held liable for any claims, loss or damages arising in consequence of reliance on this report or any default, error or omission in its preparation or the tests conducted. 5. Specimens retained 3 months from date of test and then disposed of unless instructed otherwise.

Cambridge Materials Testing Limited

For

*[Signature]*

QUALITY ASSURANCE

Per

*[Signature]*

TECHNICIAN



# Cambridge

materials testing limited

RECEIVED JUL 6 - 1999 1177 Franklin Boulevard,  
Cambridge, Ontario N1R 7W4  
Tel: (519) 621-6600 Fax: (519) 621-6082  
www.cambridgematerials.com

ISO Accredited (1989)

Report For: Lesena Steel  
1060 Birchmount Road  
SCARBOROUGH, Ontario  
M1K 1S4  
Phone: 1-416-751-1834  
Fax: 1-416-751-5158

Laboratory #: 227204-99  
Report Date: July 1, 1999  
Received Date: June 23, 1999  
Customer P.O. #: S3484

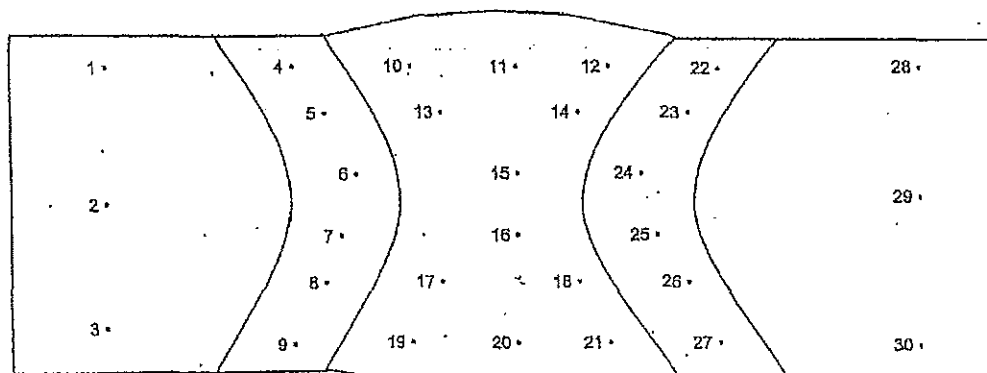
Attention: Tom Patrzalek

Specimen: 1" Thick Weld Plate, WP-45, SA-516 Grade 70

## VICKERS HARDNESS TRAVERSE TEST REPORT

A random section of the welded specimen was taken and prepared according to ASTM E3-95. The Vickers hardness readings were performed according to ASTM E92-82 (1997) using a 10 kg load. Indentations were measured at 100 X magnification. Hardness conversions are approximate and performed according to ASTM E140-97.

### HARDNESS LOCATIONS FOR DOUBLE BEVEL WELD



### RESULTS: Vickers Hardness (HV10) & Brinell Hardness (HB)\*

1) 154	7) 190	13) 163	19) 183	25) 186
2) 152	8) 199	14) 160	20) 189	26) 193
3) 152	9) 213	15) 174	21) 186	27) 192
4) 217	10) 174	16) 163	22) 216	28) 159
5) 197	11) 152	17) 179	23) 188	29) 167
6) 192	12) 176	18) 180	24) 193	30) 162

\*Note: In this hardness range, HV10 and HB are identical.

#### QTP 8 DB

This report is subject to the following terms and conditions: 1. This report relates only to the specimen provided and there is no representation or warranty that it applies to similar substances or materials or the bulk of which the specimen is a part. 2. The content of this report is for the information of the customer identified above only and it shall not be reprinted, published or disclosed to any other party except in full. Prior written consent from Cambridge Materials Testing Limited is required. 3. The name Cambridge Materials Testing Limited shall not be used in connection with the specimen reported on or any substance or materials similar to that specimen without the prior written consent of Cambridge Materials Testing Limited. 4. Neither Cambridge Materials Testing Limited nor any of its employees shall be responsible or held liable for any claims, loss or damages arising in consequence of reliance on this report or any default, error or omission in its preparation or the tests conducted. 5. Specimens retained 3 months from date of test and then disposed of unless instructed otherwise.

Page 1 of 1

Cambridge Materials Testing Limited

Per

Per

QUALITY ASSURANCE

TECHNICIAN

**QW-482 WELDING PROCEDURE SPECIFICATION (WPS)**  
 (See QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code)

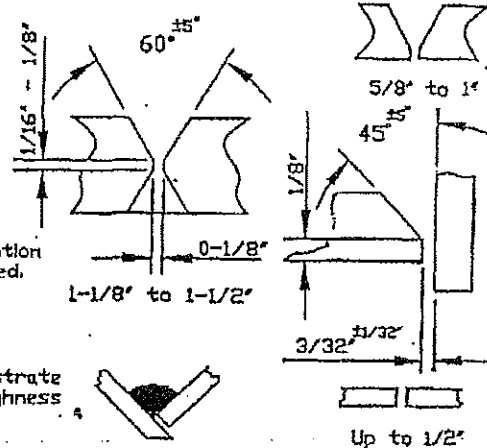
Company Name Lesena Steel Ltd By T.P.  
 Welding Procedure Specification No. 16 Date Oct 11/79 Supporting PQR No.(s) 18-1  
 Revision No. 7 Date Jun 9/03 C. R. N. D 870.6  
 Welding Process(es) SMAW Type(s) MANUAL  
 (Automatic, Manual, Machine, or Semi-Auto)

**JOINTS (QW-402)**

Joint Design Groove Welded from both sides  
 Backing (Yes) YES (No) (No Retainers)  
 Backing Material (Type) Base & Weld Material  
☒ Metal ☐ Nonfusing Metal  
☐ Nonmetallic ☐ Other

Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of the weld groove may be specified.

(At the option of the Mfr., sketches may be attached to illustrate joint design, weld layers and bead sequence, e.g. for notch toughness procedures, for multiple process procedures, etc.)

**\*BASE METALS (QW-403)**

P-No. 1 Group No. 1 & 2 to P-No. 1 Group No. 1 & 2  
 OR  
 Specification type and grade SA 516, SA 106, SA 105, SA 285, SA 38, SA 181 - All Grades  
 to Specification type or grade SAME  
 OR  
 Chem. Analysis and Mech. Prop. Per ASME Code Section II.  
 to Chem. Analysis and Mech. Prop.  
 Thickness Range:  
 Base Metal Groove 3/16" to 1-1/2" Fillet All  
 Pipe Dia. Range Groove 2.875" O.D. and UP Fillet All  
 Other

**\*FILLER METALS (QW-404)**

Spec. No. (SFA)	<u>SFA 5.1</u>
AWS No. (Class)	<u>E7018</u>
F-No.	<u>4</u>
A-No.	<u>1</u>
Size of Filler Metals	<u>3/32", 1/8", 5/32"</u>
Deposited Weld Metal	
Thickness Range:	
Groove	<u>TO 1-1/2"</u>
Fillet	<u>All</u>
Electrode-Flux (Class)	<u>N/A</u>
Flux Trade Name	<u>N/A</u>
Consumable Insert	<u>None</u>
Other	<u>No Single Pass shall 3/8" (9.5mm)</u>

QW-482 (Back)

WPS No. 16-1 Rev. 7

<b>POSITION (QW-405)</b> Position(s) of Groove <u>Flat, horiz, vertical</u> Welding Progression: Up <u>Up</u> Down <u>Down</u> Position(s) of Fillet <u>Flat, horiz, vertical</u>		<b>POSTWELD HEAT TREATMENT (QW-407)</b> Temperature Range <u>None</u> Time Range <u>N/A</u>																	
<b>PREHEAT (QW-406)</b> Preheat Temp. Min. <u>70 °F Min. - 1-1/4" or less</u> <u>200 °F Min. over 1-1/4"</u> Interpass Temp. Max. <u>300 °F MAX</u> Preheat Maintenance <u>Continuous</u> (Continuous or special heating where applicable should be recorded)		<b>GAS (QW-408)</b> <table border="1"> <thead> <tr> <th></th> <th>Gas(es)</th> <th>(Mixture)</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td>Shielding</td> <td><u>None</u></td> <td><u>None</u></td> <td><u>None</u></td> </tr> <tr> <td>Trailing</td> <td><u>None</u></td> <td><u>None</u></td> <td><u>None</u></td> </tr> <tr> <td>Backing</td> <td><u>None</u></td> <td><u>None</u></td> <td><u>None</u></td> </tr> </tbody> </table>			Gas(es)	(Mixture)	Flow Rate	Shielding	<u>None</u>	<u>None</u>	<u>None</u>	Trailing	<u>None</u>	<u>None</u>	<u>None</u>	Backing	<u>None</u>	<u>None</u>	<u>None</u>
	Gas(es)	(Mixture)	Flow Rate																
Shielding	<u>None</u>	<u>None</u>	<u>None</u>																
Trailing	<u>None</u>	<u>None</u>	<u>None</u>																
Backing	<u>None</u>	<u>None</u>	<u>None</u>																

**ELECTRICAL CHARACTERISTICS (QW-409)**

Current AC or DC DC Polarity Reverse  
 Amps (Range) See Below Volts (Range) See Below

(Amps and volts range should be recorded for each electrode size, position, and thickness, ect. This information may be listed in a tabular form similar to that shown below)

Tungsten Electrode Size and Type None (Pure Tungsten, 2% Thoriated, etc.)  
 Mode of Metal Transfer for GMAW None (Spray arc, short circuiting arc, globular)  
 Electrode Wire Feed speed range None

**TECHNIQUE (QW-410)**

String or Weave Bead String  
 Orifice or Gas Cup Size None  
 Initial and Interpass Cleaning (Brushing, Grinding, ect.) Remove all foreign material from 1/2" on either side of weld prep., then wire brushing or chipping  
 Method of Gauging Are air and grinding  
 Oscillation None  
 Contact Tube to Work Distance None  
 Multiple or Single Pass (per side) Multipass  
 Multiple or Single Electrodes Single  
 Travel Speed (Range) See below  
 Peening None & not permitted  
 Other No non-metallic backing permitted

Weld Layer(s)	Process	Filler Metal		Current		Volt Range	Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire Addition, Technique, Torch Angle, Ect)
		Class	Dia.	Type Polar	Amp. Range			
Root	SMAW	E7018	3/32" or 1/8"	DC/REV.	125-140	21-24	6	None
Balance	SMAW	E7018	3/16"	DC/REV.	215-260	24-28	5	None
Cap	SMAW	E7018	5/32"	DC/REV.	155-180	22-28	6	None



Ministry of  
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Technical  
Standards  
Division

Pressure  
Vessels  
Branch

400 University Avenue  
Toronto, Ontario  
M7A 2J8  
(416) 965-4121

REV: 1 SEPTEMBER 1997 BY JNB

## PROCEDURE QUALIFICATION RECORD

PQR-16-1-79

Date Oct.23/79

Lesena Steel Ltd.

1060 Birchmount Road, Scarborough, Ont.

(Manufacturer)

(Address)

Weld Proc. Spec. No.

16

Weld Process(es)

SHAW

Types

Manual

(Manual, Automated)

<p>JOINTS (QW-402)</p> <p>Groove Design Used</p>	<p>BASE METALS (QW-403)</p> <p>Material Spec. <u>SA-516</u></p> <p>Type or Grade <u>70</u></p> <p>P No. <u>1 Gr.2</u> to P No. <u>1 Gr.2</u></p> <p>Thickness <u>3/4"</u></p> <p>Diameter <u>1</u> MAX. THK. ANY PASS: <u>1/2"</u></p> <p>Other</p>
<p>FILLER METALS (QW-404)</p> <p>Weld Metal Analysis A No. <u>AT</u></p> <p>Size of Electrode <u>1/8" - 3/16"</u></p> <p>Filler Metal P No. <u>F4</u></p> <p>BFA Specification <u>SFA 5.1</u></p> <p>AWS Classification <u>E7018</u></p> <p>Other <u>1</u> THK. OF DEPOSITED WELD <u>3/4"</u></p>	<p>POSITION (QW-405)</p> <p>Position of Groove <u>1G</u></p> <p>Weld Progression <u>(Uphill, Downhill)</u></p> <p>Other</p> <p>PREHEAT (QW-406) <u>60F</u> <u>1</u></p> <p>Preheat Temp <u>200°F Min. over 1/2"</u></p> <p>Interpass Temp <u>350°F Max</u></p> <p>Other</p>
<p>POSTWELD HEAT TREATMENT (QW-407)</p> <p>Temperature <u>None</u></p> <p>Time</p> <p>Other</p>	<p>GAS (QW-408)</p> <p>Type of Gas or Gases <u>None</u></p> <p>Composition of Gas Mixture</p> <p>Other</p>
<p>ELECTRICAL CHARACTERISTICS (QW-409)</p> <p>Current <u>DC RP</u></p> <p>Polarity <u>Reverse</u></p> <p>Amps <u>Min. 125 Max. 260</u> Volts <u>Min. 27 Max. 28</u></p> <p>Travel Speed <u>See H.P.S.</u></p>	<p>TECHNIQUE (QW-410)</p> <p>String or Wave Slew <u>String</u></p> <p>Oscillation</p> <p>Multipass or Single Pass <u>Multipass</u> (per side)</p>

## TENSILE TEST (QW-150)

SPECIMEN NO.	WIDTH	THICKNESS	AREA	ULTIMATE TOTAL LOAD LB.	ULTIMATE UNIT STRESS PSI	CHARACTER OF FAILURE & LOCATION
16A	0.989	0.708	0.7002	55,400	79,100	Weld
16B	1.009	0.701	0.7073	56,000	79,200	Weld

## GUIDED BEND TESTS (QW-160)

TYPE AND FIGURE NO.	RESULT	TYPE AND FIGURE NO.	RESULT
1	Side Bend Satisfactory	3	Side Bend Satisfactory
2	" " "	4	" " "

## TOUGHNESS TESTS (QW-170)

SPECIMEN NO.	NOTCH LOCATION	NOTCH TYPE	TEST TEMP.	IMPACT VALUES	LATERAL EXP.		DROPWEIGHT	
					% SHEAR	MILS	BREAK	NO BREAK

Type of Test \_\_\_\_\_

Deposit Analysis \_\_\_\_\_

Other \_\_\_\_\_

Weld Test Witnessed By H. Satre  
Authorized InspectorTensile Test Made By J. T. Donald Cons. Ltd.Laboratory Test No. 179-5363

BOILERS AND PRESSURE VESSELS BRANCH

**ACCEPTED**W.P. No. D.870-5Date 30.12.79Examiner [Signature]MINISTRY OF CONSUMER & COMMERCIAL RELATIONS  
PROVINCE OF ONTARIO

We certify that the Statements in this record are correct and the test welds were prepared, welded and tested in accordance with ASME Boiler and Pressure Vessel Code Section IX.

Signed Lesena Steel Ltd.,  
(Manufacturer)By Peter Smithurst



Warnock Hersey Professional Services Ltd.

3210 AMERICAN DRIVE, MISSISSAUGA L4V 1B3  
TELEPHONE (416) 678-7820 TELEX 06-968801

RECEIVED

JUL 6 1981

REPORT NO. 281-184-1

FILE NO.

CLIENT No P.O. W87

DATE June 29, 1981

DESCRIPTION Testing of Weld Procedure No. Ans 16  
PROJECT  
SUPPLIED BY

CLIENT Lesena Steel Ltd., 1060 Birchmount Road, Scarborough, Ontario, M1K 1S4.  
Attention: Mr. P. Smithwick

This report covers Brinell Hardness Tests performed on weld coupons supplied by our client. The results are as follows: -

Welding Procedure No. 16  
E7018 Electrode, Material SA516 Grade 70

Hardness of Weld 178 B.H.N.

Hardness of H.A.Z. 160 B.H.N.

Hardness testing was done according to A.S.T.M. E 10 using a 3000 Kg load applied through a 10 mm ball for a duration of 10 to 15 seconds.

Respectfully submitted,

Warnock Hersey Professional Services Ltd.

J. W. Prince  
Metallurgist  
Physical Testing Services

JWP/svs



# Cambridge

materials testing limited

1177 Franklin Boulevard,  
Cambridge, Ontario N1R 7W4  
Tel: (519) 621-6600 Fax: (519) 621-6082  
www.cambridgematerials.com

ISO Accredited (1989)

Report For: Lesena Steel  
1060 Birchmount Road  
SCARBOROUGH, Ontario  
M1K 1S4  
Phone: 1-416-751-1834  
Fax: 1-416-751-5158

Laboratory #: 227870-99  
Report Date: July 5, 1999  
Received Date: June 30, 1999

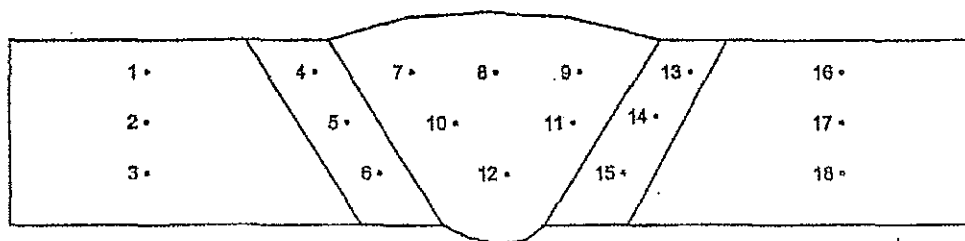
Attention: Tom Patrzalek

Specimen: WP 16, As Welded, SA516-70 Material, W.O. 99-34

## VICKERS HARDNESS TRAVERSE TEST REPORT

A random section of the welded specimen was taken and prepared according to ASTM E3-95. The Vickers hardness readings were performed according to ASTM E92-82(1997) using a 10 kg load. Indentations were measured at 100X magnification.

Hardness conversions are approximate and performed according to ASTM E140-97.



### RESULTS: Vickers Hardness (HV10) & Brinell Hardness (HB)\*

1) 193	7) 185	13) 210
2) 220	8) 171	14) 219
3) 235	9) 180	15) 215
4) 215	10) 187	16) 185
5) 228	11) 185	17) 171
6) 272	12) 207	18) 192

\*Note: In this hardness range, HV10 and HB are identical.

#### QTP8 SB

This report is subject to the following terms and conditions: 1. This report relates only to the specimen provided and there is no representation or warranty that it applies to similar substances or materials or the bulk of which the specimen is a part. 2. The content of this report is for the information of the customer identified above only and it shall not be reprinted, published or disclosed to any other party except in full. Prior written consent from Cambridge Materials Testing Limited is required. 3. The name Cambridge Materials Testing Limited shall not be used in connection with the specimen reported on or any substance or materials similar to that specimen without the prior written consent of Cambridge Materials Testing Limited. 4. Neither Cambridge Materials Testing Limited nor any of its employees shall be responsible or held liable for any claims, loss or damages arising in consequence of reliance on this report or any default, error or omission in its preparation or the tests conducted. 5. Specimens retained 3 months from date of test and then disposed of unless instructed otherwise.

Page 1 of 1

Cambridge Materials Testing Limited

Per Greg Hargreaves QUALITY ASSURANCE  
Per Pat Smith TECHNICIAN



Company Name LESENA STEEL LTD. By: TOM PATRZALEK  
Welding Procedure Specification No. 16-2 Date                      Supporting PQR No.(s) 16-2  
Revision No. 1 Date JAN. 20, 2012 C.R.N. WP-14072.5  
Welding Process(es) SAW Type(s) MANUAL  
(Automatic, Manual, Machine, or Semi-Auto)

Technical drawing of a dovetail joint. The drawing shows a cross-section of the joint with a 60° angle. The width of the joint is 1 1/4 inches. The height of the joint is 1/2 inch. The gap between the joint and the wood is 0 1/16 inch.

## Other \_\_\_\_\_

Spec. No. (SFA)	SFA 5.1
AWS No. (Class)	E6010 & E7018-1
F-No.	F3 & F4
A-No.	1
Size of Filler Metals	1/8"
Weld Metal Thickness Range:	
Groove	E3 1/4" & E4 1"
Fillet	ALL
Electrode-Flux (Class)	N/A
Flux Trade Name	N/A
Consumable Insert	NONE
Other	1) NO SINGLE PASS OVER 3/8" (9.5mm)

**QW-482 (Back)**

WPS No. 18-2 Rev. 0

<b>POSITIONS (QW-405)</b> Position(s) of Groove: <u>FLAT, HORIZONTAL</u> Welding Progression: Up <u>                    </u> Down <u>                    </u> Position(s) of Fillet: <u>FLAT, HORIZONTAL</u>	<b>POSTWELD HEAT TREATMENT (QW-407)</b> Temperature Range <u>NONE</u> Time Range <u>N/A</u>																			
<b>PREHEAT (QW-406)</b> Preheat Temp. <u>50°F MIN.</u> Interpass Temp. <u>315°F MAX</u> Preheat Maintenance <u>CONTINUOUS</u> (Continuous or special heating, where applicable, should be recorded)	<b>GAS (QW-408)</b> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">Percent Composition</th> </tr> <tr> <th>Gas(es)</th> <th>(Mixture)</th> <th>Flow Rate</th> </tr> </thead> <tbody> <tr> <td>Shielding</td> <td><u>NONE</u></td> <td><u>NONE</u></td> <td><u>NONE</u></td> </tr> <tr> <td>Trailing</td> <td><u>NONE</u></td> <td><u>NONE</u></td> <td><u>NONE</u></td> </tr> <tr> <td>Backing</td> <td><u>NONE</u></td> <td><u>NONE</u></td> <td><u>NONE</u></td> </tr> </tbody> </table>		Percent Composition			Gas(es)	(Mixture)	Flow Rate	Shielding	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>	Trailing	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>	Backing	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>
	Percent Composition																			
	Gas(es)	(Mixture)	Flow Rate																	
Shielding	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>																	
Trailing	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>																	
Backing	<u>NONE</u>	<u>NONE</u>	<u>NONE</u>																	

**ELECTRICAL CHARACTERISTICS (QW-409)**

Current AC or DC DC Polarity REVERSE  
 Amps (Range) SEE BELOW Volts (Range) SEE BELOW  
 (Amps and volts range should be recorded for each electrode size, position, and thickness, etc. This information may be listed in a tabular form similar to that shown below.)

Tungsten Electrode Size and type NONE  
 (Pure Tungsten, 2% Thoriated, etc.)

Mode of Metal Transfer for GMAW NONE  
 (Spray arc, short circuiting arc, etc.)

Electrode Wire feed speed range NONE

**TECHNIQUE (QW-410)**

String or Weave Bead	<u>STRING</u>
Orifice or Gas Cup Size	<u>NONE</u>
Initial and Interpass Cleaning (Brush, Grinding, etc.)	<u>REMOVE ALL FOREIGN MATERIAL FROM 1/2" ON EITHER SIDE OF WELD, THEN WIRE BRUSHING AND CHIPPING.</u>
Method of Back Gouging (if required)	<u>ABC AIR AND GRINDING</u>
Oscillation	<u>NONE</u>
Contact Tube to Work Distance	<u>NONE</u>
Multiple or Single Pass (per side)	<u>MULTIPASS</u>
Multiple or Single Electrodes	<u>SINGLE</u>
Travel Speed (Range)	<u>SEE BELOW</u>
Peening	<u>NONE &amp; NOT PERMITTED</u>
Other	<u>NO NON-METALLIC BACKING PERMITTED</u>

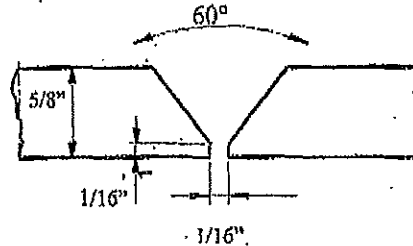
Weld Layer(s)	Process	Filler Metal		Current		Volt Range	Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire Addition, Technique, Torch Angle, etc.)
		Class	Diameter	Type Polar.	Amp Range			
ROOT	SMAW	E6010	1/8"	DC/REV.	80-125	28	8	NONE
BALANCE	SMAW	E7018-1	5/32"	DC/REV.	165-180	22-26	6	NONE

**QW-483 SUGGESTED FORMAT FOR PROCEDURE QUALIFICATION RECORDS (PQR)**  
 (See QW-200.2, Section IX, ASME Boiler and Pressure Vessel Code)

Record Actual Conditions Used to Weld Test Coupon:

Company Name LESENA STEEL LTD. 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4  
 Procedure Qualification Record No. 16-2 Date December 21, 2011  
 WPS No. 16-2  
 Welding Process(es) SMAW  
 Type(s) (Manual, Automatic, Semi-Auto.) MANUAL

**JOINTS (QW-402)**



Groove Design of Test Coupon

(For combination qualifications, the deposited weld metal thickness shall be recorded for each filler metal or process used.)

**BASE METALS (QW-403)**

Material Spec. SA-516 to SA-516  
 Type or Grade Gr. 70 to Gr. 70  
 P-No. 1 Gr.-No. 2 to P-No. 1 Gr.-No. 2  
 Thickness of Test Coupon 5/8"  
 Diameter of Test Coupon None  
 Other \_\_\_\_\_  
 Backing: BASE METAL or WELD METAL  
 Min. Tensile of Base Metal: 70,000 psi

**POSTWELD HEAT TREATMENT (QW-407)**

Temperature NONE  
 Time \_\_\_\_\_  
 Other \_\_\_\_\_

**GAS (QW-408)**

	Percent Composition		
	Gas(es)	(Mixture)	Flow Rate
Shielding	<u>None</u>	<u>None</u>	<u>None</u>
Trailing	<u>None</u>	<u>None</u>	<u>None</u>
Backing	<u>None</u>	<u>None</u>	<u>None</u>

**FILLER METALS (QW-404)**

SFA Specification	<u>SFA-5.1</u>
AWS Classification	<u>E6010, E7018-1</u>
Filler Metal F-No.	<u>F3, F4</u>
Weld Metal Analysis A-No.	<u>1</u>
Size of Filler Metals	<u>1/8"</u>
Other	
Weld Metal Thickness	<u>F3 1/8"</u>
	<u>F4 1/2"</u>

**ELECTRICAL CHARACTERISTICS (QW-409)**

Current DC RP  
 Polarity Reverse  
 Amps 80, 120 Volts 26, 26  
 Tungsten Electrode Size \_\_\_\_\_  
 Other \_\_\_\_\_

**POSITIONS (QW-405)**

Position of Groove: 2G  
 Welding Progression (Uphill, Downhill) N/A  
 Other \_\_\_\_\_

**TECHNIQUE (QW-410)**

Travel Speed 6 in/min  
 String or Weave Bead String  
 Oscillation None  
 Multipass or Single Pass (per side) Multipass  
 Single or Multiple Electrodes Single  
 Other \_\_\_\_\_

**PREHEAT (QW-406)**

Preheat Temp. 50°F Min.  
 Interpass Temp. 315°F Max.  
 Preheat Maintenance Continuous  
 Other None

First Pass - E6010

Second, Third, etc. Pass - E7018-1

### Tensile Test (QW-150)

Specimen No.	Width (in)	Thickness (in)	Area (in <sup>2</sup> )	Ultimate Total Load, lb.	Ultimate Unit Stress, psi	Type of Failure & Location
T2	0.612	0.754	0.4614	33,770	73,000	Ductile in Base Metal
T6	0.633	0.755	0.4779	34,260	71,500	Ductile in Base Metal

Type and Figure No.	Result
1. Side Bend QW 462.2	Side Bend Satisfactory
2. Side Bend QW 462.2	Side Bend Satisfactory
3. Side Bend QW 462.2	Side Bend Satisfactory
4. Side Bend QW 462.2	Side Bend Satisfactory

[illegible]

Result - Satisfactory: Yes \_\_\_\_\_ No \_\_\_\_\_ Penetration into Parent Metal: Yes \_\_\_\_\_ No \_\_\_\_\_  
Macro - Results N/A W.P.S.: 100-140-725

Type of Test None  
Deposit Analysis None  
Other Vickers Hardness Traverse Test

(Detail of record of tests are illustrative only and may be modified to conform to the type and number of tests required by code)

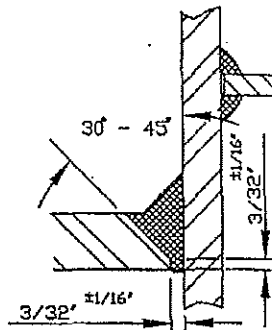
**QW-482 WELDING PROCEDURE SPECIFICATION (WPS)**  
(See QW-200.1, Section IX, ASME Boiler and Pressure Vessel Code )

Company Name Lesena Steel Ltd. By T.P.  
Welding Procedure Specification No. 40 Date May 6/82 Supporting PQR No.(s) 40  
Revision No. 4 Date August, 8/02 C. R. N. G 758.5  
Welding Process(es) FCAW Type(s) Semi-Automatic  
(Automatic, Manual, Machine, or Semi-Auto )

**JOINTS (QW-402)**

Joint Design Groove, Fillet  
Backing (Yes) — (No) No (No Retainers)  
Backing Material (Type) Base material & weld material  
☒ Metal ☐ Nonfusing Metal  
☐ Nonmetallic ☐ Other

Sketches, Production Drawings, Weld Symbols or Written Description should show the general arrangement of the parts to be welded. Where applicable, the root spacing and the details of the weld groove may be specified.



(At the option of the Mfr., sketches may be attached to illustrate joint design, weld layes and bead sequence, e.g. for notch toughness procedures, for multiple process procedures, ect.)

**\*BASE METALS (QW-403)**

P-No. 1 Group No. 1 & 2 to P-No. 1 Group No. 1 & 2  
OR  
Specification type and grade SA 516-70, SA 36  
to Specification type or grade SA 516-70, SA 36  
OR  
Chem. Analysis and Mech. Prop. \_\_\_\_\_  
to Chem. Analysis and Mech. Prop. \_\_\_\_\_  
Thickness Range:  
Base Metal: Groove 3/16" to 1-1/2" Fillet All  
Deposited Weld Metal 3/16" to 1-1/2"  
Pipe Dia. Range Groove 2-7/8" Min Fillet All  
Other \_\_\_\_\_

**\*FILLER METALS (QW-404)**

F-No.	<u>6</u>	<u>Wire form; Flux Cored</u>
A-No.	<u>1</u>	<u>Min=1.60 Max; SI=1.00 Max</u>
Spec. No. (SFA)	<u>5.20</u>	
AWS No. (Class)	<u>E70T-1</u>	
Size of Filler Metals	<u>0.45", 0.62" 0.045", 0.062"</u>	
Deposited Weld Metal		
Thickness Range:		
Groove	<u>Max. 1.50"</u>	
Fillet	<u>All</u>	
Electrode-Flux (Class)	<u>None</u>	
Flux Trade Name	<u>None</u>	
Consumable Insert	<u>None</u>	
Other	<u>1). No single pass over 1/2"</u>	<u>2). No supplemental filler metal.</u>

QW-482 (Back)

WPS No. 40 Rev. 4

<b>POSITION (QW-405)</b> Position(s) of Groove <u>Flat</u> Welding Progression: Up _____ Down _____ Position(s) of Fillet _____				<b>POSTWELD HEAT TREATMENT (QW-407)</b> Temperature Range <u>None</u> Time Range <u>None</u>				
<b>PREHEAT (QW-406)</b> Preheat Temp. Min. <u>50° F</u> Interpass Temp. Max. <u>350° F</u> Preheat Maintenance <u>Continuous</u> (Continuous or special heating where applicable should be recorded)				<b>GAS (QW-408)</b> Shielding Gas(es) <u>CO2</u> Percent Composition (Mixture) <u>100%</u> Flow Rate <u>30 CFH</u> Gas Backing <u>None</u> Trailing Shielding Gas Composition <u>N/A</u>				
<b>ELECTRICAL CHARACTERISTICS (QW-409)</b> Current AC or DC <u>DC</u> Polarity <u>Reverse</u> Amps (Range) <u>See below</u> Volts (Range) <u>See below</u> (Amps and volts range should be recorded for each electrode size, position, and thickness, ect. This information may be listed in a tabular form similar to that shown below)  Tungsten Electrode Size and Type <u>None</u> <small>(Pure Tungsten, 2% Thoriated, etc.)</small> Mode of Metal Transfer for FCAW <u>Spray</u> <small>(Spray arc, short circuiting arc, globular)</small> Electrode Wire feed speed range <u>170 to 220</u>								
<b>TECHNIQUE (QW-410)</b> String or Weave Bead <u>String</u> Orifice or Gas Cup Size _____ Initial and Interpass Cleaning (Brushing, Grinding, ect.) <u>Remove all foreign material from 1/2" on either side of weld, then wire brushing and chipping.</u> Method of Gouging <u>Arc air</u> Oscillation <u>None</u> Contact Tube to Work Distance <u>None</u> Multiple or Single Pass (per side) <u>Multipass</u> Multiple or Single Electrodes <u>Single</u> Travel Speed (Range) <u>See below</u> Peening <u>None</u> Other <u>Nozzle size 5/8"</u> <u>Tube/Work Dist. 1"</u>								
Weld Layer(s)	Process	Filler Metal		Current		Volt Range	Travel Speed Range	Other (e.g., Remarks, Comments, Hot Wire Addition, Technique, Torch Angle, Ect)
		Class	Dia.	Type Polar	Amp. Range			
Root	FCAW	E70T-1	1/16"	Rev.	250-260	27-28	14	
Balance	FCAW	E70T-1	1/16"	Rev.	270-290	28-29	12	



Ontario

Ministry of  
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400 University Avenue  
Toronto, Ontario  
M7A 2J9  
(416) 965-4121

REV. 1 MAR 12 1998 BY *evs*REV. 2 MAR 19 1998 BY *JB*

## PROCEDURE QUALIFICATION RECORD

PQR -40

Date May 6, 1982

Lesena Steel Ltd.

1060 Birchmount Road, Scarborough, Ont.

(Manufacturer)

(Address)

Weld Proc. Spec. No. 40

Weld Process(es)

FCAW

Types Semi-automatic  
(Manual, Automatic)

<p>JOINTS (QW-402)</p> <p>Groove Design Used</p>	<p>BASE METALS (QW-403)</p> <p>Material Spec. <u>SA 516</u></p> <p>Type or Grade <u>70</u></p> <p>P No. <u>1</u> to P No. <u>1</u></p> <p>Thickness <u>3/4"</u></p> <p>Diameter</p> <p>Other <u>None</u></p>
<p>FILLER METALS (QW-404)</p> <p>Weld Metal Analysis A No. <u>1</u></p> <p>Size of Electrode <u>1/16"</u></p> <p>Filler Metal F No. <u>6</u></p> <p>SFA Specification <u>SFA 5.20</u></p> <p>AWS Classification <u>E 70-T1</u></p> <p>Other <u>DEPOSITED WELD METAL THICKNESS 3/4"</u></p> <p><u>NO SINGLE PASS SHALL EXCEED 1/2"</u></p> <p><u>NO SUPPLEMENTAL FILLER METAL.</u></p>	<p>POSITION (QW-405)</p> <p>Position of Groove <u>1G</u></p> <p>Weld Progression</p> <p>(Uphill, Downhill)</p> <p>Other <u>None</u></p> <p>PREHEAT (QW-406)</p> <p>Preheat Temp. <u>50°F</u></p> <p>Interpass Temp. <u>350°F Max.</u></p> <p>Other <u>None</u></p>
<p>POSTWELD HEAT TREATMENT (QW-407)</p> <p>Temperature <u>None</u></p> <p>Time <u>None</u></p> <p>Other <u>None</u></p>	<p>GAS (QW-408)</p> <p>Type of Gas or Gases <u>CO<sub>2</sub></u></p> <p>Composition of Gas Mixture <u>100%</u></p> <p>Other <u>30 CFH</u></p>
<p>ELECTRICAL CHARACTERISTICS (QW-409)</p> <p>Current <u>DC</u></p> <p>Polarity <u>Reverse</u></p> <p>Amps. <u>255</u> <u>280</u> Volts <u>28</u> <u>29</u></p> <p>Travel Speed <u>See WPS</u></p> <p>Other <u>TRANSFER MODE IS SPRAY</u></p>	<p>TECHNIQUE (QW-410)</p> <p>String or Weave Bead <u>String</u></p> <p>Oscillation <u>None</u></p> <p>Multipass or Single Pass <u>Multipass</u></p> <p>Single or Multiple Electrodes <u>Single</u></p>

SPECIMEN NO.	WIDTH	THICKNESS	AREA	ULTIMATE TOTAL LOAD LB.	ULTIMATE UNIT STRESS PSI	CHARACTER OF FAILURE & LOCATION
T-1	1.350	.575	.7763	64,200	82,700	Base Metal
T-2	1.366	.614	.8387	68,600	81,800	Base Met

#### GUIDED BEND TESTS (QW-160)

TYPE AND FIGURE NO.	RESULT	TYPE AND FIGURE NO.	RESULT
QW-463.1 (b)	Side bend satisfactory	QW-403.1 (b)	Side bend satisfactory
"	"	"	"
"	"	"	"

#### TOUGHNESS TESTS (QW-170)

SPECIMEN NO.	NOTCH LOCATION	NOTCH TYPE	TEST TEMP.	IMPACT VALUES	LATERAL EXP.		DROPWEIGHT	
					% SHEAR	MILS	BREAK	NO BREAK

Type of Test \_\_\_\_\_

Deposit Analysis \_\_\_\_\_

Other \_\_\_\_\_

Weld Test Witnessed By \_\_\_\_\_

H. Satre

Authorized Inspector

Tensile Test Made By J.T. Donald

Laboratory Test No. T82-2489



We certify that the Statements in this record are correct and the test welds were prepared, welded and tested in accordance with ASME Boiler and Pressure Vessel Code Section IX.

Signed Lesena Steel Ltd.  
(Manufacturer)

By

*James B.R. Math* P. Eng





PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02




## **Weld Repair Procedure & Qualification Results**

**Not Applicable**



**PROJECT:** MEG Energy - Christina Lake Phase 3A  
**ECODYNE JOB:** 32125  
**REFERENCE:** PO P-5675-02

## **Non-Destructive Examination Procedures**

 <b>MEG ENERGY</b>	<b>CHRISTINA LAKE REGIONAL PROJECT</b> <b>Phase 3A EPC for Central Plant Facilities</b> <b>SLI Project No. 511036</b>	 <b>SNC-LAVALIN</b>																						
 <b>SNC-LAVALIN</b> Vendor's drawing review for conformity with specifications and design drawing. This review does not relieve the vendor of his responsibility for errors in design and detailing as detailed in his contract.		<table border="0"> <tr> <td><input type="checkbox"/> A1</td> <td>Not suitable to initiate fabrication, modify as noted, resubmit for review.</td> </tr> <tr> <td><input type="checkbox"/> B1</td> <td>Suitable to initiate fabrication as noted, modify as noted, resubmit for review.</td> </tr> <tr> <td><input type="checkbox"/> C1</td> <td>Suitable to fabricate to completion as noted, submit final documents including as-builts as required.</td> </tr> <tr> <td><input type="checkbox"/> D1</td> <td>Suitable to fabricate to completion, submit final documents including as-built documents as required.</td> </tr> <tr> <td><input type="checkbox"/> E1</td> <td>Not suitable as final documents as noted, modify as noted and resubmit.</td> </tr> <tr> <td><input checked="" type="checkbox"/> F1</td> <td>Suitable as final documents; no further resubmittal required (unless revised by vendor).</td> </tr> </table>	<input type="checkbox"/> A1	Not suitable to initiate fabrication, modify as noted, resubmit for review.	<input type="checkbox"/> B1	Suitable to initiate fabrication as noted, modify as noted, resubmit for review.	<input type="checkbox"/> C1	Suitable to fabricate to completion as noted, submit final documents including as-builts as required.	<input type="checkbox"/> D1	Suitable to fabricate to completion, submit final documents including as-built documents as required.	<input type="checkbox"/> E1	Not suitable as final documents as noted, modify as noted and resubmit.	<input checked="" type="checkbox"/> F1	Suitable as final documents; no further resubmittal required (unless revised by vendor).	<table border="1"> <tr> <td> Rev: A </td> <td> Date Rec'd 2013-03-11 </td> </tr> <tr> <td colspan="2"> Client Code: </td> </tr> <tr> <td colspan="2"> Project: MEG Phase 3A EPC </td> </tr> <tr> <td> Reviewed by: <i>[Signature]</i> </td> <td> Submittal 01 </td> </tr> <tr> <td colspan="2"> Date: <i>March 18, 2013</i> </td> </tr> </table>	Rev: A	Date Rec'd 2013-03-11	Client Code:		Project: MEG Phase 3A EPC		Reviewed by: <i>[Signature]</i>	Submittal 01	Date: <i>March 18, 2013</i>
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Date: <i>March 18, 2013</i>																								

2-Piece Heads - AFTER FILTERS & WAC  
3A-F-208 A to G & 3A-V-211 A to F


**NDE Procedures**

**ASME Vessel 2-Piece Heads**

Contents:

Cover  
Radiography Procedure (KV) RT#6 rev 02  
Magnetic Particle Inspection Procedure (KV) NDT#3 rev 02

1 Page  
21 Page  
11 Page

				<b>Title</b>  <b>NDE Procedures</b>  <b>2-Piece Heads After Filters / WAC</b> <b>3A-F-208 A to G / 3A-V-211 A to F</b>  <b>P.O.# P-5675-02</b>			<b>Customer</b>  <b>MEG ENERGY CORP.</b> <b>CALGARY, ALBERTA</b>  <b>CHRISTINA REGIONAL PROJ.</b> <b>PHASE 3A- CPF</b>  <b>ENG.: SNC- LAVALIN</b>		
					<b>SCALE -</b>			<b>ECODYNE</b> Limited   A Marmon Water/Berkshire Hathaway Company  <small>THIS DRAWING IS THE PROPERTY OF ECODYNE LIMITED. IT IS NOT TO BE USED FOR ANY PURPOSES DETRIMENTAL TO THE INTEREST OF THIS COMPANY AND IS SUBJECT TO RETURN UPON REQUEST.</small>	
						BY	DATE		
					DRN	TP	MAR 07 2013		
<b>A</b>	MAR 07 2013	FIRST ISSUE	TP	<i>TM</i>	CHKD	<i>TM</i>	MAR 07 2013		
REV	DATE	REMARKS	BY	CHKD	APPD	<i>AV</i>	MAR 07 2013	<b>DWG. NO.</b>  <b>32125-A-2909</b>	<b>REV.</b>  <b>A</b>

# **KV INSPECTION SERVICES LTD.**

*Established in 1980*

**1486 Wallace Road, Oakville, Ontario L6L 2Y2**

Office: (905) 844-9448 Fax: (905) 844-6697  
www.kvinspection.com Email: kvinsp1@aol.com

## **RADIOGRAPHY PROCEDURE**

**RT # 6**

**Rev. 02**

**September 2011**

**Ref. ASME Section V  
Article 2 & 22  
2010 Edition, 2011a Addendum**

**Ed Duitschaever  
SNT-TC-1A Level III  
48.9712 CGSB Level II**



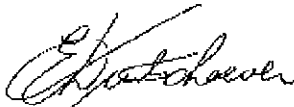
# RADIOGRAPHY PROCEDURE

RT # 6 - Rev. 02

## INDEX

1.0	Scope	13.0	Location Markers
2.0	Personnel	14.0	Backscatter
3.0	Acceptance Criteria	15.0	Examination Methods
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5.0	Film	17.0	Film Density
6.0	Screens	18.0	Identification of Radiographs
7.0	Minimum Source - to - Object Distance	19.0	Evaluation
8.0	Maximum Distance from Source Side of Object to Film	20.0	Inspection Reports and Documentation
9.0	Geometric Unsharpness	21.0	Procedure Certification
10.0	Penetrameters (IQI's)	22.0	Revisions
11.0	IQI Sensitivity	23.0	Attachments
12.0	Shims		

Submitted By:  
**KV INSPECTION SERVICES LTD.**



Ed Duitschaever  
SNT-TC-1A Level III  
48.9712 CGSB Level II

**1.0 SCOPE:**

This procedure covers the techniques for radiography of all fabricated pipe and pressure vessel welds of ferritic and austenitic materials having circumferential and longitudinal butt welded seams in the .125" - 2.75" thickness range. It is based on requirements set forth in ASME Boiler and Pressure Vessel Code, Section V, Article 2 & Article 22 and ASME Boiler and Pressure Vessel Code Section VIII, (2010 Edition, 2011a Addendum).

**2.0 PERSONNEL:**

All radiography to be carried out by technicians certified to KV Inspection written practice Document No. 03-95 which meets SNT-TC-1A (2006 Edition). Interpretation to be carried out by personnel certified to Level II or III, SNT-TC-1A. In Canada NDE Technicians will be certified to the Canadian General Standards Board, CGSB CAN/CGSB-48.9712 in the NDE technique to be used. Examination techniques will be established by Level 3 certified personnel. Only Level 2 or 3 certified personnel will interpret and evaluate results.

**3.0 ACCEPTANCE CRITERIA:**

Interpretation of results will be in accordance with ASME Section VIII, Paragraph U.W. 51, (2010 Edition, 2011a Addendum) or ASME Section VIII Paragraph U.W. 52, as required, or criteria as required by contract. However the rules of UW-52(d) will apply for evaluation and retest (see attachment # 3). Porosity under UW-51 to be evaluated as per Appendix 4 (see attachment #4). Rules for UW-52 apply to spot radiography.

**4.0 SOURCE OF RADIATION:**

Up to 80 curies, Iridium 192, Type 1, housed in INC IR100 Exposure Device, source size 2.7mm diameter X 2.1mm long or Seifert-200kv Xray tube, 3mm x 3mm focal spot. The source supplier's decay curve shall be used for verification of source size.

**5.0 FILM:**

Unless otherwise specified by the manufacturer or the client, Class II film will be used such as Kodak AA, Gevaert D5P or Gevaert D7P.

**6.0 SCREENS:**

Lead Foil .010" front and back will be used.

**7.0 MINIMUM SOURCE - TO - OBJECT DISTANCE:**

Calculated not to exceed maximum geometric unsharpness.

**8.0 MAXIMUM DISTANCE FROM SOURCE SIDE OF OBJECT TO FILM:**

Calculated not to exceed maximum geometric unsharpness.

**9.0 GEOMETRIC UNSHARPNESS:**

Geometric unsharpness of the radiograph shall be determined in accordance with:

$$U_g = Fd/D$$

Where  $U_g$  = Geometric unsharpness

F = source size: the maximum projected dimension of the radiating source (or effective focal spot) in the plane perpendicular to the distance  $D$  from the weld or object being

radiographed, in

$D$  = distance from source of radiation to weld or object being radiographed, in

$d$  = distance from source side of weld or object being radiographed to the film

$D$  and  $d$  shall be determined at the approximate center of the area of interest.

**Geometric Unsharpness Limitations** - Recommended maximum values for geometric unsharpness are as follows:

Material Thickness, in. (mm)	$U_g$ Maximum, in. (mm)
Under 2 (50.8)	0.020 (0.51)
2 through 3 (50.8 - 76.2)	0.030 (0.76)
Over 3 through 4 ( 76.2 - 101.6)	0.040 (1.02)
Greater than 4 (101.6)	0.070 (1.78)

Note: Material thickness is the thickness on which the IQI is based.

#### 10.0 PENETRAMETERS (IQI):

- A. *Material* - IQIs shall be selected from either the same alloy material group or grade as identified in SE-1025, or SE-747, as applicable, or from an alloy material group or grade with less radiation absorption than the material being radiographed.
- B. *Size* - The designated hole IQI or essential wire shall be as specified in Table T-276. A thinner or thicker hole-type IQI may be substituted for any section thickness listed in Table T-276, provided an equivalent IQI sensitivity is maintained. See T-283.2.
- C. *Welds with Reinforcements* - The thickness on which the IQI is based is the nominal single-wall thickness plus the estimated weld reinforcement not to exceed the maximum permitted by the referencing Code Section. Backing rings or strips shall not be considered as part of the thickness in IQI selection. The actual measurement of the weld reinforcement is not required.
- D. *Welds without Reinforcements* - The thickness on which the IQI is based is the nominal single-wall thickness. Backing rings or strips shall not be considered as part of the weld thickness in IQI selection.
- E. *Welds Joining Dissimilar Materials or Welds With Dissimilar Filler Metal* - When the weld metal is of an alloy group or grade that has a radiation attenuation that differs from the base material, the IQI material selection shall be based on the weld metal and be in accordance with T-276.1. When the density limits of T-282.2 cannot be met with one IQI, and the exceptional density area(s) is at the interface of the weld metal and the base metal, the material selection for the additional IQIs shall be based on the base material and be in accordance with T-276.1.
- F. *Facilities for Viewing of Radiographs* - Viewing facilities shall provide subdued background lighting of an intensity that will not cause troublesome reflections, shadows, or glare on the radiograph. Equipment used to view radiographs for interpretation shall provide a variable light source sufficient for the essential IQI hole or designated wire to be visible for the specified density range. The viewing conditions shall be such that light from around the outer edge of the radiograph or coming through low-density portions of the radiograph does not interfere with interpretation.

G. *Placement of IQIs:*

- a) *Source-Side IQIs:* The IQI(s) shall be placed on the source side of the part being examined, except for the condition described in T-277.1 (b). When, due to part or weld configuration or size, it is not practical to place the IQI(s) on the part or weld, the IQI(s) may be placed on a separate block. Separate blocks shall be made up of the same or radiographically similar materials (as defined in SE-1025) and may be used to facilitate IQI positioning. There is no restriction on the separate block thickness, provided the IQI/area-of-interest density tolerance requirements of T-282.2 are met.
- i) The IQI on the source side of the separate block shall be placed no closer to the film than the source side of the part being radiographed.
  - ii) The separate block shall be placed as close as possible to the part being radiographed.
  - iii) The block dimensions shall exceed the IQI dimensions such that the outline of at least three sides of the IQI image shall be visible on the radiograph.
- b) *Film Side IQIs:* Where inaccessibility prevents hand placing the IQIs on the source side, the IQIs shall be placed on the film side in contact with the part being examined. A lead letter "F" shall be placed adjacent to or on the IQIs, but shall not mask the essential hole where hole IQIs are used.
- c) *IQI Placement for Welds - Hole IQIs:* The IQIs may be placed adjacent to or on the weld. The identification number(s) and, when used, the lead letter "F", shall not be in the area of interest, except when geometric configuration makes it impractical.
- d) *IQI Placement for Welds - Wire IQIs:* The IQIs shall be placed on the weld so that the length of the wires is perpendicular to the length of the weld.
- e) *IQI Placement for Materials other than Welds:* The IQIs with the IQI identification number(s), and, when used, the lead letter "F", may be placed in the area of interest.
- f) *Number of IQI's:* When one or more film holders are used for an exposure, at least one IQI image shall appear on each radiograph except as outlined in (b) below.

## (a) Multiple IQIs:

If the requirements of T-282 are met by using more than one IQI, one shall be representative of the lightest area of interest and the other the darkest area of interest; the intervening densities on the radiography shall be considered as having acceptable density.

## (b) Special Cases:

- 1) For cylindrical components where the source is placed on the axis of the component for a single exposure, at least three IQIs, spaced approximately 120° apart, are required under the following conditions:
  - i) When the complete circumference is radiographed using one or more film holders, or
  - ii) When a section(s) of the circumference, where the length between the ends of the outermost sections span 240° or more, is radiographed using one or more film holders. Additional film locations may be required to obtain necessary IQI spacing.

- 2) For cylindrical components where the source is placed on the axis of the component for a single exposure, at least three IQIs, with one placed at each end of the span of the circumference radiographed and one in the approximate center of the span, are required under the following conditions:
  - i) When a section of the circumference, the length of which is greater than  $120^{\circ}$  and less than  $240^{\circ}$  is radiographed using just one film, or
  - ii) When a section(s) of the circumference, where the length between the ends of the outermost sections span less than  $240^{\circ}$  is radiographed using more than one film holder.
- 3) In (1) and (2) above, where sections of longitudinal welds adjoining the circumferential weld are radiographed simultaneously with the circumferential weld, an additional IQI shall be placed on each longitudinal weld at the end of the section most remote from the junction with the circumferential weld being radiographed.
- 4) For spherical components where the source is placed at the center of the component for a single exposure, at least three IQIs, spaced approximately  $120^{\circ}$  apart, are required under the following conditions:
  - i) When a complete circumference is radiographed using one or more film holders, or
  - ii) When a section(s) of a circumference, where the length between the ends of the outermost sections span  $240^{\circ}$  or more, is radiographed using one or more film holders. Additional film locations may be required to obtain necessary IQI spacing.
- 5) For spherical components where the source is placed at the center of the component for single exposure, at least three IQIs, with one placed at each end of the radiographed span of the circumference radiographed and one in the approximate center of the span, are required under the following conditions:
  - i) When a section of a circumference, the length of which is greater than  $120^{\circ}$  and less than  $240^{\circ}$ , is radiographed using just one film holder, or
  - ii) When a section or sections of a circumference, where the length between the ends of the outermost sections span less than  $240^{\circ}$  is radiographed using more than just one film holder.
- 6) In (4) and (5) above, where other welds are radiographed simultaneously with the circumferential weld, one additional IQI shall be placed on each other weld.
- 7) For segments of a flat or curved (ie. Ellipsoidal, torispherical, toriconical, elliptical, etc.) component where the source is placed perpendicular to the center of a length of weld for a single exposure when using more than three film holders, at least three IQIs, one placed at each end of the radiographed span and one in the approximate center of the span, are required.
- 8) When an array of components in a circle is radiographed, at least one IQI shall show on each component image.
- 9) In order to maintain the continuity of records involving subsequent exposures, all radiographs exhibiting IQIs that quality the techniques permitted in accordance with (1) through (6) above shall be retained.

### 11.0 IQI SENSITIVITY

- A) *Required Sensitivity:* Radiography shall be performed with a technique of sufficient sensitivity to display the designated hole IQI image and the 2T hole, or the essential wire of a wire IQI. The radiograph shall also display the IQI identifying numbers and letters. If the designated hole IQI image and 2T hole, or essential wire, do not show on any film in a multiple film technique, but do show in composite film viewing, interpretation shall be permitted only by composite film viewing.
- B) *Equivalent Hole-Type Sensitivity:* If a thinner or thicker hole-type IQI than listed in Table T-276 was substituted, an equivalent IQI sensitivity, as specified in Table T-283, shall have been maintained as well as all other requirements for radiography having been met.

### 12.0 SHIMS UNDER HOLE -TYPE IQIs:

For welds, a shim of material radiographically similar to the weld metal will be placed between the part and the penetrometer, if needed, so that the radiographic density throughout the area of interest is no more than minus 15% from (lighter than) the radiographic density through the penetrometer. The shim dimensions will exceed the penetrometer dimensions such that the outline of at least three sides of the penetrometer image will be visible on the radiograph.

### 13.0 LOCATION MARKERS:

Location markers, which are to appear as radiographic images on the film, shall be placed on the part, not on the exposure holder/ cassette. Their locations shall be permanently marked on the surface of the part being radiographed when permitted, or on a map, in a manner permitting the area of interest on a radiograph to be accurately traceable to its location on the part, for the required retention period of the radiograph that the required coverage of the region being examined has been obtained. Location markers shall be placed as follows.

#### Single-Wall Viewing

- (A) **Source Side Markers:** Location markers shall be placed on the source side when radiographing the following:
1. Flat components or longitudinal joints in cylindrical or conical components
  2. Curved or spherical components whose concave side is toward the source and when the "source-to-material" distance is less than the inside radius of the component.
  3. Curved or spherical components whose convex side is toward the source.
- (B) **Film Side Markers:**
1. Location markers shall be placed on the film side when radiographing either curved or spherical components whose concave side is toward the source and when the "source-to-material" distance is greater than the inside radius.
  2. As an alternative to source-side placement in (A) (1), location markers may be placed on the film side when the radiograph shows coverage beyond the location markers to the extent demonstrated by Fig. T-275 sketch, and when this alternate is documented in accordance with T-291.
- (C) **Either Side Markers:** Location markers may be placed on either side or film side when radiographing either curved or spherical components whose concave side is toward the source and the "source-to-material" distance equals the inside radius of the component.

For double-wall viewing, at least one location marker shall be placed adjacent to the weld (or on the material in the area of interest) for each radiograph.

#### **Mapping the Placement of Location Markers**

When inaccessibility or other limitations prevent the placement of markers as stipulated in T-275.1 and T-275.2, a dimension map of the actual marker placement shall accompany the radiographs to show that full coverage has been obtained.

#### **14.0 BACKSCATTER:**

Backscatter will be monitored by placing a lead symbol "B", ½ inch high and 1/16th inch thick, on the back of each film holder. If the letter appears on any radiograph, the radiograph will be retaken with additional precautions to guard against backscatter. If a light image of the "B" as described in T-223, appears on a darker background of the radiograph, protection from backscatter is insufficient and the radiograph shall be considered unacceptable. (A dark image of the "B" on a lighter background is not cause for rejection )

#### **15.0 EXAMINATION METHODS:**

A single-wall exposure technique will be used for radiography whenever practical. When it is not practical to use a single-wall technique, a double-wall technique will be used. An adequate number of exposures will be made to demonstrate that the required coverage has been obtained.

##### **Single-Wall Technique**

In the single wall technique, the radiation passes through only one wall of the weld (material), which is viewed for acceptance on the radiograph.

##### **Double-Wall Technique**

When it is not practical to use a single-wall technique, one of the following double-wall techniques will be used.

- (a) **Single-Wall Viewing.** For materials and for welds in components, a technique may be used in which the radiation passes through two walls and only the weld (material) on the film side wall is viewed for acceptance on the radiograph. When complete coverage is required for circumferential welds (material), a minimum of three exposures taken 120° to each other will be made.
- (b) **Double-Wall Viewing.** For materials and for welds in components 3½" (89mm) or less in nominal outside diameter, a technique may be used in which the radiation passes through two walls and the weld (material) in both walls is viewed for acceptance on the same radiograph. For double-wall viewing, only a source side penetrameter will be used. Care should be exercised to ensure that the required geometric unsharpness is not exceeded. If the geometric unsharpness requirement cannot be met, then single-wall viewing will be used.
  - (1) For welds, the radiation beam may be offset from the plane of the weld at an angle sufficient to separate the images of the source side and film side portions of the weld so that there is no overlap of the areas to be interpreted. When complete coverage is required, a minimum of two exposures taken 90° to each other will be made for each joint.

- (2) As an alternative, the weld may be radiographed with the radiation beam positioned so that the images of both walls are superimposed. When complete coverage is required, a minimum of three exposures taken at either 60° or 120° to each other will be made for each joint.
- (3) Additional exposures will be made if the required radiographic coverage cannot be obtained using the minimum number of exposures indicated in (b)(1) or (b)(2) above.

## **16.0 FILM PROCESSING:**

### **A. Manual Developing of Film**

1. Developing - Minimum 5 minutes @ 68°F.
2. Stop Bath - 30 seconds to one minute.
3. Fixer - Minimum 5 minutes
4. Wash - Minimum 20 minutes in running water
5. Rinse - Dip in photo-flow solution to promote even drying.
6. Drying - Manual drying can vary from still air drying at ambient temperature to as high as 140°F with air circulated by a fan. Follow manufacturers recommended drying conditions. Take precaution to tighten film on hangers so that it can not touch in the dryer. Too hot a drying temperature at low humidity should be avoided.

### **B. Automatic Processing of Film**

1. As a general guideline follow the manufacturer's recommendations for industrial processing of film.
2. Solution temperatures are to be checked daily with a thermometer to ensure that the processor's thermometers are accurate.
3. Check machine speed to comply with the manufacturer recommendations.
4. Check the replenishment of solutions. These are ongoing checks as films are being processed.
5. Ensure rollers are clean with no foreign matter settled on the rollers.
6. Make sure that the dryer is clean and that no foreign matter is settled on the rollers.
7. Ensure films are uniformly dried.
8. The heat setting used for air temperature should be compatible with the film manufacturer's recommendations.

## **17.0 FILM DENSITY:**

### **A. Density Limitations**

The transmitted film density through the radiographic image of the body of the appropriate hole penetrometer or adjacent to the designated wire of a wire penetrometer and the area of interest will be 1.8 minimum for single film viewing for radiographs made with an X-ray source and 2.0 minimum for radiographs made with a gamma ray source. For composite viewing of multiple film exposures, each film of the composite set will have a minimum density of 1.3. The maximum density will be 4.0 for either single or composite viewing. A tolerance of 0.05 in density is allowed for variations between densitometer readings.



**B. Density Variations**

- a) General - If the density of the radiograph anywhere through the area of interest varies by more than minus 15% or plus 30% from the density through the body of the hole penetrometer or adjacent to the designated wire of a wire penetrometer, within the minimum/maximum allowable density ranges specified as above, then an additional penetrometer will be used for each exceptional area or areas and the radiograph retaken. When calculating the allowable variation in density, the calculation may be rounded to the nearest 0.1 within the range as specified above.
- b) With Shims - When shims are used the plus 30% density restriction of (a) above may be exceeded, provided the required penetrometer sensitivity is displayed and the density limitations of above are not exceeded.
- c) Density Measurement - Film density to be measured by calibrated densitometer or by comparison to certified film density strip as per ASME Section V, Article 2 Para. T262 which reads as follows:

*Densitometers - Densitometers shall be calibrated at least every 90 days during use as follows:*

- i) A national standard step tablet or a step wedge calibration film, traceable to a national standard step tablet and having at least 5 steps with neutral densities from at least 1.0 through 4.0, shall be used. The step wedge calibration film shall have been verified within the last year by comparison with a national standard step tablet unless prior to first use, it was maintained in a light tight and waterproof sealed package as supplied by the Manufacturer. Step wedge calibration films may be used without verification for one year upon opening, provided it is within the manufacturer's stated shelf life.
- ii) The densitometer manufacturer's step-by-step instructions for the operation of the densitometer shall be followed.
- iii) The density steps closest to 1.0, 2.0, 3.0 and 4.0 on the national standard step tablet or step wedge calibration film shall be read.
- iv) The densitometer is acceptable if the density readings do not vary by more than  $\pm 0.05$  density units from the actual density stated on the national step tablet or step wedge calibration film.

*Step Wedge Comparison Films: - Step wedge comparison films shall be verified prior to first use, unless performed by the manufacturer as follows:*

- i) The density of the steps on a step wedge comparison film shall be verified by a calibrated densitometer.
- ii) The step wedge comparison film is acceptable if the density readings do not vary by more than  $\pm 0.1$  density units from the density stated on the step wedge comparison film.

*Periodic Verification:*

- i) *Densitometers* - Periodic calibration verification checks shall be performed as described in T-262.1 at the beginning of each shift, after 8 hours of continuous use, or after change of apertures, whichever comes first. The densitometer is acceptable if the density readings are

within  $\pm 0.05$  of the calibration readings determined in T-262.1 (c).

- ii) *Step Wedge Comparison Films:* Verification checks shall be performed annually per T-262.2.

*Documentation:*

- i) *Densitometer* calibration readings required by T-262.1 (c) shall be documented, but the actual readings for each step do not have to be recorded. Periodic verification readings required by T-262.3 do not have to be recorded.
- ii) *Step Wedge Calibration Films:* Step wedge calibration film verifications required by T-262.1 (a) shall be documented, but the actual readings for each step do not have to be recorded.
- iii) *Step Wedge Calibration Films:* Step wedge calibration film verifications required by T-262.2 and T-262.3 (b) shall be documented, but the actual readings for each step do not have to be recorded.

## 18.0 IDENTIFICATION OF RADIOGRAPHS:

A system shall be used to produce permanent identification on the radiograph traceable to the contract, component, weld or weld seam, or part numbers, as appropriate. In addition, the Manufacturer's symbol or name and the date of the radiograph shall be plainly and permanently included on the radiograph. This identification system does not necessarily require that the information appear as radiographic images. In any case, this information shall not obscure the area of interest.

Each radiograph will show the following information:

1. Manufacturer's name or initials.
  2. Contract or job number.
  3. Vessel, component, weld, seam or spot number.
  4. Location markers - at least two location markers will be shown on each film. Markers at extremities of area of interest on each film will be common to adjacent films, to indicate that sufficient coverage has been achieved.
  5. Date of inspection
- [ASME Section V, Article 2, T275 (2010 Edition, 2011a Addendum)]

## 19.0 EVALUATION

**Quality of Radiographs:** All radiograph shall be free from mechanical, chemical, or other blemishes to the extent that they do not mask and are not confused with the image of any discontinuity in the area of interest of the object being radiographed. Such blemishes include, but are not limited to:

- (a) fogging
- (b) processing defects such as streaks, watermarks, or chemical stains;
- (c) scratches, finger marks, crimps, dirtiness, static marks, smudges, or tears;
- (d) false indications due to defective screens.

**20.0 INSPECTION REPORTS AND DOCUMENTATION**

**Evaluation by Manufacturer:** The appointed Level II or Level III examiner shall be responsible for interpretation, evaluation, and acceptance of the completed radiographs to assure compliance with the requirements of Article 2 and the referencing Code Section. The Manufacturer will be responsible for the review and acceptance. As an aid to the review and evaluation, the radiographic technique documentation required by T-291 shall be completed prior to the evaluation. The radiograph review form required by T-292 shall be completed during the evaluation. The radiographic technique details and the radiograph review form documentation shall accompany the radiographs. Acceptance shall be completed prior to presentation of the radiographs and accompanying documentation to the Inspector.

**Radiographic Technique Documentation Details:** The appointed level II or Level III examiner shall prepare and document the radiographic technique details. As a minimum, the following shall be provided:

1. Identification - manufacturer's name or initials  
Contract/job number  
Vessel, component, weld, weld seam or spot number
2. The dimensional map (if used) of marker placement in accordance with T-275.3
3. Number of radiographs (exposures)
4. X-ray voltage or isotope type used
5. Source size
6. Base material type and thickness, weld thickness, weld reinforcement thickness, as applicable
7. Source-object-distance
8. Distance from source side of object to the film
9. Film manufacturer and type used
10. Number of film in each film holder/cassette
11. Single or double wall exposure and viewing

See attachment #2 Radiographic Examination Report which is in accordance with T.292

**21.0 PROCEDURE CERTIFICATION**

This standard inspection and weld test procedure is prepared in accordance with T-150, ASME Section V, Article 1 (2010 Edition, 2011a Addendum).

**22.0 REVISIONS:**

Rev. 00	June 2010
Rev. 01	February 2011
Rev. 02	September 2011

**23.0 ATTACHMENTS:**

- 1 Radiography technique sheets (2 of)
2. RT inspection report sheet (1 of)
3. ASME Section VIII, Div. 1, Paragraph UW-51 and UW-52 (2010 Edition, 2011a Addendum)
4. ASME Section VIII, Appendix 7 (2010 Edition, 2011a Addendum)

## ATTACHMENT 1 (1 of 2)

TECHNIQUE FOR SINGLE OR MULTIPLE EXPOSURES ON  
CIRCUMFERENTIAL BUTT WELDS

Technique 1A

Minimum O.D. - Greater than 36 inches.

Exposure Technique - Single Wall T-271

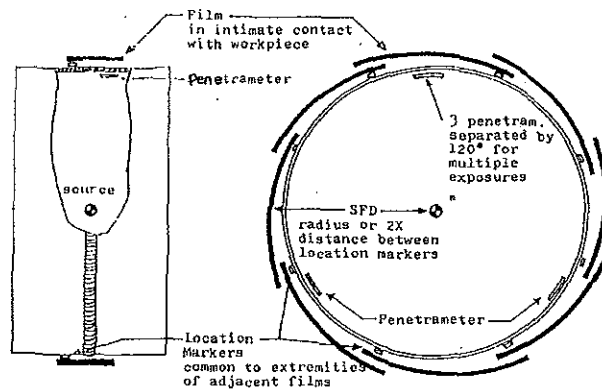
Radiograph Viewing - Single Wall

I.Q.I. Penetrator - Selection - T-276

- Placement - Source side T-277.1a  
- Film side T-277.1b

Location Marker Placement - Either side T-275

Source - Weld - Film Arrangement



TECHNIQUE FOR BUTT WELDS ON  
SMALL DIAMETER PIPE

Technique 1C

Maximum O.D. - 36 inches

Exposure Technique - Double Wall T 272.1

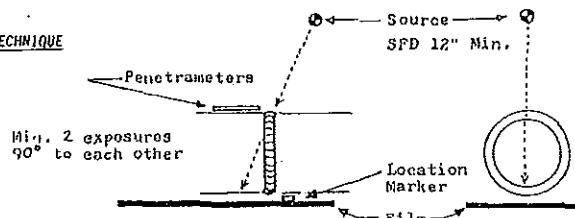
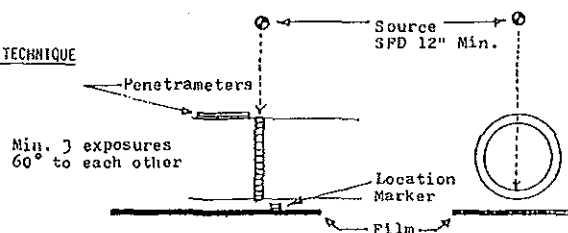
Radiograph Viewing - Double Wall

I.Q.I. Penetrator - Selection - T 276

- Placement - Source side - T 277.1 (a)

Location Marker Placement - Either side T 275

Source - Weld - Film Arrangement

ELLIPTICAL TECHNIQUESUPERIMPOSED TECHNIQUE

## ATTACHMENT # 1 (2 of 2)

TECHNIQUE FOR SINGLE EXPOSURES  
ON LONGITUDINAL BUTT WELDED SEAMS.

Technique 10

Minimum O.D. - See note 1

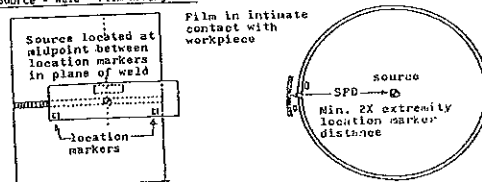
Exposure Technique - Single Wall T-271.

Radiograph Viewing - Single Wall

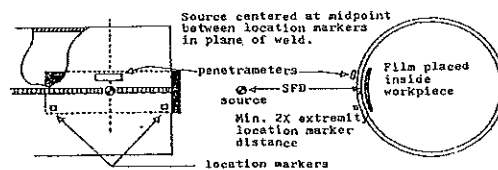
I.Q.I. Penetrator - Selection - T-276

Placement - Source side - T-277.1 (a)

Location Marker Placement - Either side - T-275.

Source - Weld - Film Arrangement

Note 1: When O.D. of workpiece makes it impossible to achieve minimum SPD of 2X extremity location marker distance, the following variation of the above technique will be used.



**ATTACHMENT #2**

[illegible]

## ATTACHMENT # 3 (1 of 2)

## 2011a SECTION VIII — DIVISION 1

UW-51 RADIOGRAPHIC EXAMINATION OF (a)  
WELDED JOINTS

(a) All welded joints to be radiographed shall be examined in accordance with Article 2 of Section V except as specified below.

(1) A complete set of radiographs and records, as described in Article 2 of Section V, for each vessel or vessel part shall be retained by the Manufacturer, as follows:

(a) films until the Manufacturer's Data Report has been signed by the Inspector;

(b) records as required by this Division (10-13).

(2) A written radiographic examination procedure is not required. Demonstration of density and penetrameter image requirements on production or technique radiographs shall be considered satisfactory evidence of compliance with Article 2 of Section V.

(3) The requirements of T-274.2 of Article 2 of Section V are to be used only as a guide. Final acceptance of radiographs shall be based on the ability to see the prescribed penetrameter image and the specified hole or the designated wire of a wire penetrameter.

(4) As an alternative to the radiographic examination requirements above, all welds in material  $\frac{1}{2}$  in. (13 mm) and greater in thickness may be examined using the ultrasonic (UT) method per the requirements of 7.5.5 of Section VIII, Division 2.

(b) Indications shown on the radiographs of welds and characterized as imperfections are unacceptable under the following conditions and shall be repaired as provided in UW-38, and the repair radiographed to UW-51 or, at the option of the Manufacturer, ultrasonically examined in accordance with the method described in Appendix 12 and the standards specified in this paragraph, provided the defect has been confirmed by the ultrasonic examination to the satisfaction of the Authorized Inspector prior to making the repair. For material thicknesses in excess of 1 in. (25 mm), the concurrence of the user shall be obtained.

This ultrasonic examination shall be noted under remarks on the Manufacturer's Data Report Form:

(1) any indication characterized as a crack or zone of incomplete fusion or penetration;

(2) any other elongated indication on the radiograph which has length greater than:

(a)  $\frac{1}{4}$  in. (6 mm) for  $t$  up to  $\frac{3}{4}$  in. (19 mm)

(b)  $\frac{1}{2}t$  for  $t$  from  $\frac{3}{4}$  in. (19 mm) to  $2\frac{1}{4}$  in. (57 mm)

(c)  $\frac{3}{4}$  in. (19 mm) for  $t$  over  $2\frac{1}{4}$  in. (57 mm)

where

$t$  = the thickness of the weld excluding any allowable reinforcement. For a butt weld joining two members having different thicknesses at the weld,  $t$  is the thinner of these two thicknesses. If a full penetration weld includes a fillet weld, the thickness of the throat of the fillet shall be included in  $t$ .

(3) any group of aligned indications that have an aggregate length greater than  $t$  in a length of  $12t$ , except when the distance between the successive imperfections exceeds  $6L$  where  $L$  is the length of the longest imperfection in the group;

(4) rounded indications in excess of that specified by the acceptance standards given in Appendix 4.

## ATTACHMENT # 3 (2 of 2)

## 2011a SECTION VIII — DIVISION 1

## UW-52 SPOT EXAMINATION OF WELDED JOINTS

NOTE: Spot radiographing of a welded joint is recognized as an effective inspection tool. The spot radiography rules are also considered to be an aid to quality control. Spot radiographs made directly after a welder or an operator has completed a unit of weld proves that the work is or is not being done in accordance with a satisfactory procedure. If the work is unsatisfactory, corrective steps can then be taken to improve the welding in the subsequent units, which unquestionably will improve the weld quality.

Spot radiography in accordance with these rules will not ensure a fabrication product of predetermined quality level throughout. It must be realized that an accepted vessel under these spot radiography rules may still contain defects which might be disclosed on further examination. If all radiographically disclosed weld defects must be eliminated from a vessel, then 100% radiography must be employed.

(a) But welded joints which are to be spot radiographed shall be examined locally as provided herein.

(b) *Minimum Extent of Spot Radiographic Examination*

(1) One spot shall be examined on each vessel for each 50 ft (15 m) increment of weld or fraction thereof for which a joint efficiency from column (b) of Table UW-12 is selected. However, for identical vessels or parts, each with less than 50 ft (15 m) of weld for which a joint efficiency from column (b) of Table UW-12 is selected, 50 ft (15 m) increments of weld may be represented by one spot examination.

(2) For each increment of weld to be examined, a sufficient number of spot radiographs shall be taken to examine the welding of each welder or welding operator. Under conditions where two or more welders or welding operators make weld layers in a joint, or on the two sides of a double-welded butt joint, one spot may represent the work of all welders or welding operators.

(3) Each spot examination shall be made as soon as practicable after completion of the increment of weld to be examined. The location of the spot shall be chosen by the Inspector after completion of the increment of welding to be examined, except that when the Inspector has been notified in advance and cannot be present or otherwise make the selection, the Manufacturer may exercise his own judgment in selecting the spots.

(4) Radiographs required at specific locations to satisfy the rules of other paragraphs, such as UW-9(d), UW-11(a)(5)(b), and UW-14(b), shall not be used to satisfy the requirements for spot radiography.

(c) *Standards for Spot Radiographic Examination.* Spot examination by radiography shall be made in accordance with the technique prescribed in UW-51(a). The minimum length of spot radiograph shall be 6 in. Spot radiographs may be retained or be discarded by the Manufacturer after acceptance of the vessel by the Inspector. The acceptability of welds examined by spot radiography shall be judged by the following standards:

(1) Welds in which indications are characterized as cracks or zones of incomplete fusion or penetration shall be unacceptable.

(2) Welds having indications characterized as slag inclusions or cavities are unacceptable when the indication length exceeds  $\frac{2}{3}t$ , where  $t$  is defined as shown in UW-51(b)(2). For all thicknesses, indications less than  $\frac{1}{4}$  in. (6 mm) are acceptable, and indications greater than  $\frac{1}{4}$  in. (19 mm) are unacceptable. Multiple aligned indications meeting these acceptance criteria are acceptable when the sum of their longest dimensions indications does not exceed  $t$  within a length of  $6t$  (or proportionally for radiographs shorter than  $6t$ ), and when the longest length  $L$  for each indication is separated by a distance not less than  $3L$  from adjacent indications.

(3) Rounded indications are not a factor in the acceptability of welds not required to be fully radiographed.

(d) *Evaluation and Retests*

(1) When a spot, radiographed as required in (b)(1) or (b)(2) above, is acceptable in accordance with (c)(1) and (c)(2) above, the entire weld increment represented by this radiograph is acceptable.

(2) When a spot, radiographed as required in (b)(1) or (b)(2) above, has been examined and the radiograph discloses welding which does not comply with the minimum quality requirements of (c)(1) or (c)(2) above, two additional spots shall be radiographically examined in the same weld increment at locations away from the original

spot. The locations of these additional spots shall be determined by the Inspector or fabricator as provided for the original spot examination in (b)(3) above.

(a) If the two additional spots examined show welding which meets the minimum quality requirements of (c)(1) and (c)(2) above, the entire weld increment represented by the three radiographs is acceptable provided the defects disclosed by the first of the three radiographs are removed and the area repaired by welding. The weld repaired area shall be radiographically examined in accordance with the foregoing requirements of UW-52.

(b) If either of the two additional spots examined shows welding which does not comply with the minimum quality requirements of (c)(1) or (c)(2) above, the entire increment of weld represented shall be rejected. The entire rejected weld shall be removed and the joint shall be rewelded or, at the fabricator's option, the entire increment of weld represented shall be completely radiographed and only defects need be corrected.

(c) Repair welding shall be performed using a qualified procedure and in a manner acceptable to the Inspector. The rewelded joint, or the weld repaired areas, shall be spot radiographically examined at one location in accordance with the foregoing requirements of UW-52.



## ATTACHMENT 4 (1 of 4)

## MANDATORY APPENDIX 4

### ROUNDED INDICATIONS CHARTS

### ACCEPTANCE STANDARD FOR

### RADIOGRAPHICALLY DETERMINED

### ROUNDED INDICATIONS IN WELDS

#### 4-1 APPLICABILITY OF THESE STANDARDS

These standards are applicable to ferritic, austenitic, and nonferrous materials.

#### 4-2 TERMINOLOGY

(a) *Rounded Indications.* Indications with a maximum length of three times the width or less on the radiograph are defined as rounded indications. These indications may be circular, elliptical, conical, or irregular in shape and may have tails. When evaluating the size of an indication, the tail shall be included. The indication may be from any imperfection in the weld, such as porosity, slag, or tungsten.

(b) *Aligned Indications.* A sequence of four or more rounded indications shall be considered to be aligned when they touch a line parallel to the length of the weld drawn through the center of the two outer rounded indications.

(c) *Thickness  $t$ .*  $t$  is the thickness of the weld, excluding any allowable reinforcement. For a butt weld joining two members having different thicknesses at the weld,  $t$  is the thinner of these two thicknesses. If a full penetration weld includes a fillet weld, the thickness of the throat of the fillet shall be included in  $t$ .

#### 4-3 ACCEPTANCE CRITERIA

(a) *Image Density.* Density within the image of the indication may vary and is not a criterion for acceptance or rejection.

(b) *Relevant Indications.* (See Table 4-1 for examples.) Only those rounded indications which exceed the following dimensions shall be considered relevant.

(1)  $\frac{1}{10}t$  for  $t$  less than  $\frac{1}{8}$  in. (3 mm)

(2)  $\frac{1}{64}$  in. for  $t$  from  $\frac{1}{8}$  in. to  $\frac{1}{4}$  in. (3 mm to 6 mm), incl.

(3)  $\frac{1}{32}$  in. for  $t$  greater than  $\frac{1}{4}$  in. to 2 in. (6 mm to 50 mm), incl.

(4)  $\frac{1}{16}$  in. for  $t$  greater than 2 in. (50 mm)

(c) *Maximum Size of Rounded Indication.* (See Table 4-1 for examples.) The maximum permissible size of any indication shall be  $\frac{1}{4}t$ , or  $\frac{5}{32}$  in. (4 mm), whichever is smaller; except that an isolated indication separated from an adjacent indication by 1 in. (25 mm) or more may be  $\frac{1}{2}t$ , or  $\frac{1}{4}$  in. (6 mm), whichever is less. For  $t$  greater than 2 in. (50 mm) the maximum permissible size of an isolated indication shall be increased to  $\frac{3}{8}$  in. (10 mm).

(d) *Aligned Rounded Indications.* Aligned rounded indications are acceptable when the summation of the diameters of the indications is less than  $t$  in a length of  $12t$ . See Fig. 4-1. The length of groups of aligned rounded indications and the spacing between the groups shall meet the requirements of Fig. 4-2.

(e) *Spacing.* The distance between adjacent rounded indications is not a factor in determining acceptance or rejection, except as required for isolated indications or groups of aligned indications.

(f) *Rounded Indication Charts.* The rounded indications characterized as imperfections shall not exceed that shown in the charts. The charts in Figs. 4-3 through 4-8 illustrate various types of assorted, randomly dispersed and clustered rounded indications for different weld thicknesses greater than  $\frac{1}{8}$  in. (3 mm). These charts represent the maximum acceptable concentration limits for rounded indications. The charts for each thickness range represent full-scale 6 in. (150 mm) radiographs, and shall not be enlarged or reduced. The distributions shown are not necessarily the patterns that may appear on the radiograph, but are typical of the concentration and size of indications permitted.

(g) *Weld Thickness  $t$  less than  $\frac{1}{8}$  in. (3 mm).* For  $t$  less than  $\frac{1}{8}$  in. (3 mm) the maximum number of rounded indications shall not exceed 12 in a 6 in. (150 mm) length of weld. A proportionally fewer number of indications shall

## ATTACHMENT 4 (2 of 4)

## 2011a SECTION VIII — DIVISION 1

TABLE 4-1

Customary Units			
Thickness $t$ , in.	Maximum Size of Acceptable Rounded Indication, in.		Maximum Size of Nonrelevant Indication, in.
	Random	Isolated	
Less than $\frac{3}{8}$	$\frac{1}{4}t$	$\frac{1}{2}t$	$\frac{1}{16}t$
$\frac{3}{8}$	0.031	0.042	0.015
$\frac{7}{16}$	0.047	0.063	0.015
$\frac{1}{2}$	0.063	0.083	0.015
$\frac{5}{16}$	0.078	0.104	0.031
$\frac{3}{8}$	0.091	0.125	0.031
$\frac{7}{16}$	0.109	0.146	0.031
$\frac{1}{2}$	0.125	0.168	0.031
$\frac{9}{16}$	0.142	0.188	0.031
$\frac{5}{8}$	0.156	0.210	0.031
$\frac{11}{16}$	0.156	0.230	0.031
$\frac{3}{4}$ to 2, incl.	0.156	0.250	0.031
Over 2	0.156	0.375	0.063
SI Units			
Thickness $t$ , mm	Maximum Size of Acceptable Rounded Indication, mm		Maximum Size of Nonrelevant Indication, mm
	Random	Isolated	
Less than 3	$\frac{1}{4}t$	$\frac{1}{2}t$	$\frac{1}{16}t$
3	0.79	1.07	0.38
5	1.19	1.60	0.38
6	1.60	2.11	0.38
8	1.98	2.64	0.79
10	2.31	3.18	0.79
11	2.77	3.71	0.79
13	3.18	4.27	0.79
14	3.61	4.78	0.79
16	3.96	5.33	0.79
17	3.96	5.84	0.79
19.0 to 50, incl.	3.96	6.35	0.79
Over 50	3.96	9.53	1.60

GENERAL NOTE: This Table contains examples only.

be permitted in welds less than 6 in. (150 mm) in length.

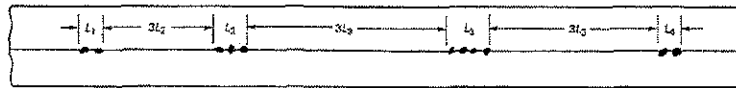
(h) *Clustered Indications.* The illustrations for clustered indications show up to four times as many indications in a local area, as that shown in the illustrations for random indications. The length of an acceptable cluster shall not exceed the lesser of 1 in. (25 mm) or  $2t$ . Where more than one cluster is present, the sum of the lengths of the clusters shall not exceed 1 in. (25 mm) in a 6 in. (150 mm) length weld.

## ATTACHMENT 4 (3 of 4)



GENERAL NOTE: Sum of  $L_1$  to  $L_n$  shall be less than  $t$  in a length of  $12L$ .

FIG. 4-1 ALIGNED ROUNDED INDICATIONS



GENERAL NOTE: Sum of the group lengths shall be less than  $t$  in a length of  $12L$ .

## Maximum Group Length:

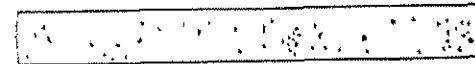
$L = 1/16$  in. (1.6 mm) for  $t$  less than  $3/4$  in. (19 mm)  
 $L = 1/8$  in. (3.2 mm) for  $t$  from  $3/4$  in. to  $2 1/4$  in. (57 mm)  
 $L = 3/16$  in. (4.8 mm) for  $t$  greater than  $2 1/4$  in. (57 mm)

## Minimum Group Spacing:

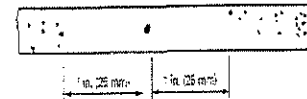
$3L$ , where  $L$  is the length of the longest adjacent group being evaluated.

FIG. 4-2 GROUPS OF ALIGNED ROUNDED INDICATIONS

## MANDATORY APPENDIX



(a) Random Rounded Indications (See Note (1))



(b) Isolated Indication (See Note (2))



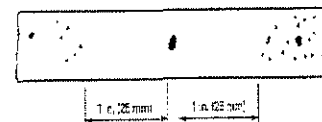
(c) Cluster

## NOTES:

- (1) Typical concentration and size permitted in any 5 in. (125 mm) length of weld.
- (2) Maximum size per Table 4-1.

FIG. 4-3 CHARTS FOR  $t$  EQUAL TO  $1/2$  in. to  $1/2$  in. (13 mm to 6 mm), INCLUSIVE

(a) Random Rounded Indications (See Note (1))



(b) Isolated Indication (See Note (2))



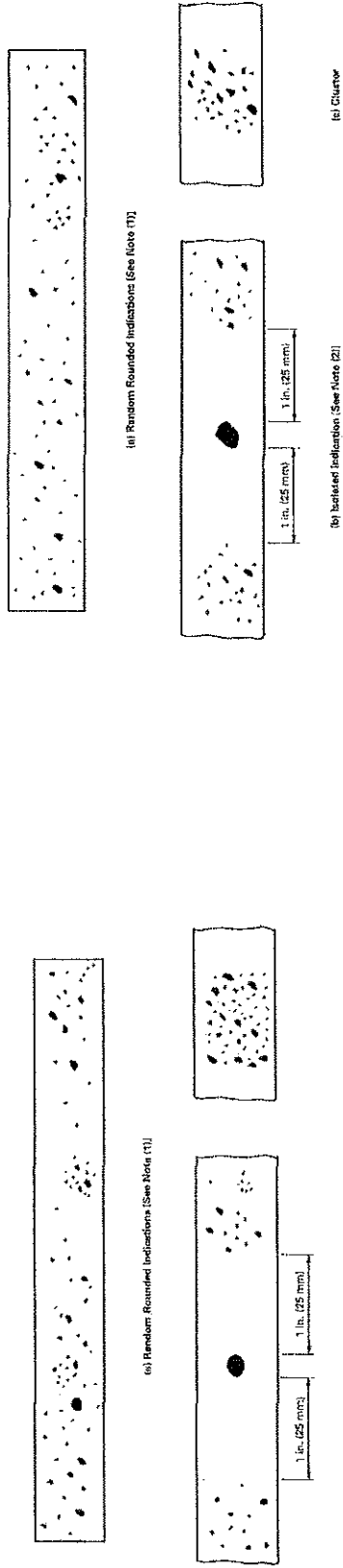
(c) Cluster

## NOTES:

- (1) Typical concentration and size permitted in any 5 in. (125 mm) length of weld.
- (2) Maximum size per Table 4-1.

FIG. 4-4 CHARTS FOR  $t$  OVER  $1/2$  in. to  $1/2$  in. (6 mm to 10 mm), INCLUSIVE

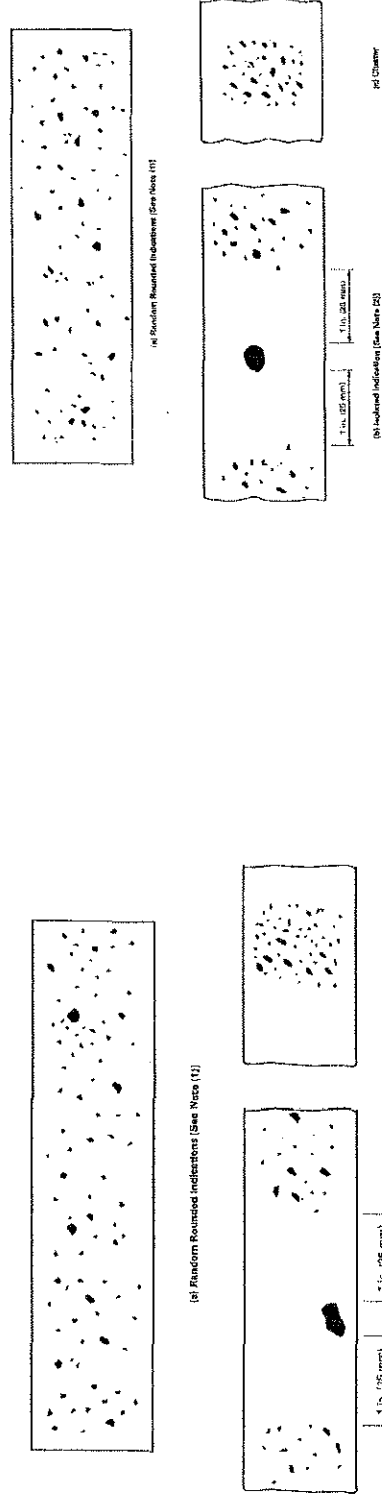
## ATTACHMENT 4 (4 of 4)



NOTES:

(1) Typical concentration and size permitted in any 6 in. (150 mm) length of weld.

(2) Maximum size per Table 4-1.

FIG. 4-6 CHARTS FOR OVER  $\frac{1}{2}$  in. to 2 in. (25 mm to 50 mm), INCLUSIVE

NOTES:

(1) Typical concentration and size permitted in any 6 in. (150 mm) length of weld.

(2) Maximum size per Table 4-1.

FIG. 4-7 CHARTS FOR OVER 2 in. to 4 in. (50 mm to 100 mm), INCLUSIVE

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## **MAGNETIC PARTICLE INSPECTION PROCEDURE**

**SPECIFICATION NO:**

**NDT # 3 Rev. 02**

**September 2011**

Ref. ASME Section V  
Article 7  
2010 Edition, 2011a Addendum

Ed Duitschaever  
SNT-TC-1A Level III  
48.9712 CGSB Level II

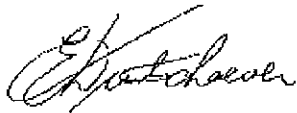
# **GENERAL MAGNETIC PARTICLE INSPECTION PROCEDURE**

**NDT # 3, Rev. 02**

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2.0	REFERENCES
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14.0	ATTACHMENTS

Submitted for  
KV INSPECTION SERVICES LTD



Ed Duitschaever  
SNT-TC-1A Level III  
CGSB Level II, (48.9712) - Reg. # 515

## **1.0 PURPOSE AND SCOPE**

The magnetic particle examination method and acceptance standards described herein will be used for the examination of all fabricated pipe and pressure vessel welds and base metals in ferromagnetic materials when required by the contract and complies with the requirements of ASME Section VIII, Division 1, Appendix 6 (2010 Edition, 2011a Addendum), ASME Sect. V, Article 7 (2010 Edition, 2011a Addendum) and ASME Section V, Article 25 SE709 (2010 Edition, 2011a Addendum).

## **2.0 REFERENCES**

ASME Section VIII, Division 1, Appendix 6, "Methods for Magnetic Particle Examination" (2010 Edition, 2011a Addendum).

ASME Section V, Article 7, (2010 Edition, 2011a Addendum), "Non-Destructive Examination."

ASME Section V, Article 25 SE709 (2010 Edition, 2011a Addendum), Standard Guide for Magnetic Particle Examination.

## **3.0 GENERAL REQUIREMENTS**

Contractual obligations imposed by code or specifications will have precedence over this procedure in the event of conflict.

Deviation from this procedure is not permitted without client authorization.

## **4.0 PERSONNEL**

All personnel associated with this examination will be qualified in accordance with C.G.S.B. 48.9712 and SNT-TC-1A (2006 Edition). Only Level II or Level III qualified personnel may evaluate results.

## **5.0 EQUIPMENT**

Magnaflux Yoke Type Y-6, Magnaflux P90, Parker Contour Probe DA-200, Electro Spect. - Ferrous Probe Model # ESX, or equivalent.

Magnaflux Ferromagnetic Powder 8A (red), 1 (grey) or 3A (black), Chemetall Oakite 825R (red), Circle Systems yellow dusting powder 66 or equivalent.

Chemetall Oakite 8901W contrast aid (or equivalent).

Parker Research Company magnetic particle blower Model PB1

Magnetic particle field indicator as per figure T-764.1.1, Article 7, ASME Section V, (2010 Edition, 2011a Addendum).

A calibrated Gold Bass Model DLM or Extech EA 31 - 1000 lx light meter or equivalent.

### **Calibration of Equipment:**

*Frequency:* Magnetizing equipment shall be calibrated at least once per year, or whenever the equipment has been subjected to major electric repair, periodic overhaul or damage. If the equipment has not been used for one year or more, calibration shall be done prior to first use.

*Light meters:* Light meters shall be calibrated at least once a year or whenever the light meter has been repaired. If light meters have not been in use for a year or more, calibration shall be done prior to first use

## **6.0**    **EXTENT AND METHOD**

All external and accessible internal surfaces defined by the client will be examined. The weld surface and 1"(25mm) either side of the reinforcement cap will be examined.

A check of the examination surface shall also be conducted to locate any discontinuity surface openings which may not attract and hold magnetic particle particles because of their width.

The method will be in accordance with ASME V, Article 7 (2010 Edition, 2011a Addendum). Examination will be done by the continuous method; that is the magnetizing current remains on while the examination medium is being removed.

Alternating or direct current will be used as required. Yoke method only.

## **7.0**    **PROCEDURE**

Sizes and shapes of items to be examined shall be unrestricted, provided the required magnetic flux can be proven adequate and maintained for the technique used.

Surface conditioning is not generally required unless surface irregularities are present that would otherwise mask the indication of discontinuities.

Prior to magnetic particle examination, the surface to be examined and any adjacent area within at least 1" (25mm) of the surface to be examined will be dry and free of any dirt, grease, scale, welding flux, spatter, oil or other extraneous matter that would interfere with the examination.

*Method of Particle Application:* Dry particles to be applied by dusting directly onto the surface of the part being examined

*Non-Magnetic Surface Contrast Enhancement* - Non-magnetic surface contrasts may be applied by the examiner to uncoated surfaces, only in amounts sufficient to enhance possible contrast. When non-magnetic surface contrast enhancement is used, it shall be demonstrated that indications can be detected through the enhancement. Thickness measurement of this non-magnetic surface contrast enhancement is not required.

If non-magnetic coatings are left on the part in the area being examined, it shall be demonstrated that indications can be detected through the existing maximum coating thickness applied. When AC yoke technique is used, the demonstration shall be to the satisfaction of the inspector in accordance with the requirements of the referencing Code Section.

Examination will not be done using dry particles on surfaces where temperature exceeds 600°F (316°C).

Each area will be examined at least twice, with the lines of flux in one case approximately perpendicular to the lines of flux in the other.

Field adequacy and direction will be checked by the magnetic particle field indicator.

*Yoke Method* - Each alternating current electromagnetic yoke will have a minimum lifting power of at least 10 lbs (4.5 kgs.) at the maximum pole spacing that will be 3" minimum to 4" maximum.

Each direct current or permanent magnetic yoke will have a lifting power of at least 40 lbs. (18.1 kgs.) at the maximum spacing that will be used.

The lifting power of the yoke is to be checked once yearly or after any repair to the yoke.



Each weight will be weighed with a scale from a reputable manufacturer and stencilled with the applicable nominal weight prior to the first use.

A weight need only be verified again if damaged in a manner that could have caused potential loss of material.

Examination will overlap to assure 100% coverage.

Surface discontinuities are indicated by accumulations of magnetic particles which should contrast with the examination surface. The colour of the magnetic particle powder shall be sufficiently different than the colour of the examination surface.

The interpretation shall identify if an indication is false, non-relevant or relevant. False and non-relevant indications shall be proven as false or non-relevant. Interpretation shall be carried out to identify the locations of indications and the character of the indication.

Discontinuities on or near the surface are indicated by retention of the examination medium. However localized surface irregularities due to machining marks or other surface conditions may produce false indications. Broad areas of particle accumulation which might mask indications from discontinuities are prohibited and such areas shall be cleaned and re-examined.

The yoke method shall only be applied to detect discontinuities that are open to the surface of the part.

Any indication which is believed to be non-relevant will be regarded as a defect and will be re-examined to verify whether or not actual defects are present. Surface conditioning may precede the re-examination. Non-relevant indications that would mask indication of defects are unacceptable.

Viewing of indications is performed using visible light. A minimum of 1000 Lx is required.

Parts will be cleaned after testing is completed. When post-examination cleaning is performed it should be conducted as soon as practical using a process that does not adversely affect the part.

*Excess Particle Removal:* Accumulations of excess dry particles shall be removed with a light air stream from a bulb or syringe or other source of low pressure dry air. The examination current or power shall be maintained while removing the excess particles.

*Post-examination cleaning method:* Parts will be cleaned after testing is completed - Normally only powder will need to be blown off with compressed air. If a cleaner is required Chemetall Oakite 9PR50 will be used. Contrast aid will be removed with a solvent

## **8.0 EVALUATION**

- a) All indications shall be evaluated in terms of the acceptance standards of the referencing Code Section.
- b) Discontinuities on or near the surface are indication by retention of the examination medium. However, localized surface irregularities due to machining marks or other surface conditions may produce false indications.
- c) Broad areas of particle accumulation, which might mask indications from discontinuities, are prohibited and such areas shall be cleaned and re-examined.

## **9.0 ACCEPTANCE STANDARDS**

ASME Section VIII, Division 1, Appendix 6, Para. 6-4 (2010 Edition, 2011a Addendum).

These acceptance standards will apply unless other more restrictive standards are specified for specific materials or applications within this division.

All surfaces to be examined will be free of:

- a. relevant linear indications - only indications which have any dimension greater than 1/16th" will be considered relevant. *A linear indication is one having a length greater than three times the width.*
- b. relevant rounded indications greater than 3/16th". *A rounded indication is one of circular or elliptical shape with a length equal or less than three times its width.*
- c. four or more relevant rounded indications in a line separated by 1/16th" or less, edge to edge.
- d. an indication of an imperfection may be larger than the imperfection that causes it, however the size of the indication is the basis for acceptance evaluation.
- e. Any questionable or doubtful indications shall be re-examined to determine whether they are relevant.

## **10.0 REPORTS**

Reports will include results and will affirm that examination was performed in accordance with this procedure.

Reports will include:

- a. Procedure identification and revision
- b. magnetic particle equipment and type of current
- c. magnetic particles (visible or fluorescent) (wet or dry)
- d. technician and qualification level
- e. record of indications
- f. material and thickness
- g. lighting equipment used
- h. date of examination

### **Rejectable Indications:**

Rejectable indications shall be recorded. As a minimum. The type of indications (linear or rounded), location and extent (length or diameter or aligned) shall be recorded.

## **11.0 PROCEDURE CERTIFICATION**

This standard inspection and weld test procedure is prepared in accordance with T-150, ASME Section V, Article 1 (2010 Edition, 2011a Addendum).

## **12.0 PERFORMANCE DEMONSTRATION**

Performance demonstration, when required by the referencing Code Section shall be documented.

### **13.0 REVISIONS**

00	June 2010
01	February 2011
02	September 2011

### **14.0 ATTACHMENTS**

- I) Magnetic particle inspection report form
- ii) Fig T-764.1.1 Magnetic particle field indicator
- iii) Calibration for electromagnetic yokes (sample)

### **ADDENDUM 1 - DEMAGNETIZATION**

**Applicability** - All ferromagnetic material will retain some residual magnetism, the strength of which is dependent on the retentivity of the part. Residual magnetism does not affect the mechanical properties of the part. However, a residual field may permit chips to adhere to the surface affecting subsequent machining operations as well as painting or plating. Additionally, if the part will be used in locations near sensitive instruments, high residual fields could affect the operation of these instruments. Furthermore, a strong residual magnetic field in a part to be arc-welded could interfere with this operation. Residual fields may also interfere with subsequent magnetic particle examination. Demagnetization is required only if specified in the drawings, specification, or purchase order. When required, an acceptable level of residual magnetization and the measuring method will also be specified.

**Demagnetization Methods** - The ease of demagnetization is dependent on the coercive force of the metal. High retentivity is not necessarily related to high coercive force in that the strength of the residual field is not always an indicator of ease of demagnetizing. In general, demagnetization is accomplished by subjecting the part to a field equal to or greater than that used to magnetize the part, then continuously reversing the field direction while gradually decreasing it to zero.

**Withdrawal from Alternating Current Coil** - The fastest and most simple technique is to pass the part through a high intensity alternating current coil and then slowly withdraw the part from the field of the coil. A coil of 5000 to 10,000 ampere turns is recommended. Line frequency is usually from 50- to 60-Hz alternating current because of its inability to penetrate. Alternating-current yokes may be used for local demagnetization by placing the poles on the surface, moving them around the area and slowly withdrawing the A-C yoke while it is still energized. Care should be exercised to assure that the part is entirely removed from the influence of the coil or the A-C yoke before the demagnetizing force is discontinued, otherwise the demagnetizer may have the reverse effect of magnetizing the part.

**Decreasing Alternating Current** - An alternative technique for part demagnetization is subjecting the part to the field while gradually reducing its strength to a desired level.

**Reversing Direct Current** - The part to be demagnetized is subjected to consecutive steps of reversed and reduced direct current magnetization to a desired level. (This is the most effective process of demagnetizing large parts in which the alternating current field has insufficient penetration to remove the internal residual magnetization). This technique requires special equipment for reversing it in small increments.

Effectiveness of the demagnetizing operation can be indicated by the use of appropriate magnetic field indicators or field strength meters. However, a part may retain a strong residual field after having been circularly magnetized and exhibit little or no external evidence of this field. Therefore the circular magnetization should be conducted before longitudinal magnetization if complete demagnetization is required.

April 2005

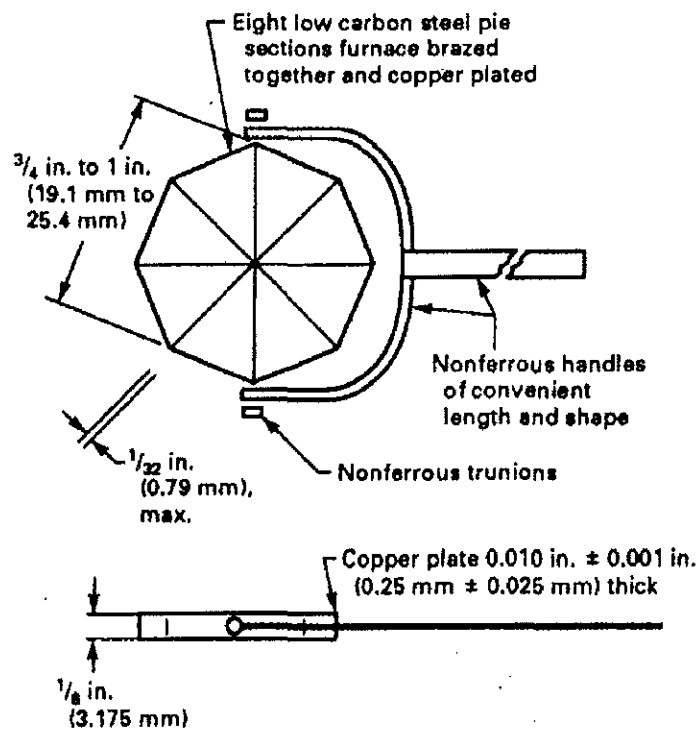


FIG. T-764.1.1 PIE-SHAPED MAGNETIC PARTICLE FIELD INDICATOR

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---

## CALIBRATION CERTIFICATE FOR ELECTROMAGNETIC YOKES

YOKE TYPE: AC\_\_\_\_ DC\_\_\_\_

MANUFACTURER: \_\_\_\_\_

SERIAL NUMBER: \_\_\_\_\_

LIFTING FORCE: \_\_\_\_\_ lbs. LEG SPACING: 2→4 inches.

MEETS REQUIREMENTS OF ASME SECTION V, SE 709, TABLE 3 - MINIMUM YOKE  
LIFTING FORCE

DATE OF CALIBRATION: \_\_\_\_\_

DATE DUE FOR NEXT CALIBRATION: \_\_\_\_\_

CALIBRATED BY: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



Inspection Services Ltd.

1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697

## Magnetic Particle Inspection Report MT

### Specification - Acceptance Criteria

### General Data

Customer		Date	
Location		P. O. #	
Project		Shop Order #	
Procedure		Worksheet #	
Technician		CGSB Reg #	ASNT/SNT-TC-1A Level

### Technical Data - Magnetic Particle (MT)

Material Type	<input type="radio"/> Carbon Steel	<input type="radio"/> Other	Material Thickness	
---------------	------------------------------------	-----------------------------	--------------------	--

### Test Method

<input type="radio"/> Dry	<input type="radio"/> Wet	<input type="radio"/> Wet Fluorescent
---------------------------	---------------------------	---------------------------------------

### Test Equipment

Indicators	<input type="radio"/> 825 R - Red	<input type="radio"/> 66 - Yellow	<input type="radio"/> Magnaglow 20B Fluorescent
	<input type="radio"/> 3A - Black	<input type="radio"/> 803/1 - Black Ink	<input type="radio"/> 8800A Fluorescent
Background	<input type="radio"/> 8901W Contrast Aid	<input type="radio"/> None	
Equipment	<input type="radio"/> AC Yoke	<input type="radio"/> Calibrated Blacklight	<input type="radio"/> Other
Method	<input type="radio"/> Continuous	<input type="radio"/> Residual	
Light Meter	Type	Serial #	Intensity Lx



Lighting Equipment Description:


### Inspection

Description:

Item #	Description of Weld/Test Area	Technique	Defect Location	Interpretation

KV Inspection Technician		Date	
Customer Representative		Date	

 <b>MEG ENERGY</b>	<b>CHRISTINA LAKE REGIONAL PROJECT</b> <b>Phase 3A EPC for Central Plant Facilities</b> <b>SLI Project No. 511036</b>	 <b>SNC-LAVALIN</b>

 <b>SNC-LAVALIN</b>	<input type="checkbox"/> A1 Not suitable to initiate fabrication, modify as noted, resubmit for review
	<input type="checkbox"/> B1 Suitable to initiate fabrication as noted; modify as noted, resubmit for review
Vendor's drawing review for conformity with specifications and design drawing.	<input type="checkbox"/> C1 Suitable to fabricate to completion as noted, submit final documents including as-builts as required
This review does not relieve the vendor of his responsibility for errors in design and detailing as detailed in his contract.	<input type="checkbox"/> D1 Suitable to fabricate to completion, submit final documents including as-built documents as required
	<input type="checkbox"/> E1 Not suitable as final documents as noted, modify as noted and resubmit.
	<input checked="" type="checkbox"/> F1 Suitable as final documents, no further resubmittal required (unless revised by Vendor)
Vendor: Ecodyne Limited ( Canada ) - 12123      No.: 32125-A-2910      Rev: A      Date Rec'd 2013-03-11	
Doc. Title: M00.08 - NDE PROCEDURES - VESSELS - Tag:All	
Client Code:	Project: MEG Phase 3A EPC
Reviewed by: <i>[Signature]</i>	Document No
Date: <i>Mar 18, 2013</i>	P-5675-02-0043
	Submittal 01




AFTER FILTERS & WAC  
3A-F-208 A to G & 3A-V-211 A to F  
**NDE Procedures**  
**ASME Vessels**

Contents:

Cover  
Radiography Procedure (KV) RT#6 rev 02  
Magnetic Particle Inspection Procedure (KV) NDT#3 rev 02  
Magnetic Particle Inspection Procedure (Martin's) MPI-02 rev 02  
Liquid Penetrant Inspection Procedure (KV) KV#16

1 Page  
21 Page  
11 Page  
8 Page  
11 Page

<b>Title</b>  <b>NDE Procedures</b>  <b>After Filters / WAC</b> 3A-F-208 A to G / 3A-V-211 A to F  P.O.# P-5675-02					<b>Customer</b>  <b>MEG ENERGY CORP.</b> CALGARY, ALBERTA  <b>CHRISTINA REGIONAL PROJ.</b> PHASE 3A- CPF  ENG.: SNC- LAVALIN								
					SCALE -			<b>ECODYNE</b> Limited   A Marmon Water/Berkshire Hathaway Company  <small>THIS DRAWING IS THE PROPERTY OF ECODYNE LIMITED. IT IS NOT TO BE USED FOR ANY PURPOSES DETRIMENTAL TO THE INTEREST OF THIS COMPANY AND IS SUBJECT TO RETURN UPON REQUEST.</small>					
						BY	DATE		DWG. NO.  <b>32125-A-2910</b>		REV.  <b>A</b>		
						DRN	TP	MAR 07 2013					
A		MAR 07 2013		FIRST ISSUE		TP		TM					MAR 07 2013
REV		DATE		REMARKS		BY		CHKD		APPD		MAR 07 2013	

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## **RADIOGRAPHY PROCEDURE**

**RT # 6**

**Rev. 02**

**September 2011**

**Ref. ASME Section V**  
**Article 2 & 22**  
**2010 Edition, 2011a Addendum**

**Ed Duitschaever**  
**SNT-TC-1A Level III**  
**48.9712 CGSB Level II**

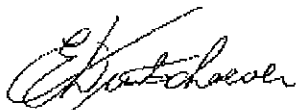
# RADIOGRAPHY PROCEDURE

RT # 6 - Rev. 02

## INDEX

1.0	Scope	13.0	Location Markers
2.0	Personnel	14.0	Backscatter
3.0	Acceptance Criteria	15.0	Examination Methods
4.0	Source of Radiation	16.0	Film Processing
5.0	Film	17.0	Film Density
6.0	Screens	18.0	Identification of Radiographs
7.0	Minimum Source - to - Object Distance	19.0	Evaluation
8.0	Maximum Distance from Source Side of Object to Film	20.0	Inspection Reports and Documentation
9.0	Geometric Unsharpness	21.0	Procedure Certification
10.0	Penetrameters (IQI's)	22.0	Revisions
11.0	IQI Sensitivity	23.0	Attachments
12.0	Shims		

Submitted By:  
**KV INSPECTION SERVICES LTD.**



Ed Duitschaever  
SNT-TC-1A Level III  
48.9712 CGSB Level II

**1.0 SCOPE:**

This procedure covers the techniques for radiography of all fabricated pipe and pressure vessel welds of ferritic and austenitic materials having circumferential and longitudinal butt welded seams in the .125" - 2.75" thickness range. It is based on requirements set forth in ASME Boiler and Pressure Vessel Code, Section V, Article 2 & Article 22 and ASME Boiler and Pressure Vessel Code Section VIII, (2010 Edition, 2011a Addendum).

**2.0 PERSONNEL:**

All radiography to be carried out by technicians certified to KV Inspection written practice Document No. 03-95 which meets SNT-TC-1A (2006 Edition). Interpretation to be carried out by personnel certified to Level II or III, SNT-TC-1A. In Canada NDE Technicians will be certified to the Canadian General Standards Board, CGSB CAN/CGSB-48.9712 in the NDE technique to be used. Examination techniques will be established by Level 3 certified personnel. Only Level 2 or 3 certified personnel will interpret and evaluate results.

**3.0 ACCEPTANCE CRITERIA:**

Interpretation of results will be in accordance with ASME Section VIII, Paragraph U.W. 51, (2010 Edition, 2011a Addendum) or ASME Section VIII Paragraph U.W. 52, as required, or criteria as required by contract. However the rules of UW-52(d) will apply for evaluation and retest (see attachment # 3). Porosity under UW-51 to be evaluated as per Appendix 4 (see attachment #4). Rules for UW-52 apply to spot radiography.

**4.0 SOURCE OF RADIATION:**

Up to 80 curies, Iridium 192, Type 1, housed in INC IR100 Exposure Device, source size 2.7mm diameter X 2.1mm long or Seifert-200kv Xray tube, 3mm x 3mm focal spot. The source supplier's decay curve shall be used for verification of source size.

**5.0 FILM:**

Unless otherwise specified by the manufacturer or the client, Class II film will be used such as Kodak AA, Gevaert D5P or Gevaert D7P.

**6.0 SCREENS:**

Lead Foil .010" front and back will be used.

**7.0 MINIMUM SOURCE - TO - OBJECT DISTANCE:**

Calculated not to exceed maximum geometric unsharpness.

**8.0 MAXIMUM DISTANCE FROM SOURCE SIDE OF OBJECT TO FILM:**

Calculated not to exceed maximum geometric unsharpness.

**9.0 GEOMETRIC UNSHARPNESS:**

Geometric unsharpness of the radiograph shall be determined in accordance with:

$$U_g = Fd/D$$

Where  $U_g$  = Geometric unsharpness

F = source size: the maximum projected dimension of the radiating source (or effective focal spot) in the plane perpendicular to the distance  $D$  from the weld or object being

radiographed, in

$D$  = distance from source of radiation to weld or object being radiographed, in

$d$  = distance from source side of weld or object being radiographed to the film

$D$  and  $d$  shall be determined at the approximate center of the area of interest.

**Geometric Unsharpness Limitations** - Recommended maximum values for geometric unsharpness are as follows:

Material Thickness, in. (mm)	$U_g$ Maximum, in. (mm)
Under 2 (50.8)	0.020 (0.51)
2 through 3 (50.8 - 76.2)	0.030 (0.76)
Over 3 through 4 ( 76.2 - 101.6)	0.040 (1.02)
Greater than 4 (101.6)	0.070 (1.78)

Note: Material thickness is the thickness on which the IQI is based.

#### 10.0 PENETRAMETERS (IQI):

- A. *Material* - IQIs shall be selected from either the same alloy material group or grade as identified in SE-1025, or SE-747, as applicable, or from an alloy material group or grade with less radiation absorption than the material being radiographed.
- B. *Size* - The designated hole IQI or essential wire shall be as specified in Table T-276. A thinner or thicker hole-type IQI may be substituted for any section thickness listed in Table T-276, provided an equivalent IQI sensitivity is maintained. See T-283.2.
- C. *Welds with Reinforcements* - The thickness on which the IQI is based is the nominal single-wall thickness plus the estimated weld reinforcement not to exceed the maximum permitted by the referencing Code Section. Backing rings or strips shall not be considered as part of the thickness in IQI selection. The actual measurement of the weld reinforcement is not required.
- D. *Welds without Reinforcements* - The thickness on which the IQI is based is the nominal single-wall thickness. Backing rings or strips shall not be considered as part of the weld thickness in IQI selection.
- E. *Welds Joining Dissimilar Materials or Welds With Dissimilar Filler Metal* - When the weld metal is of an alloy group or grade that has a radiation attenuation that differs from the base material, the IQI material selection shall be based on the weld metal and be in accordance with T-276.1. When the density limits of T-282.2 cannot be met with one IQI, and the exceptional density area(s) is at the interface of the weld metal and the base metal, the material selection for the additional IQIs shall be based on the base material and be in accordance with T-276.1.
- F. *Facilities for Viewing of Radiographs* - Viewing facilities shall provide subdued background lighting of an intensity that will not cause troublesome reflections, shadows, or glare on the radiograph. Equipment used to view radiographs for interpretation shall provide a variable light source sufficient for the essential IQI hole or designated wire to be visible for the specified density range. The viewing conditions shall be such that light from around the outer edge of the radiograph or coming through low-density portions of the radiograph does not interfere with interpretation.

G. *Placement of IQIs:*

- a) *Source-Side IQIs:* The IQI(s) shall be placed on the source side of the part being examined, except for the condition described in T-277.1 (b). When, due to part or weld configuration or size, it is not practical to place the IQI(s) on the part or weld, the IQI(s) may be placed on a separate block. Separate blocks shall be made up of the same or radiographically similar materials (as defined in SE-1025) and may be used to facilitate IQI positioning. There is no restriction on the separate block thickness, provided the IQI/area-of-interest density tolerance requirements of T-282.2 are met.
- i) The IQI on the source side of the separate block shall be placed no closer to the film than the source side of the part being radiographed.
  - ii) The separate block shall be placed as close as possible to the part being radiographed.
  - iii) The block dimensions shall exceed the IQI dimensions such that the outline of at least three sides of the IQI image shall be visible on the radiograph.
- b) *Film Side IQIs:* Where inaccessibility prevents hand placing the IQIs on the source side, the IQIs shall be placed on the film side in contact with the part being examined. A lead letter "F" shall be placed adjacent to or on the IQIs, but shall not mask the essential hole where hole IQIs are used.
- c) *IQI Placement for Welds - Hole IQIs:* The IQIs may be placed adjacent to or on the weld. The identification number(s) and, when used, the lead letter "F", shall not be in the area of interest, except when geometric configuration makes it impractical.
- d) *IQI Placement for Welds - Wire IQIs:* The IQIs shall be placed on the weld so that the length of the wires is perpendicular to the length of the weld.
- e) *IQI Placement for Materials other than Welds:* The IQIs with the IQI identification number(s), and, when used, the lead letter "F", may be placed in the area of interest.
- f) *Number of IQI's:* When one or more film holders are used for an exposure, at least one IQI image shall appear on each radiograph except as outlined in (b) below.

## (a) Multiple IQIs:

If the requirements of T-282 are met by using more than one IQI, one shall be representative of the lightest area of interest and the other the darkest area of interest; the intervening densities on the radiography shall be considered as having acceptable density.

## (b) Special Cases:

- 1) For cylindrical components where the source is placed on the axis of the component for a single exposure, at least three IQIs, spaced approximately 120° apart, are required under the following conditions:
  - i) When the complete circumference is radiographed using one or more film holders, or
  - ii) When a section(s) of the circumference, where the length between the ends of the outermost sections span 240° or more, is radiographed using one or more film holders. Additional film locations may be required to obtain necessary IQI spacing.

- 2) For cylindrical components where the source is placed on the axis of the component for a single exposure, at least three IQIs, with one placed at each end of the span of the circumference radiographed and one in the approximate center of the span, are required under the following conditions:
  - i) When a section of the circumference, the length of which is greater than  $120^{\circ}$  and less than  $240^{\circ}$  is radiographed using just one film, or
  - ii) When a section(s) of the circumference, where the length between the ends of the outermost sections span less than  $240^{\circ}$  is radiographed using more than one film holder.
- 3) In (1) and (2) above, where sections of longitudinal welds adjoining the circumferential weld are radiographed simultaneously with the circumferential weld, an additional IQI shall be placed on each longitudinal weld at the end of the section most remote from the junction with the circumferential weld being radiographed.
- 4) For spherical components where the source is placed at the center of the component for a single exposure, at least three IQIs, spaced approximately  $120^{\circ}$  apart, are required under the following conditions:
  - i) When a complete circumference is radiographed using one or more film holders, or
  - ii) When a section(s) of a circumference, where the length between the ends of the outermost sections span  $240^{\circ}$  or more, is radiographed using one or more film holders. Additional film locations may be required to obtain necessary IQI spacing.
- 5) For spherical components where the source is placed at the center of the component for single exposure, at least three IQIs, with one placed at each end of the radiographed span of the circumference radiographed and one in the approximate center of the span, are required under the following conditions:
  - i) When a section of a circumference, the length of which is greater than  $120^{\circ}$  and less than  $240^{\circ}$ , is radiographed using just one film holder, or
  - ii) When a section or sections of a circumference, where the length between the ends of the outermost sections span less than  $240^{\circ}$  is radiographed using more than just one film holder.
- 6) In (4) and (5) above, where other welds are radiographed simultaneously with the circumferential weld, one additional IQI shall be placed on each other weld.
- 7) For segments of a flat or curved (ie. Ellipsoidal, torispherical, toriconical, elliptical, etc.) component where the source is placed perpendicular to the center of a length of weld for a single exposure when using more than three film holders, at least three IQIs, one placed at each end of the radiographed span and one in the approximate center of the span, are required.
- 8) When an array of components in a circle is radiographed, at least one IQI shall show on each component image.
- 9) In order to maintain the continuity of records involving subsequent exposures, all radiographs exhibiting IQIs that quality the techniques permitted in accordance with (1) through (6) above shall be retained.

### 11.0 IQI SENSITIVITY

- A) *Required Sensitivity:* Radiography shall be performed with a technique of sufficient sensitivity to display the designated hole IQI image and the 2T hole, or the essential wire of a wire IQI. The radiograph shall also display the IQI identifying numbers and letters. If the designated hole IQI image and 2T hole, or essential wire, do not show on any film in a multiple film technique, but do show in composite film viewing, interpretation shall be permitted only by composite film viewing.
- B) *Equivalent Hole-Type Sensitivity:* If a thinner or thicker hole-type IQI than listed in Table T-276 was substituted, an equivalent IQI sensitivity, as specified in Table T-283, shall have been maintained as well as all other requirements for radiography having been met.

### 12.0 SHIMS UNDER HOLE -TYPE IQIs:

For welds, a shim of material radiographically similar to the weld metal will be placed between the part and the penetrometer, if needed, so that the radiographic density throughout the area of interest is no more than minus 15% from (lighter than) the radiographic density through the penetrometer. The shim dimensions will exceed the penetrometer dimensions such that the outline of at least three sides of the penetrometer image will be visible on the radiograph.

### 13.0 LOCATION MARKERS:

Location markers, which are to appear as radiographic images on the film, shall be placed on the part, not on the exposure holder/ cassette. Their locations shall be permanently marked on the surface of the part being radiographed when permitted, or on a map, in a manner permitting the area of interest on a radiograph to be accurately traceable to its location on the part, for the required retention period of the radiograph that the required coverage of the region being examined has been obtained. Location markers shall be placed as follows.

#### Single-Wall Viewing

- (A) **Source Side Markers:** Location markers shall be placed on the source side when radiographing the following:
1. Flat components or longitudinal joints in cylindrical or conical components
  2. Curved or spherical components whose concave side is toward the source and when the "source-to-material" distance is less than the inside radius of the component.
  3. Curved or spherical components whose convex side is toward the source.
- (B) **Film Side Markers:**
1. Location markers shall be placed on the film side when radiographing either curved or spherical components whose concave side is toward the source and when the "source-to-material" distance is greater than the inside radius.
  2. As an alternative to source-side placement in (A) (1), location markers may be placed on the film side when the radiograph shows coverage beyond the location markers to the extent demonstrated by Fig. T-275 sketch, and when this alternate is documented in accordance with T-291.
- (C) **Either Side Markers:** Location markers may be placed on either side or film side when radiographing either curved or spherical components whose concave side is toward the source and the "source-to-material" distance equals the inside radius of the component.



For double-wall viewing, at least one location marker shall be placed adjacent to the weld (or on the material in the area of interest) for each radiograph.

#### **Mapping the Placement of Location Markers**

When inaccessibility or other limitations prevent the placement of markers as stipulated in T-275.1 and T-275.2, a dimension map of the actual marker placement shall accompany the radiographs to show that full coverage has been obtained.

### **14.0 BACKSCATTER:**

Backscatter will be monitored by placing a lead symbol "B", ½ inch high and 1/16th inch thick, on the back of each film holder. If the letter appears on any radiograph, the radiograph will be retaken with additional precautions to guard against backscatter. If a light image of the "B" as described in T-223, appears on a darker background of the radiograph, protection from backscatter is insufficient and the radiograph shall be considered unacceptable. (A dark image of the "B" on a lighter background is not cause for rejection )

### **15.0 EXAMINATION METHODS:**

A single-wall exposure technique will be used for radiography whenever practical. When it is not practical to use a single-wall technique, a double-wall technique will be used. An adequate number of exposures will be made to demonstrate that the required coverage has been obtained.

#### **Single-Wall Technique**

In the single wall technique, the radiation passes through only one wall of the weld (material), which is viewed for acceptance on the radiograph.

#### **Double-Wall Technique**

When it is not practical to use a single-wall technique, one of the following double-wall techniques will be used.

- (a) **Single-Wall Viewing.** For materials and for welds in components, a technique may be used in which the radiation passes through two walls and only the weld (material) on the film side wall is viewed for acceptance on the radiograph. When complete coverage is required for circumferential welds (material), a minimum of three exposures taken 120° to each other will be made.
- (b) **Double-Wall Viewing.** For materials and for welds in components 3½" (89mm) or less in nominal outside diameter, a technique may be used in which the radiation passes through two walls and the weld (material) in both walls is viewed for acceptance on the same radiograph. For double-wall viewing, only a source side penetrameter will be used. Care should be exercised to ensure that the required geometric unsharpness is not exceeded. If the geometric unsharpness requirement cannot be met, then single-wall viewing will be used.
  - (1) For welds, the radiation beam may be offset from the plane of the weld at an angle sufficient to separate the images of the source side and film side portions of the weld so that there is no overlap of the areas to be interpreted. When complete coverage is required, a minimum of two exposures taken 90° to each other will be made for each joint.

- (2) As an alternative, the weld may be radiographed with the radiation beam positioned so that the images of both walls are superimposed. When complete coverage is required, a minimum of three exposures taken at either 60° or 120° to each other will be made for each joint.
- (3) Additional exposures will be made if the required radiographic coverage cannot be obtained using the minimum number of exposures indicated in (b)(1) or (b)(2) above.

## **16.0 FILM PROCESSING:**

### **A. Manual Developing of Film**

1. Developing - Minimum 5 minutes @ 68°F.
2. Stop Bath - 30 seconds to one minute.
3. Fixer - Minimum 5 minutes
4. Wash - Minimum 20 minutes in running water
5. Rinse - Dip in photo-flow solution to promote even drying.
6. Drying - Manual drying can vary from still air drying at ambient temperature to as high as 140°F with air circulated by a fan. Follow manufacturers recommended drying conditions. Take precaution to tighten film on hangers so that it can not touch in the dryer. Too hot a drying temperature at low humidity should be avoided.

### **B. Automatic Processing of Film**

1. As a general guideline follow the manufacturer's recommendations for industrial processing of film.
2. Solution temperatures are to be checked daily with a thermometer to ensure that the processor's thermometers are accurate.
3. Check machine speed to comply with the manufacturer recommendations.
4. Check the replenishment of solutions. These are ongoing checks as films are being processed.
5. Ensure rollers are clean with no foreign matter settled on the rollers.
6. Make sure that the dryer is clean and that no foreign matter is settled on the rollers.
7. Ensure films are uniformly dried.
8. The heat setting used for air temperature should be compatible with the film manufacturer's recommendations.

## **17.0 FILM DENSITY:**

### **A. Density Limitations**

The transmitted film density through the radiographic image of the body of the appropriate hole penetrometer or adjacent to the designated wire of a wire penetrometer and the area of interest will be 1.8 minimum for single film viewing for radiographs made with an X-ray source and 2.0 minimum for radiographs made with a gamma ray source. For composite viewing of multiple film exposures, each film of the composite set will have a minimum density of 1.3. The maximum density will be 4.0 for either single or composite viewing. A tolerance of 0.05 in density is allowed for variations between densitometer readings.

**B. Density Variations**

- a) General - If the density of the radiograph anywhere through the area of interest varies by more than minus 15% or plus 30% from the density through the body of the hole penetrameter or adjacent to the designated wire of a wire penetrameter, within the minimum/maximum allowable density ranges specified as above, then an additional penetrameter will be used for each exceptional area or areas and the radiograph retaken. When calculating the allowable variation in density, the calculation may be rounded to the nearest 0.1 within the range as specified above.
- b) With Shims - When shims are used the plus 30% density restriction of (a) above may be exceeded, provided the required penetrameter sensitivity is displayed and the density limitations of above are not exceeded.
- c) Density Measurement - Film density to be measured by calibrated densitometer or by comparison to certified film density strip as per ASME Section V, Article 2 Para. T262 which reads as follows:

*Densitometers - Densitometers shall be calibrated at least every 90 days during use as follows:*

- i) A national standard step tablet or a step wedge calibration film, traceable to a national standard step tablet and having at least 5 steps with neutral densities from at least 1.0 through 4.0, shall be used. The step wedge calibration film shall have been verified within the last year by comparison with a national standard step tablet unless prior to first use, it was maintained in a light tight and waterproof sealed package as supplied by the Manufacturer. Step wedge calibration films may be used without verification for one year upon opening, provided it is within the manufacturer's stated shelf life.
- ii) The densitometer manufacturer's step-by-step instructions for the operation of the densitometer shall be followed.
- iii) The density steps closest to 1.0, 2.0, 3.0 and 4.0 on the national standard step tablet or step wedge calibration film shall be read.
- iv) The densitometer is acceptable if the density readings do not vary by more than  $\pm 0.05$  density units from the actual density stated on the national step tablet or step wedge calibration film.

*Step Wedge Comparison Films: - Step wedge comparison films shall be verified prior to first use, unless performed by the manufacturer as follows:*

- i) The density of the steps on a step wedge comparison film shall be verified by a calibrated densitometer.
- ii) The step wedge comparison film is acceptable if the density readings do not vary by more than  $\pm 0.1$  density units from the density stated on the step wedge comparison film.

*Periodic Verification:*

- i) *Densitometers* - Periodic calibration verification checks shall be performed as described in T-262.1 at the beginning of each shift, after 8 hours of continuous use, or after change of apertures, whichever comes first. The densitometer is acceptable if the density readings are

within  $\pm 0.05$  of the calibration readings determined in T-262.1 (c).

- ii) *Step Wedge Comparison Films:* Verification checks shall be performed annually per T-262.2.

*Documentation:*

- i) *Densitometer* calibration readings required by T-262.1 (c) shall be documented, but the actual readings for each step do not have to be recorded. Periodic verification readings required by T-262.3 do not have to be recorded.
- ii) *Step Wedge Calibration Films:* Step wedge calibration film verifications required by T-262.1 (a) shall be documented, but the actual readings for each step do not have to be recorded.
- iii) *Step Wedge Calibration Films:* Step wedge calibration film verifications required by T-262.2 and T-262.3 (b) shall be documented, but the actual readings for each step do not have to be recorded.

## 18.0 IDENTIFICATION OF RADIOGRAPHS:

A system shall be used to produce permanent identification on the radiograph traceable to the contract, component, weld or weld seam, or part numbers, as appropriate. In addition, the Manufacturer's symbol or name and the date of the radiograph shall be plainly and permanently included on the radiograph. This identification system does not necessarily require that the information appear as radiographic images. In any case, this information shall not obscure the area of interest.

Each radiograph will show the following information:

1. Manufacturer's name or initials.
2. Contract or job number.
3. Vessel, component, weld, seam or spot number.
4. Location markers - at least two location markers will be shown on each film. Markers at extremities of area of interest on each film will be common to adjacent films, to indicate that sufficient coverage has been achieved.
5. Date of inspection  
[ASME Section V, Article 2, T275 (2010 Edition, 2011a Addendum)]

## 19.0 EVALUATION

**Quality of Radiographs:** All radiograph shall be free from mechanical, chemical, or other blemishes to the extent that they do not mask and are not confused with the image of any discontinuity in the area of interest of the object being radiographed. Such blemishes include, but are not limited to:

- (a) fogging
- (b) processing defects such as streaks, watermarks, or chemical stains;
- (c) scratches, finger marks, crimps, dirtiness, static marks, smudges, or tears;
- (d) false indications due to defective screens.

**20.0 INSPECTION REPORTS AND DOCUMENTATION**

**Evaluation by Manufacturer:** The appointed Level II or Level III examiner shall be responsible for interpretation, evaluation, and acceptance of the completed radiographs to assure compliance with the requirements of Article 2 and the referencing Code Section. The Manufacturer will be responsible for the review and acceptance. As an aid to the review and evaluation, the radiographic technique documentation required by T-291 shall be completed prior to the evaluation. The radiograph review form required by T-292 shall be completed during the evaluation. The radiographic technique details and the radiograph review form documentation shall accompany the radiographs. Acceptance shall be completed prior to presentation of the radiographs and accompanying documentation to the Inspector.

**Radiographic Technique Documentation Details:** The appointed level II or Level III examiner shall prepare and document the radiographic technique details. As a minimum, the following shall be provided:

1. Identification - manufacturer's name or initials  
Contract/job number  
Vessel, component, weld, weld seam or spot number
2. The dimensional map (if used) of marker placement in accordance with T-275.3
3. Number of radiographs (exposures)
4. X-ray voltage or isotope type used
5. Source size
6. Base material type and thickness, weld thickness, weld reinforcement thickness, as applicable
7. Source-object-distance
8. Distance from source side of object to the film
9. Film manufacturer and type used
10. Number of film in each film holder/cassette
11. Single or double wall exposure and viewing

See attachment #2 Radiographic Examination Report which is in accordance with T.292

**21.0 PROCEDURE CERTIFICATION**

This standard inspection and weld test procedure is prepared in accordance with T-150, ASME Section V, Article 1 (2010 Edition, 2011a Addendum).

**22.0 REVISIONS:**

Rev. 00	June 2010
Rev. 01	February 2011
Rev. 02	September 2011

**23.0 ATTACHMENTS:**

- 1 Radiography technique sheets (2 of)
2. RT inspection report sheet (1 of)
3. ASME Section VIII, Div. 1, Paragraph UW-51 and UW-52 (2010 Edition, 2011a Addendum)
4. ASME Section VIII, Appendix 7 (2010 Edition, 2011a Addendum)

## ATTACHMENT 1 (1 of 2)

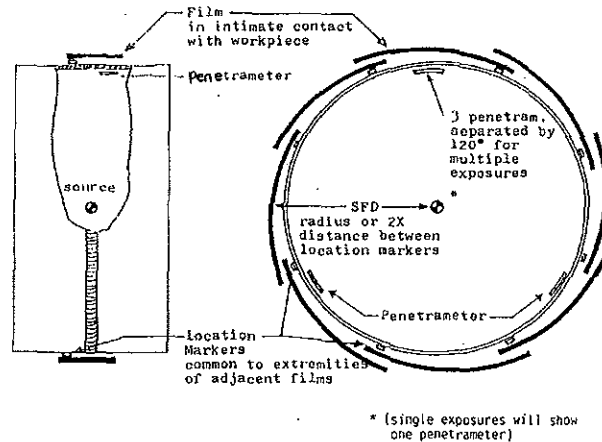
TECHNIQUE FOR SINGLE OR MULTIPLE EXPOSURES ON  
CIRCUMFERENTIAL BUTT WELDS

Technique 1A

Minimum O.D. - Greater than 3½ inches.

Exposure Technique - Single Wall T-271Radiograph Viewing - Single WallI.Q.I. Penetrator - Selection - T-276

- Placement - Source side T-277.1a  
- Film side T-277.1b

Location Marker Placement - Either side T-275Source - Weld - Film Arrangement

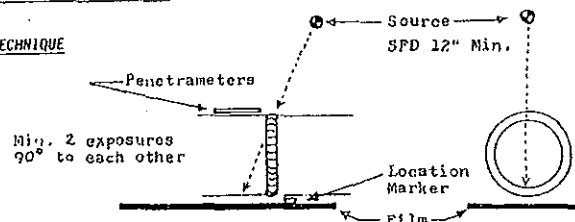
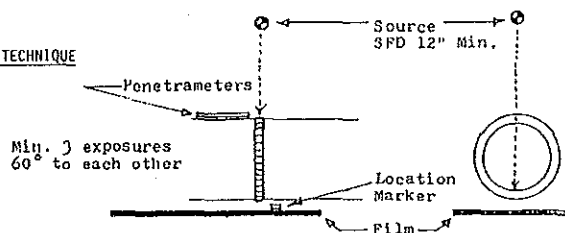
TECHNIQUE FOR BUTT WELDS ON  
SMALL DIAMETER PIPE

Technique 1C

Maximum O.D. - 3½ inches

Exposure Technique - Double Wall T 272.1Radiograph Viewing - Double WallI.Q.I. Penetrator - Selection - T 276

- Placement - Source side - T 277.1 (a)

Location Marker Placement - Either side T 275Source - Weld - Film ArrangementELLIPTICAL TECHNIQUESUPERIMPOSED TECHNIQUE

## ATTACHMENT # 1 (2 of 2)

TECHNIQUE FOR SINGLE EXPOSURES  
ON LONGITUDINAL BUTT WELDED SEAMS

Technique 10

Minimum O.D. - See note 1

Exposure technique - Single wall T-271.

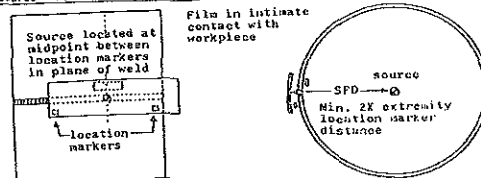
Radiograph Viewing - Single Wall

I.Q.I. Penetrator - Selection - T-276

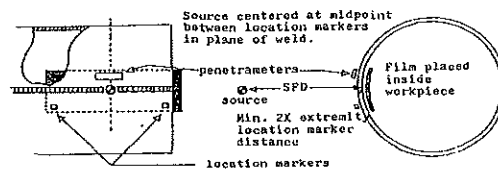
- Placement - Source side - T-277.1 (a)

Location Marker Placement - Either side - T-275.

Source - Weld - Film Arrangement



Note 1: When O.D. of workpiece makes it impossible to achieve minimum SPD of 2X extremity location marker distance, the following variation of the above technique will be used.



**ATTACHMENT #2**[illegible]



## ATTACHMENT # 3 (1 of 2)

## 2011a SECTION VIII — DIVISION 1

UW-51 RADIOGRAPHIC EXAMINATION OF (a)  
WELDED JOINTS

(a) All welded joints to be radiographed shall be examined in accordance with Article 2 of Section V except as specified below.

(1) A complete set of radiographs and records, as described in Article 2 of Section V, for each vessel or vessel part shall be retained by the Manufacturer, as follows:

(a) films until the Manufacturer's Data Report has been signed by the Inspector;

(b) records as required by this Division (10-13).

(2) A written radiographic examination procedure is not required. Demonstration of density and penetrameter image requirements on production or technique radiographs shall be considered satisfactory evidence of compliance with Article 2 of Section V.

(3) The requirements of T-274.2 of Article 2 of Section V are to be used only as a guide. Final acceptance of radiographs shall be based on the ability to see the prescribed penetrameter image and the specified hole or the designated wire of a wire penetrameter.

(4) As an alternative to the radiographic examination requirements above, all welds in material  $\frac{1}{2}$  in. (13 mm) and greater in thickness may be examined using the ultrasonic (UT) method per the requirements of 7.5.5 of Section VIII, Division 2.

(b) Indications shown on the radiographs of welds and characterized as imperfections are unacceptable under the following conditions and shall be repaired as provided in UW-38, and the repair radiographed to UW-51 or, at the option of the Manufacturer, ultrasonically examined in accordance with the method described in Appendix 12 and the standards specified in this paragraph, provided the defect has been confirmed by the ultrasonic examination to the satisfaction of the Authorized Inspector prior to making the repair. For material thicknesses in excess of 1 in. (25 mm), the concurrence of the user shall be obtained.

This ultrasonic examination shall be noted under remarks on the Manufacturer's Data Report Form:

(1) any indication characterized as a crack or zone of incomplete fusion or penetration;

(2) any other elongated indication on the radiograph which has length greater than:

(a)  $\frac{1}{4}$  in. (6 mm) for  $t$  up to  $\frac{3}{4}$  in. (19 mm)

(b)  $\frac{1}{2}t$  for  $t$  from  $\frac{3}{4}$  in. (19 mm) to  $2\frac{1}{4}$  in. (57 mm)

(c)  $\frac{3}{4}$  in. (19 mm) for  $t$  over  $2\frac{1}{4}$  in. (57 mm)

where

$t$  = the thickness of the weld excluding any allowable reinforcement. For a butt weld joining two members having different thicknesses at the weld,  $t$  is the thinner of these two thicknesses. If a full penetration weld includes a fillet weld, the thickness of the throat of the fillet shall be included in  $t$ .

(3) any group of aligned indications that have an aggregate length greater than  $t$  in a length of  $12t$ , except when the distance between the successive imperfections exceeds  $6L$  where  $L$  is the length of the longest imperfection in the group;

(4) rounded indications in excess of that specified by the acceptance standards given in Appendix 4.

## ATTACHMENT # 3 (2 of 2)

## 2011a SECTION VIII — DIVISION 1

## UW-52 SPOT EXAMINATION OF WELDED JOINTS

NOTE: Spot radiographing of a welded joint is recognized as an effective inspection tool. The spot radiography rules are also considered to be an aid to quality control. Spot radiographs made directly after a welder or an operator has completed a unit of weld proves that the work is or is not being done in accordance with a satisfactory procedure. If the work is unsatisfactory, corrective steps can then be taken to improve the welding in the subsequent units, which unquestionably will improve the weld quality.

Spot radiography in accordance with these rules will not ensure a fabrication product of predetermined quality level throughout. It must be realized that an accepted vessel under these spot radiography rules may still contain defects which might be disclosed on further examination. If all radiographically disclosed weld defects must be eliminated from a vessel, then 100% radiography must be employed.

(a) Butt welded joints which are to be spot radiographed shall be examined locally as provided herein.

(b) *Minimum Extent of Spot Radiographic Examination*

(1) One spot shall be examined on each vessel for each 50 ft (15 m) increment of weld or fraction thereof for which a joint efficiency from column (b) of Table UW-12 is selected. However, for identical vessels or parts, each with less than 50 ft (15 m) of weld for which a joint efficiency from column (b) of Table UW-12 is selected, 50 ft (15 m) increments of weld may be represented by one spot examination.

(2) For each increment of weld to be examined, a sufficient number of spot radiographs shall be taken to examine the welding of each welder or welding operator. Under conditions where two or more welders or welding operators make weld layers in a joint, or on the two sides of a double-welded butt joint, one spot may represent the work of all welders or welding operators.

(3) Each spot examination shall be made as soon as practicable after completion of the increment of weld to be examined. The location of the spot shall be chosen by the Inspector after completion of the increment of welding to be examined, except that when the Inspector has been notified in advance and cannot be present or otherwise make the selection, the Manufacturer may exercise his own judgment in selecting the spots.

(4) Radiographs required at specific locations to satisfy the rules of other paragraphs, such as UW-9(d), UW-11(a)(5)(b), and UW-14(b), shall not be used to satisfy the requirements for spot radiography.

(c) *Standards for Spot Radiographic Examination.* Spot examination by radiography shall be made in accordance with the technique prescribed in UW-51(a). The minimum length of spot radiograph shall be 6 in. Spot radiographs may be retained or be discarded by the Manufacturer after acceptance of the vessel by the Inspector. The acceptability of welds examined by spot radiography shall be judged by the following standards:

(1) Welds in which indications are characterized as cracks or zones of incomplete fusion or penetration shall be unacceptable.

(2) Welds having indications characterized as slag inclusions or cavities are unacceptable when the indication length exceeds  $\frac{2}{3}t$ , where  $t$  is defined as shown in UW-51(b)(2). For all thicknesses, indications less than  $\frac{1}{4}$  in. (6 mm) are acceptable, and indications greater than  $\frac{1}{4}$  in. (19 mm) are unacceptable. Multiple aligned indications meeting these acceptance criteria are acceptable when the sum of their longest dimensions indications does not exceed  $t$  within a length of  $6t$  (or proportionally for radiographs shorter than  $6t$ ), and when the longest length  $L$  for each indication is separated by a distance not less than  $3L$  from adjacent indications.

(3) Rounded indications are not a factor in the acceptability of welds not required to be fully radiographed.

(d) *Evaluation and Retests*

(1) When a spot, radiographed as required in (b)(1) or (b)(2) above, is acceptable in accordance with (c)(1) and (c)(2) above, the entire weld increment represented by this radiograph is acceptable.

(2) When a spot, radiographed as required in (b)(1) or (b)(2) above, has been examined and the radiograph discloses welding which does not comply with the minimum quality requirements of (c)(1) or (c)(2) above, two additional spots shall be radiographically examined in the same weld increment at locations away from the original spot. The locations of these additional spots shall be determined by the Inspector or fabricator as provided for the original spot examination in (b)(3) above.

(a) If the two additional spots examined show welding which meets the minimum quality requirements of (c)(1) and (c)(2) above, the entire weld increment represented by the three radiographs is acceptable provided the defects disclosed by the first of the three radiographs are removed and the area repaired by welding. The weld repaired area shall be radiographically examined in accordance with the foregoing requirements of UW-52.

(b) If either of the two additional spots examined shows welding which does not comply with the minimum quality requirements of (c)(1) or (c)(2) above, the entire increment of weld represented shall be rejected. The entire rejected weld shall be removed and the joint shall be rewelded or, at the fabricator's option, the entire increment of weld represented shall be completely radiographed and only defects need be corrected.

(c) Repair welding shall be performed using a qualified procedure and in a manner acceptable to the Inspector. The rewelded joint, or the weld repaired areas, shall be spot radiographically examined at one location in accordance with the foregoing requirements of UW-52.

## ATTACHMENT 4 (1 of 4)

## MANDATORY APPENDIX 4

### ROUNDED INDICATIONS CHARTS

### ACCEPTANCE STANDARD FOR

### RADIOGRAPHICALLY DETERMINED

### ROUNDED INDICATIONS IN WELDS

#### 4-1 APPLICABILITY OF THESE STANDARDS

These standards are applicable to ferritic, austenitic, and nonferrous materials.

#### 4-2 TERMINOLOGY

(a) *Rounded Indications.* Indications with a maximum length of three times the width or less on the radiograph are defined as rounded indications. These indications may be circular, elliptical, conical, or irregular in shape and may have tails. When evaluating the size of an indication, the tail shall be included. The indication may be from any imperfection in the weld, such as porosity, slag, or tungsten.

(b) *Aligned Indications.* A sequence of four or more rounded indications shall be considered to be aligned when they touch a line parallel to the length of the weld drawn through the center of the two outer rounded indications.

(c) *Thickness  $t$ .*  $t$  is the thickness of the weld, excluding any allowable reinforcement. For a butt weld joining two members having different thicknesses at the weld,  $t$  is the thinner of these two thicknesses. If a full penetration weld includes a fillet weld, the thickness of the throat of the fillet shall be included in  $t$ .

#### 4-3 ACCEPTANCE CRITERIA

(a) *Image Density.* Density within the image of the indication may vary and is not a criterion for acceptance or rejection.

(b) *Relevant Indications.* (See Table 4-1 for examples.) Only those rounded indications which exceed the following dimensions shall be considered relevant.

(1)  $\frac{1}{16}t$  for  $t$  less than  $\frac{1}{8}$  in. (3 mm)

(2)  $\frac{1}{64}$  in. for  $t$  from  $\frac{1}{8}$  in. to  $\frac{1}{4}$  in. (3 mm to 6 mm), incl.

(3)  $\frac{1}{32}$  in. for  $t$  greater than  $\frac{1}{4}$  in. to 2 in. (6 mm to 50 mm), incl.

(4)  $\frac{1}{16}$  in. for  $t$  greater than 2 in. (50 mm)

(c) *Maximum Size of Rounded Indication.* (See Table 4-1 for examples.) The maximum permissible size of any indication shall be  $\frac{1}{4}t$ , or  $\frac{1}{32}$  in. (4 mm), whichever is smaller; except that an isolated indication separated from an adjacent indication by 1 in. (25 mm) or more may be  $\frac{1}{2}t$ , or  $\frac{1}{4}$  in. (6 mm), whichever is less. For  $t$  greater than 2 in. (50 mm) the maximum permissible size of an isolated indication shall be increased to  $\frac{3}{8}$  in. (10 mm).

(d) *Aligned Rounded Indications.* Aligned rounded indications are acceptable when the summation of the diameters of the indications is less than  $t$  in a length of  $12t$ . See Fig. 4-1. The length of groups of aligned rounded indications and the spacing between the groups shall meet the requirements of Fig. 4-2.

(e) *Spacing.* The distance between adjacent rounded indications is not a factor in determining acceptance or rejection, except as required for isolated indications or groups of aligned indications.

(f) *Rounded Indication Charts.* The rounded indications characterized as imperfections shall not exceed that shown in the charts. The charts in Figs. 4-3 through 4-8 illustrate various types of assorted, randomly dispersed and clustered rounded indications for different weld thicknesses greater than  $\frac{1}{8}$  in. (3 mm). These charts represent the maximum acceptable concentration limits for rounded indications. The charts for each thickness range represent full-scale 6 in. (150 mm) radiographs, and shall not be enlarged or reduced. The distributions shown are not necessarily the patterns that may appear on the radiograph, but are typical of the concentration and size of indications permitted.

(g) *Weld Thickness  $t$  less than  $\frac{1}{8}$  in. (3 mm).* For  $t$  less than  $\frac{1}{8}$  in. (3 mm) the maximum number of rounded indications shall not exceed 12 in a 6 in. (150 mm) length of weld. A proportionally fewer number of indications shall

## ATTACHMENT 4 (2 of 4)

## 2011a SECTION VIII — DIVISION 1

TABLE 4-1

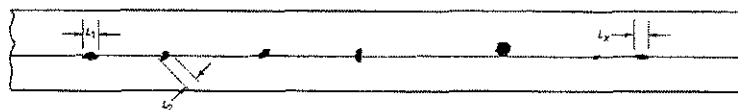
Customary Units			
Thickness $t$ , in.	Maximum Size of Acceptable Rounded Indication, in.		Maximum Size of Nonrelevant Indication, in.
	Random	Isolated	
Less than $\frac{1}{8}$	$\frac{1}{4}t$	$\frac{1}{2}t$	$\frac{1}{16}t$
$\frac{1}{8}$	0.031	0.042	0.015
$\frac{3}{16}$	0.047	0.063	0.015
$\frac{1}{4}$	0.063	0.083	0.015
$\frac{5}{16}$	0.078	0.104	0.031
$\frac{3}{8}$	0.091	0.125	0.031
$\frac{7}{16}$	0.109	0.146	0.031
$\frac{1}{2}$	0.125	0.168	0.031
$\frac{9}{16}$	0.142	0.188	0.031
$\frac{5}{8}$	0.156	0.210	0.031
$\frac{11}{16}$	0.156	0.230	0.031
$\frac{3}{4}$ to 2, incl.	0.156	0.250	0.031
Over 2	0.156	0.375	0.063
SI Units			
Thickness $t$ , mm	Maximum Size of Acceptable Rounded Indication, mm		Maximum Size of Nonrelevant Indication, mm
	Random	Isolated	
Less than 3	$\frac{1}{4}t$	$\frac{1}{2}t$	$\frac{1}{16}t$
3	0.79	1.07	0.38
5	1.19	1.60	0.38
6	1.60	2.11	0.38
8	1.98	2.64	0.79
10	2.31	3.18	0.79
11	2.77	3.71	0.79
13	3.18	4.27	0.79
14	3.61	4.78	0.79
16	3.96	5.33	0.79
17	3.96	5.84	0.79
19.0 to 50, incl.	3.96	6.35	0.79
Over 50	3.96	9.53	1.60

GENERAL NOTE: This Table contains examples only.

be permitted in welds less than 6 in. (150 mm) in length.

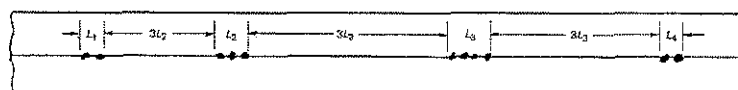
(h) *Clustered Indications.* The illustrations for clustered indications show up to four times as many indications in a local area, as that shown in the illustrations for random indications. The length of an acceptable cluster shall not exceed the lesser of 1 in. (25 mm) or  $2t$ . Where more than one cluster is present, the sum of the lengths of the clusters shall not exceed 1 in. (25 mm) in a 6 in. (150 mm) length weld.

## ATTACHMENT 4 (3 of 4)



GENERAL NOTE: Sum of  $L_1$  to  $L_n$  shall be less than  $t$  in a length of  $12t$ .

FIG. 4-1 ALIGNED ROUNDED INDICATIONS



GENERAL NOTE: Sum of the group lengths shall be less than  $t$  in a length of  $12t$ .

## Maximum Group Length

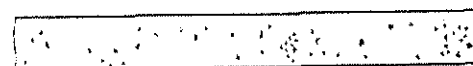
$L = \frac{1}{4}$  in. (6 mm) for  $t$  less than  $\frac{3}{4}$  in. (19 mm)  
 $L = \frac{1}{8}t$  for  $t \frac{3}{4}$  in. (19 mm) to  $2\frac{1}{4}$  in. (57 mm)  
 $L = \frac{3}{4}$  in. (19 mm) for  $t$  greater than  $2\frac{1}{4}$  in. (57 mm)

## Minimum Group Spacing

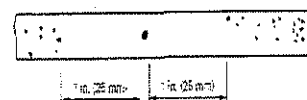
$3L$  where  $L$  is the length of the longest adjacent group being evaluated.

FIG. 4-2 GROUPS OF ALIGNED ROUNDED INDICATIONS

## MANDATORY APPENDIX -



(a) Random Rounded Indications (See Note (1))



(b) Isolated Indication (See Note (2))



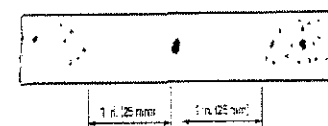
(c) Cluster

## NOTES:

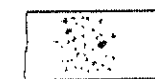
- (1) Typical concentration and size permitted in any 6 in. (152 mm) length of weld.  
 (2) Maximum size per Table 4-1.

FIG. 4-3 CHARTS FOR  $t$  EQUAL TO  $\frac{1}{2}$  in. to  $\frac{3}{4}$  in. (13 mm to 19 mm), INCLUSIVE

(a) Random Rounded Indications (See Note (1))



(b) Isolated Indication (See Note (2))



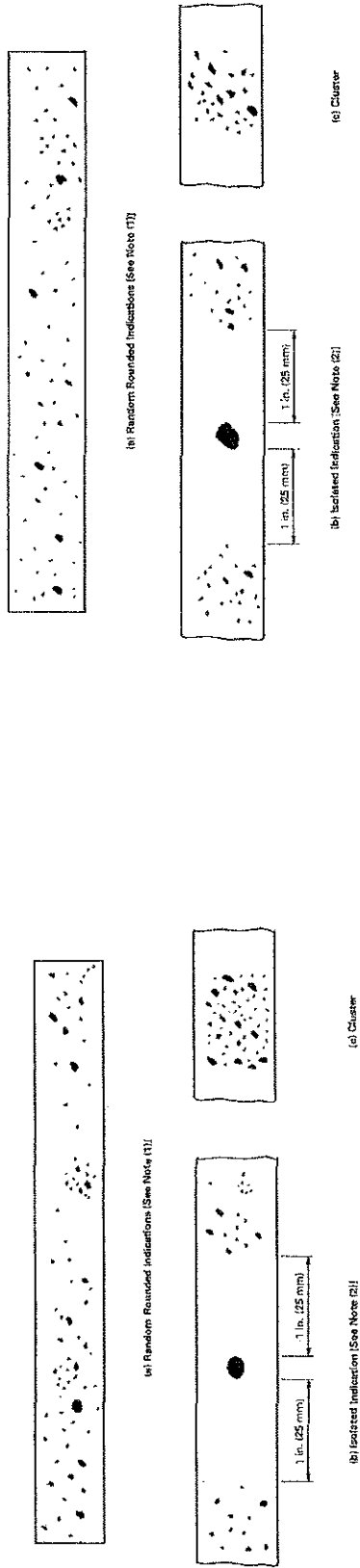
(c) Cluster

## NOTES:

- (1) Typical concentration and size permitted in any 6 in. (152 mm) length of weld.  
 (2) Maximum size per Table 4-1.

FIG. 4-4 CHARTS FOR  $t$  OVER  $\frac{3}{4}$  in. to  $2\frac{1}{2}$  in. (19 mm to 64 mm), INCLUSIVE

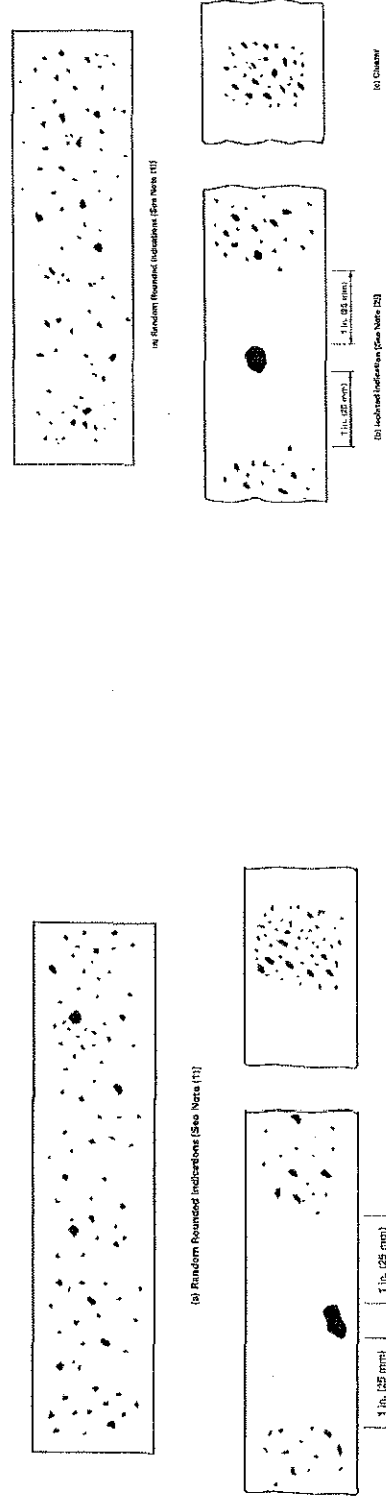
## ATTACHMENT 4 (4 of 4)



NOTES:

- (1) Typical concentration and also permitted in any 6 in. (150 mm) length of weld.
- (2) Maximum size per Table 4-1.

FIG. 4-6 CHARTS FOR COVER  $\frac{3}{4}$  IN. TO 2 IN. (19 mm TO 50 mm), INCLUSIVE



NOTES:

- (1) Typical concentration and also permitted in any 6 in. (150 mm) length of weld.
- (2) Maximum size per Table 4-1.

FIG. 4-7 CHARTS FOR COVER 2 IN. TO 4 IN. (50 mm TO 100 mm)

NOTES:

- (1) Typical concentration and also permitted in any 6 in. (150 mm) length of weld.
- (2) Maximum size per Table 4-1.

FIG. 4-7 CHARTS FOR COVER 2 IN. TO 4 IN. (50 mm TO 100 mm), INCLUSIVE

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## **MAGNETIC PARTICLE INSPECTION PROCEDURE**

**SPECIFICATION NO:**

**NDT # 3 Rev. 02**

**September 2011**

Ref. ASME Section V  
Article 7  
2010 Edition, 2011a Addendum

Ed Duitschaever  
SNT-TC-1A Level III  
48.9712 CGSB Level II

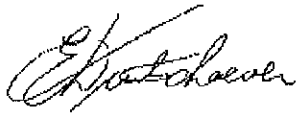
# GENERAL MAGNETIC PARTICLE INSPECTION PROCEDURE

NDT # 3, Rev. 02

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Submitted for  
KV INSPECTION SERVICES LTD



Ed Duitschaever  
SNT-TC-1A Level III  
CGSB Level II, (48.9712) - Reg. # 515



## **1.0 PURPOSE AND SCOPE**

The magnetic particle examination method and acceptance standards described herein will be used for the examination of all fabricated pipe and pressure vessel welds and base metals in ferromagnetic materials when required by the contract and complies with the requirements of ASME Section VIII, Division 1, Appendix 6 (2010 Edition, 2011a Addendum), ASME Sect. V, Article 7 (2010 Edition, 2011a Addendum) and ASME Section V, Article 25 SE709 (2010 Edition, 2011a Addendum).

## **2.0 REFERENCES**

ASME Section VIII, Division 1, Appendix 6, "Methods for Magnetic Particle Examination" (2010 Edition, 2011a Addendum).

ASME Section V, Article 7, (2010 Edition, 2011a Addendum), "Non-Destructive Examination."

ASME Section V, Article 25 SE709 (2010 Edition, 2011a Addendum), Standard Guide for Magnetic Particle Examination.

## **3.0 GENERAL REQUIREMENTS**

Contractual obligations imposed by code or specifications will have precedence over this procedure in the event of conflict.

Deviation from this procedure is not permitted without client authorization.

## **4.0 PERSONNEL**

All personnel associated with this examination will be qualified in accordance with C.G.S.B. 48.9712 and SNT-TC-1A (2006 Edition). Only Level II or Level III qualified personnel may evaluate results.

## **5.0 EQUIPMENT**

Magnaflux Yoke Type Y-6, Magnaflux P90, Parker Contour Probe DA-200, Electro Spect. - Ferrous Probe Model # ESX, or equivalent.

Magnaflux Ferromagnetic Powder 8A (red), 1 (grey) or 3A (black), Chemetall Oakite 825R (red), Circle Systems yellow dusting powder 66 or equivalent.

Chemetall Oakite 8901W contrast aid (or equivalent).

Parker Research Company magnetic particle blower Model PB1

Magnetic particle field indicator as per figure T-764.1.1, Article 7, ASME Section V, (2010 Edition, 2011a Addendum).

A calibrated Gold Bass Model DLM or Extech EA 31 - 1000 lx light meter or equivalent.

### **Calibration of Equipment:**

*Frequency:* Magnetizing equipment shall be calibrated at least once per year, or whenever the equipment has been subjected to major electric repair, periodic overhaul or damage. If the equipment has not been used for one year or more, calibration shall be done prior to first use.

*Light meters:* Light meters shall be calibrated at least once a year or whenever the light meter has been repaired. If light meters have not been in use for a year or more, calibration shall be done prior to first use

## **6.0**    **EXTENT AND METHOD**

All external and accessible internal surfaces defined by the client will be examined. The weld surface and 1"(25mm) either side of the reinforcement cap will be examined.

A check of the examination surface shall also be conducted to locate any discontinuity surface openings which may not attract and hold magnetic particle particles because of their width.

The method will be in accordance with ASME V, Article 7 (2010 Edition, 2011a Addendum). Examination will be done by the continuous method; that is the magnetizing current remains on while the examination medium is being removed.

Alternating or direct current will be used as required. Yoke method only.

## **7.0**    **PROCEDURE**

Sizes and shapes of items to be examined shall be unrestricted, provided the required magnetic flux can be proven adequate and maintained for the technique used.

Surface conditioning is not generally required unless surface irregularities are present that would otherwise mask the indication of discontinuities.

Prior to magnetic particle examination, the surface to be examined and any adjacent area within at least 1" (25mm) of the surface to be examined will be dry and free of any dirt, grease, scale, welding flux, spatter, oil or other extraneous matter that would interfere with the examination.

*Method of Particle Application:* Dry particles to be applied by dusting directly onto the surface of the part being examined

*Non-Magnetic Surface Contrast Enhancement* - Non-magnetic surface contrasts may be applied by the examiner to uncoated surfaces, only in amounts sufficient to enhance possible contrast. When non-magnetic surface contrast enhancement is used, it shall be demonstrated that indications can be detected through the enhancement. Thickness measurement of this non-magnetic surface contrast enhancement is not required.

If non-magnetic coatings are left on the part in the area being examined, it shall be demonstrated that indications can be detected through the existing maximum coating thickness applied. When AC yoke technique is used, the demonstration shall be to the satisfaction of the inspector in accordance with the requirements of the referencing Code Section.

Examination will not be done using dry particles on surfaces where temperature exceeds 600°F (316°C).

Each area will be examined at least twice, with the lines of flux in one case approximately perpendicular to the lines of flux in the other.

Field adequacy and direction will be checked by the magnetic particle field indicator.

*Yoke Method* - Each alternating current electromagnetic yoke will have a minimum lifting power of at least 10 lbs (4.5 kgs.) at the maximum pole spacing that will be 3" minimum to 4" maximum.

Each direct current or permanent magnetic yoke will have a lifting power of at least 40 lbs. (18.1 kgs.) at the maximum spacing that will be used.

The lifting power of the yoke is to be checked once yearly or after any repair to the yoke.

Each weight will be weighed with a scale from a reputable manufacturer and stencilled with the applicable nominal weight prior to the first use.

A weight need only be verified again if damaged in a manner that could have caused potential loss of material.

Examination will overlap to assure 100% coverage.

Surface discontinuities are indicated by accumulations of magnetic particles which should contrast with the examination surface. The colour of the magnetic particle powder shall be sufficiently different than the colour of the examination surface.

The interpretation shall identify if an indication is false, non-relevant or relevant. False and non-relevant indications shall be proven as false or non-relevant. Interpretation shall be carried out to identify the locations of indications and the character of the indication.

Discontinuities on or near the surface are indicated by retention of the examination medium. However localized surface irregularities due to machining marks or other surface conditions may produce false indications. Broad areas of particle accumulation which might mask indications from discontinuities are prohibited and such areas shall be cleaned and re-examined.

The yoke method shall only be applied to detect discontinuities that are open to the surface of the part.

Any indication which is believed to be non-relevant will be regarded as a defect and will be re-examined to verify whether or not actual defects are present. Surface conditioning may precede the re-examination. Non-relevant indications that would mask indication of defects are unacceptable.

Viewing of indications is performed using visible light. A minimum of 1000 Lx is required.

Parts will be cleaned after testing is completed. When post-examination cleaning is performed it should be conducted as soon as practical using a process that does not adversely affect the part.

*Excess Particle Removal:* Accumulations of excess dry particles shall be removed with a light air stream from a bulb or syringe or other source of low pressure dry air. The examination current or power shall be maintained while removing the excess particles.

*Post-examination cleaning method:* Parts will be cleaned after testing is completed - Normally only powder will need to be blown off with compressed air. If a cleaner is required Chemetall Oakite 9PR50 will be used. Contrast aid will be removed with a solvent

## **8.0 EVALUATION**

- a) All indications shall be evaluated in terms of the acceptance standards of the referencing Code Section.
- b) Discontinuities on or near the surface are indication by retention of the examination medium. However, localized surface irregularities due to machining marks or other surface conditions may produce false indications.
- c) Broad areas of particle accumulation, which might mask indications from discontinuities, are prohibited and such areas shall be cleaned and re-examined.

## **9.0 ACCEPTANCE STANDARDS**

ASME Section VIII, Division 1, Appendix 6, Para. 6-4  
(2010 Edition, 2011a Addendum).

These acceptance standards will apply unless other more restrictive standards are specified for specific materials or applications within this division.

All surfaces to be examined will be free of:

- a. relevant linear indications - only indications which have any dimension greater than 1/16th" will be considered relevant. *A linear indication is one having a length greater than three times the width.*
- b. relevant rounded indications greater than 3/16th". *A rounded indication is one of circular or elliptical shape with a length equal or less than three times its width.*
- c. four or more relevant rounded indications in a line separated by 1/16th" or less, edge to edge.
- d. an indication of an imperfection may be larger than the imperfection that causes it, however the size of the indication is the basis for acceptance evaluation.
- e. Any questionable or doubtful indications shall be re-examined to determine whether they are relevant.

## **10.0 REPORTS**

Reports will include results and will affirm that examination was performed in accordance with this procedure.

Reports will include:

- a. Procedure identification and revision
- b. magnetic particle equipment and type of current
- c. magnetic particles (visible or fluorescent) (wet or dry)
- d. technician and qualification level
- e. record of indications
- f. material and thickness
- g. lighting equipment used
- h. date of examination

### **Rejectable Indications:**

Rejectable indications shall be recorded. As a minimum. The type of indications (linear or rounded), location and extent (length or diameter or aligned) shall be recorded.

## **11.0 PROCEDURE CERTIFICATION**

This standard inspection and weld test procedure is prepared in accordance with T-150, ASME Section V, Article 1 (2010 Edition, 2011a Addendum).

## **12.0 PERFORMANCE DEMONSTRATION**

Performance demonstration, when required by the referencing Code Section shall be documented.

### **13.0 REVISIONS**

00	June 2010
01	February 2011
02	September 2011

### **14.0 ATTACHMENTS**

- I) Magnetic particle inspection report form
- ii) Fig T-764.1.1 Magnetic particle field indicator
- iii) Calibration for electromagnetic yokes (sample)

### **ADDENDUM 1 - DEMAGNETIZATION**

**Applicability** - All ferromagnetic material will retain some residual magnetism, the strength of which is dependent on the retentivity of the part. Residual magnetism does not affect the mechanical properties of the part. However, a residual field may permit chips to adhere to the surface affecting subsequent machining operations as well as painting or plating. Additionally, if the part will be used in locations near sensitive instruments, high residual fields could affect the operation of these instruments. Furthermore, a strong residual magnetic field in a part to be arc-welded could interfere with this operation. Residual fields may also interfere with subsequent magnetic particle examination. Demagnetization is required only if specified in the drawings, specification, or purchase order. When required, an acceptable level of residual magnetization and the measuring method will also be specified.

**Demagnetization Methods** - The ease of demagnetization is dependent on the coercive force of the metal. High retentivity is not necessarily related to high coercive force in that the strength of the residual field is not always an indicator of ease of demagnetizing. In general, demagnetization is accomplished by subjecting the part to a field equal to or greater than that used to magnetize the part, then continuously reversing the field direction while gradually decreasing it to zero.

**Withdrawal from Alternating Current Coil** - The fastest and most simple technique is to pass the part through a high intensity alternating current coil and then slowly withdraw the part from the field of the coil. A coil of 5000 to 10,000 ampere turns is recommended. Line frequency is usually from 50- to 60-Hz alternating current because of its inability to penetrate. Alternating-current yokes may be used for local demagnetization by placing the poles on the surface, moving them around the area and slowly withdrawing the A-C yoke while it is still energized. Care should be exercised to assure that the part is entirely removed from the influence of the coil or the A-C yoke before the demagnetizing force is discontinued, otherwise the demagnetizer may have the reverse effect of magnetizing the part.

**Decreasing Alternating Current** - An alternative technique for part demagnetization is subjecting the part to the field while gradually reducing its strength to a desired level.

**Reversing Direct Current** - The part to be demagnetized is subjected to consecutive steps of reversed and reduced direct current magnetization to a desired level. (This is the most effective process of demagnetizing large parts in which the alternating current field has insufficient penetration to remove the internal residual magnetization). This technique requires special equipment for reversing it in small increments.

Effectiveness of the demagnetizing operation can be indicated by the use of appropriate magnetic field indicators or field strength meters. However, a part may retain a strong residual field after having been circularly magnetized and exhibit little or no external evidence of this field. Therefore the circular magnetization should be conducted before longitudinal magnetization if complete demagnetization is required.

April 2005

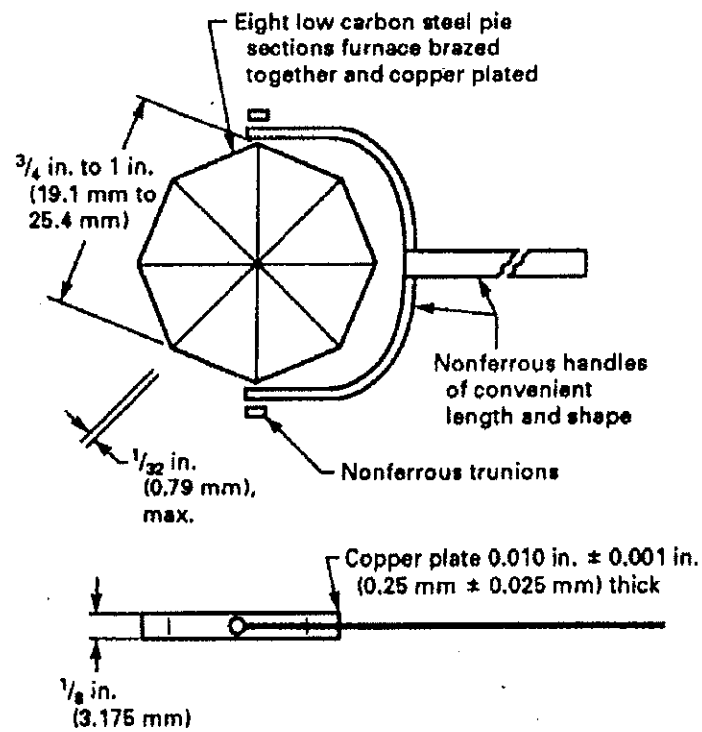


FIG. T-764.1.1 PIE-SHAPED MAGNETIC PARTICLE FIELD INDICATOR

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## CALIBRATION CERTIFICATE FOR ELECTROMAGNETIC YOKES

YOKE TYPE: AC\_\_\_\_ DC\_\_\_\_

MANUFACTURER: \_\_\_\_\_

SERIAL NUMBER: \_\_\_\_\_

LIFTING FORCE: \_\_\_\_\_ lbs. LEG SPACING: 2→4 inches.

MEETS REQUIREMENTS OF ASME SECTION V, SE 709, TABLE 3 - MINIMUM YOKE  
LIFTING FORCE

DATE OF CALIBRATION: \_\_\_\_\_

DATE DUE FOR NEXT CALIBRATION: \_\_\_\_\_

CALIBRATED BY: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_



KV Inspection Services Ltd.

1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697

# Magnetic Particle Inspection Report

### Specification – Acceptance Criteria

## General Data

Customer	Date	
Location	P. O. #	
Project	Shop Order #	
Procedure	Worksheet #	
Technician	CGSB Reg #	ASNT/SNT-TC-1A Level

### Technical Data - Magnetic Particle (MT)

Material Type	<input type="radio"/> Carbon Steel	<input type="radio"/> Other	Material Thickness
---------------	------------------------------------	-----------------------------	--------------------

## Test Method

☐ Dry                      ☐ Wet                      ☐ Wet Fluorescent

### Test Equipment

Indicators	<input type="radio"/> 825 R - Red <input type="radio"/> 3A - Black	<input type="radio"/> 66 - Yellow <input type="radio"/> 803/1- Black Ink	<input type="radio"/> Magnaglow 20B Fluorescent <input type="radio"/> 8800A Fluorescent
Background	<input type="radio"/> 8901W Contrast Aid	<input type="radio"/> None	
Equipment	<input type="radio"/> AC Yoke	<input type="radio"/> Calibrated Blacklight	<input type="radio"/> Other
Method	<input type="radio"/> Continuous	<input type="radio"/> Residual	
Light Meter	Type	Serial #	Intensity
			Lx

### Lighting Equipment Description:

## Inspection

**Description:**

Item #	Description of Weld/Test Area	Technique	Defect Location	Interpretation

KV Inspection Technician	Date
Customer Representative	Date



NON DESTRUCTIVE INSPECTION  
AND CONSULTING INC.

BOX 82042, WATERDOWN, ONTARIO LOR 2MO  
BUS.: (905) 317-3313  
FAX: (905) 332-8225

## Magnetic Particle Inspection Procedure

MPI-02

Rev 02  
December, 2011.

Ref: ASME Section VIII Div 1  
Appendix VI  
ASME Section V  
Article 7  
2010 Edition, 2011a Addendum

Peter N. Martin, CET  
SNT-TC-1A Level III  
48.9712 CGSB Level II

*PR ADD. 19/12*

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Submitted by;



Peter N. Martin, CET  
Martins Nondestructive Inspection and Consulting Inc.



Peter N Martin  
CWI 07030017  
QC1 EXP. 12/1/2012

1. Scope:

The magnetic particle inspection method and acceptance standards described herein will be used for the examination and testing of pressure vessel welds and ferro magnetic base metals when stipulated by the contract.

Testing will comply with the requirements of ASME Section VIII, Division 1, Appendix 6 (2010 Edition, 2011a Addendum), ASME Section V, Article 7 (2010 Edition, 2011a Addendum) and ASME Section V, Article 25 SE709 (2010 Edition, 2011a Addendum).

2. References:

ASME Section VIII, Division 1, Appendix 6, 'Methods for Magnetic Particle Examination' (2010 Edition, 2011a Addendum)

ASME Section V, Article 7, (2010 Edition, 2011a Addendum), 'Nondestructive Examination'

ASME Section V, Article 25 SE709 (2010 Edition, 2011a Addendum), Standard guide for Magnetic particle Examination.

3. General Requirements:

Contractual preferences imposed by code or specifications will have precedence over this procedure in event of conflict.

Deviation from this procedure is not permitted without client approval.

4. Personnel:

All personnel associated with this examination will be qualified in accordance with CGSB 48.9712 and/or SNT-TC-1A (2006 Edition). Evaluation is to be done by level II minimum personnel.

5. Testing Equipment:

Magnaflux Y-7 type yoke, Magnaflux P90, Parker Contour probe DA-200 or equivalent.

Indicating agents are Magnaflux Ferromagnetic powder 8A and/or 2 (red/yellow).

Contrast aid Ardrex 8901W available for clarity.

Indicator blower - Parker Research PB1.

Field indicator - MG-50 Magnetic pie Gauge

Gold Bass Model DLM 1000 light meter

Calibration:

Magnetizing and Light Meter equipment is to be calibrated at least once a year or after repairs.

Magnetizing and Light Meter equipment may be subject to regular calibration within one year durations or non use periods of 12 months prior to use.

6. Coverage & Method

All accessible surfaces defined by the client will be examined. The weld surface will include heat zones up to 1" either side of the weld cap center.

Mechanical entrapment will be considered at inspection times.

The method will be in accordance with ASME V, Article 7 (2010 edition, 2011a Addendum)

Examination will be performed in the continuous method.

AC or DC current settings will be used at the discretion of the technician and the client - yoke method.

7. Procedure:

Size and shape of test items is unrestricted providing the required areas of testing are adequate for the technique used.

Surface condition should be dry, free of loose and irregularity contamination.

Prior to magnetic particle examination the areas to be examined should be visually reviewed to be free of surface contamination such as particles, oil, scale, etc which may impede the performance of MPI testing.

Method of particle application - dry particle dusting during magnetic field application.

Contrast enhancement - light application as determined by the technician to enhance areas of testing without masking any possible defects.

Examination will not be performed on surfaces with a temperature exceeding 600 degrees F.

All inspection areas will be examined in opposing angles perpendicular to each.

Field adequacy and direction will be verified with a field indicator.

Yoke method lifting power will be verified at 10lbs - AC and 40lbs - DC.

Examination will be carried out with a minimum of 10% overlap during scanning.

The yoke method shall be applied to detect discontinuities that are open to the surface of the test area.

Non-relevant indications that may mask indications are unacceptable and will be removed for clear testing of the inspection area.

Viewing of the examination areas is performed using white light with a minimum of 1000 Lx.

Cleaning of the examination area will be performed at the end of inspection and to the client's satisfaction.

8. Evaluation:

All indications shall be evaluated in accordance with the acceptance standards of the Referencing Code Section.

Indications on or near surface are noted by retention of the examination medium.

Mechanical entrapment due to machine marks and/or surface configuration are to be evaluated for masking and false indications of defects. False indications may require cleaning for defect verification.

9. Acceptance Standards: ASME Section VIII, Division 1, Appendix 6, Para. 6 - 4  
(2010 Edition, 2011a Addendum),

These acceptance standards will apply unless modified by the client and/or engineer for specific materials and/or conditions.

All areas examined shall be free of;

- 1 relevant linear indications - only indications which have any dimension greater than 1/16" will be considered relevant. A linear indication is one having a length greater than three times the width.
- 2 relevant rounded indications greater than 3/16". A rounded indication is one of circular or elliptical shape with a length equal to or less than three times its width.
- 3 four or more relevant rounded indications in a line separated by 1/16" or less, edge to edge.
- 4 the size of the indication is the basis for the acceptance evaluation.
- 5 suspect indications will be re-examined to determine relevant indication status

10. Reports:

Reports will include all results and confirm that examination was performed in accordance with the is procedure.

Reports will include but not be limited to;

- procedure identification and revision
- magnetic particle equipment and current type
- magnetic indicating agent
- technician and qualifications
- record of indications - type, size, location
- material
- viewing mode
- date

11. Procedure Certification:

This inspection standard and weld test procedure is prepared in accordance with T - 150, ASME Section V, Article 1 (2010 Edition, 2011a Addendum),

12. Performance Verification:

Performance verification, when required by the referencing Code Section shall be documented.

13. Attachments:

Addendum 1 - Demagnetization  
Fig T - 764.1.1 Magnetic particle field indicator - pie gauge  
Sample report

## MAGNETIC PARTICLE INSPECTION PROCEDURE

### ADDENDUM 1 - DEMAGNETIZATION

**Applicability** - All ferromagnetic material will retain some residual magnetism, the strength of which is dependent on the retentivity of the part. Residual magnetism does not affect the mechanical properties of the part. However, a residual field may permit chips to adhere to the surface affecting subsequent machining operations as well as painting or plating. Additionally, if the part will be used in locations near sensitive instruments, high residual fields could affect the operation of these instruments. Furthermore, a strong residual magnetic field in a part to be arc-welded could interfere with this operation. Residual fields may also interfere with subsequent magnetic particle examination. Demagnetization is required only if specified in the drawings, specification, or purchase order. When required, an acceptable level of residual magnetization and the measuring method will also be specified.

**Demagnetization Methods** - The ease of demagnetization is dependent on the coercive force of the metal. High retentivity is not necessarily related to high coercive force in that the strength of the residual field is not always an indicator of ease of demagnetizing. In general, demagnetization is accomplished by subjecting the part to a field equal to or greater than that used to magnetize the part, then continuously reversing the field direction while gradually decreasing it to zero.

**Withdrawal from Alternating Current Coil** - The fastest and most simple technique is to pass the part through a high intensity alternating current coil and then slowly withdraw the part from the field of the coil. A coil of 5000 to 10,000 ampere turns is recommended. Line frequency is usually from 50- to 60-Hz alternating current because of its inability to penetrate. Alternating-current yokes may be used for local demagnetization by placing the poles on the surface, moving them around the area and slowly withdrawing the A-C yoke while it is still energized. Care should be exercised to assure that the part is entirely removed from the influence of the coil or the A-C yoke before the demagnetizing force is discontinued, otherwise the demagnetizer may have the reverse effect of magnetizing the part.

**Decreasing Alternating Current** - An alternative technique for part demagnetization is subjecting the part to the field while gradually reducing its strength to a desired level.

**Reversing Direct Current** - The part to be demagnetized is subjected to consecutive steps of reversed and reduced direct current magnetization to a desired level. (This is the most effective process of demagnetizing large parts in which the alternating current field has insufficient penetration to remove the internal residual magnetization). This technique requires special equipment for reversing it in small increments.

Effectiveness of the demagnetizing operation can be indicated by the use of appropriate magnetic field indicators or field strength meters. However, a part may retain a strong residual field after having been circularly magnetized and exhibit little or no external evidence of this field. Therefore the circular magnetization should be conducted before longitudinal magnetization if complete demagnetization is required.

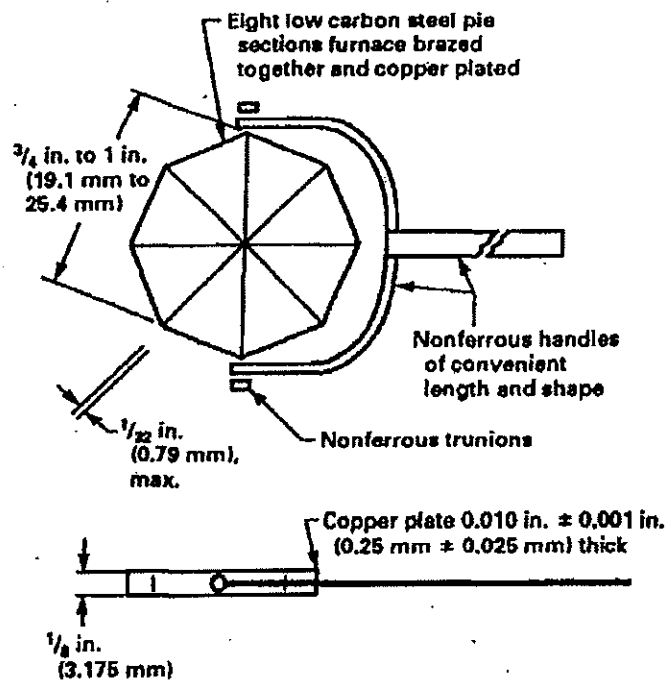


FIG. T-764.1.1 PIE-SHAPED MAGNETIC PARTICLE FIELD INDICATOR





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AND CONSULTING INC.

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Magnetic Particle Inspection Report - MT

Specification - Acceptance Criteria

As per ASME Section VIII, Appendix 6

Customer: Lesena Steel	Date:
Location: Scarborough, Ontario	PO #
Project: Ecodyne	SO #
Procedure: MPI - 02 Rev 02	Martin File #
Technician: P. Martin CET	CGSB - ASNT Level II 1696 CWB - AWS Level III 1154
Material type: Carbon Steel	Material thickness: Varies

Test Equipment - Dry Method

Yoke - source	Magnaflux Y-7	AC - continuous method
Indicators	825 R - Red	Dry powder
Background - (optional)	Chemetall oakite 9D1B	White
Light meter	Gould-Bass DLM-1000	SN # 071097A
Light source	Trouble light - white light	

Report - results

Item - ID	Description	Technique	Defect	Results

Inspector:

P. Martin, CET  
CGSB/ASNT Level II 1696  
CWB/AWS Level III 1154

Customer Representative:

Date:

# **KV INSPECTION SERVICES LTD.**

*Established in 1980*

**1486 Wallace Road, Oakville, Ontario L6L 2Y2**

**Office: (905) 844-9448 Fax: (905) 844-6697**  
**www.kvinspection.com Email: kvinsp1@aol.com**

## **LIQUID PENETRANT INSPECTION PROCEDURE**

**KV # 16**

**Rev. 02**

**September 2011**

Ref. ASME Section V  
Article 6  
2010 Edition, 2011a Addendum

Ed Duitschaever  
SNT-TC-1A Level III  
48.9712 CGSB Level II

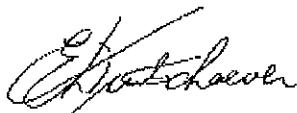
## **GENERAL LIQUID PENETRANT INSPECTION PROCEDURE:**

**KV # 16, Rev. 02**

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1.0	Scope	5.11	Post Examination Cleaning Operation
2.0	Material	6.0	Inspection Process (Water Washable)
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3.1	Acceptance Standards	6.2	Cleaning
3.2	Repair Requirements	6.3	Drying After Cleaning
4.0	Equipment & Materials	6.4	Penetrant Application
5.0	Inspection Process (Solvent Removable)	6.5	Penetration Time
5.1	Surface Preparation	6.6	Excess Penetrant Removal
5.2	Cleaning	6.7	Drying After Excess Penetrant
5.3	Drying after Cleaning	6.8	Developer Application
5.4	Penetrant Application	6.9	Developing Time
5.5	Penetration Time	6.10	Interpretation
5.6	Removal of Excess Penetrant	6.11	Post Examination Cleaning Operation
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5.8	Developer Application	8.0	Documentation
5.9	Developing Time	9.0	Procedure Certification
5.10	Interpretation	10.0	Revisions
		11.0	Attachments

Submitted for  
KV INSPECTION SERVICES LTD.



Ed Duitschaever  
SNT-TC-1A Level III  
48.9712 CGSB Level II

## **1.0 Scope**

— This procedure outlines the general technique and equipment to be used for liquid penetrant inspection, in accordance with the ASME Boiler and Pressure Vessel Code, Section V, Article 6 and Section VIII, Division 1, Appendix 8 (2010 Edition, 2011a Addendum).

## **2.0 Material**

Stainless steel, Carbon steel, Aluminum

The shape and size of objects to be examined are not limiting factors, provided the specified area under examination can be properly examined within the specified intervals of this procedure.

## **3.0 Evaluation of Indications** ASME Section VIII, Division 1, Appendix 8, Paragraph 8-3 (2010 Edition, 2011a Addendum).

An indication is the evidence of a mechanical imperfection. Only indications with major dimensions greater than 1/16th inch will be considered relevant.

- a) A linear indication is one having a length greater than three times its width
- b) A rounded indication is one of circular or elliptical shape with the length equal to or less than three times the width
- c) Any questionable or doubtful indications will be re-examined to determine whether or not they are relevant

### **3.1 Acceptance Standard** ASME Section VIII, Division 1, Appendix 8, Paragraph 8-4 (2010 Edition, 2011a Addendum)

These acceptance standards will apply unless other more restrictive standards are specified for specific materials or applications within this division.

All surfaces to be examined shall be free of:

- a) relevant linear indications
- b) relevant rounded indications greater than 3/16th inch.
- c) four or more relevant rounded indications in a line separated by 1/16th inch or less (edge to edge).
- d) an indication of an imperfection may be larger than the imperfection that causes it, however, the size of the indication is the basis for acceptance evaluation.

### **3.2 Repair Requirements** ASME Section VIII, Division 1, Appendix 8, Paragraph 8-5 (2010 Edition, 2011a Addendum)

— Unacceptable imperfections will be repaired and re-examination made to assure removal or reduction to an acceptable size. Whenever an imperfection is repaired by chipping or grinding and subsequent repair by welding is not required, the excavated area will be blended into the surrounding surface so

as to avoid sharp notches, crevices or corners. Where welding is required after repair of an imperfection, the area will be cleaned and welding performed in accordance with a qualified welding procedure.

- a) *Treatment of Indications Believed Non-relevant:*  
Any indication which is believed to be non-relevant will be regarded as an imperfection

unless it is shown by re-examination by the same method or by use of other non-destructive methods and/or by surface conditioning that no unacceptable imperfection is present.

- b) *Examination of Areas From Which Defects Have Been Removed:*  
After a defect is thought to have been removed and prior to making weld repairs, the area will be examined by suitable methods to ensure that it has been removed or reduced to an acceptably sized imperfection.
- c) *Re-examination of Repair Areas:*  
After repairs have been made, the repaired area will be blended into the surrounding surface so as to avoid sharp notches, crevices or corners and re-examined by the liquid penetrant method and by all other methods of examination that were originally required for the affected areas, except that, when the depth of repair is less than the radiographic sensitivity required, re-radiography may be omitted.

#### **4.0 Equipment and Material**

- a) All penetrant materials will meet the chemical requirements of ASME V, Article 6 (2010 Edition, 2011a Addendum).
  - Chemetall Oakite Penetrant 906 - water washable
  - Chemetall Oakite Penetrant 996 - solvent removable
  - Chemetall Oakite Developer 9D1B
  - Chemetall Oakite Cleaner 9PR50

Technique Restrictions: Fluorescent penetrant examination shall not follow a colour contrast penetrant examination. Intermixing of penetrant materials from different families or different manufacturers is not permitted. A re-test with water-washable penetrants may cause loss of marginal indications due to contamination.

- b) The penetrants, developers and cleaners will contain not more than 250 µ grams halogens per gram of material, nor 1 percent by weight of residual sulphur when tested in accordance with ASTM D-129 Test for Sulphur in Petroleum Products by the Bomb Method.
- c) Certificates of compliance for each batch of the above materials will be supplied as proof of conformance, if required.
- d) A calibrated light meter Gold-Bass Model DLM-1000 or Extech EA 31. Calibration to be performed once yearly by a certified agency - calibration certificate to be available on request.

#### **5.0 Inspection Process: (Solvent Removable)**

##### **5.1 Surface Preparation**

Grinding, machining or other methods may be necessary in some instances where surface irregularities could otherwise mask indications of unacceptable discontinuities.

##### **5.2 Cleaning**

Prior to the application of penetrant, the surfaces to be examined and adjacent areas within at least one inch, will be dry and free of any dirt, grease, lint, scale, welding flux, weld spatter and/or any extraneous matter that could obscure surface openings or otherwise interfere with the examination. A cleaning solution may be used.

### 5.3 Drying After Cleaning/Preparation

The surfaces to be examined will be dried by normal evaporation or with forced hot or cold air. Prior to application of the penetrant, a minimum period of five minutes will be observed to ensure that the cleaning solution has completely evaporated.

### 5.4 Penetrant Application

The penetrant will be sprayed using aerosol cans or brushed on the inspection areas or items. Throughout the whole examination period, the temperature of both the test piece and the penetrant will be between 50°F and 125°F.

### 5.5 Penetration Time

The minimum penetration time will be as required in Table T-672 (attached) or as qualified by demonstration for specific purposes.

<u>Table T-672 - Minimum Dwell Times</u>	<u>Penetrant</u>
Castings & welds	5
Wrought materials - extrusions, forgings & plate	10

### 5.6 Removal of Excess Penetrant

Excess penetrant will be removed by wiping with a cloth or absorbent paper. The remaining traces will be removed by wiping the surface lightly with a lint-free cloth or absorbent paper moistened with solvent. Flushing the surface with solvent is prohibited.

### 5.7 Drying After Excess Penetrant Removal

Surfaces may be dried (for a minimum of 15 minutes and a maximum of 60 minutes) by normal evaporation, blotting, wiping or forced air.

### 5.8 Developer Application

The developer will be applied as soon as possible after penetrant removal. The developer will be sprayed on using aerosol cans or brushed on the inspection areas or items. During the application of the developer, the areas will be carefully watched to detect any irregularities that tend to bleed out profusely. Care will be taken that coating thickness is sufficient to draw the penetrant out of discontinuities, conversely excessive coating thickness may mask indications.

### 5.9 Developing Time

Developing time for final interpretation begins immediately after the developer coating is dry. The minimum developing time will be as per Table T-672 (attached) requirements.

<u>Table T-672 - Minimum Dwell Times</u>	<u>Developer</u>
Castings & welds	10
Wrought materials - extrusions, forgings & plate	10

#### 5.10 Interpretation

The inspection of components will be carried out in daylight or good illumination at a mean temperature of between 50°F and 125°F. Examination of area/items will begin within 10 minutes to 60 minutes after the requirements of 5.9 are met. If the surface to be examined is large enough to preclude complete examination within the prescribed or established time, the examination shall be performed in increments.

During inspection of components adequate illumination is required to ensure no loss in the sensitivity of the examination. A minimum light intensity at the examination site of 100 foot candles (1000 Lx) is required.

The acceptance criteria will be in accordance with the specification outlined previously in Section 3.1 of this procedure.

Rejectable indications shall be recorded. As a minimum the type of indications (linear or rounded) location and extent (length and diameter or aligned) shall be recorded.

#### 5.11 Post Examination Cleaning Operation

Cleaning will proceed as soon as the areas/items have been thoroughly examined and recorded. Cleaner/remover will be used. After removing all traces of penetrant and developer the area/items will be dried with clean compressed air. Other cleaning processes are permissible if they do not adversely affect the part.

### 6.0 Inspection Process (Water Washable)

#### 6.1 Surface Preparation

Grinding, machining or other methods may be necessary in some instances where surface irregularities could otherwise mask indications of unacceptable discontinuities.

#### 6.2 Cleaning

Prior to the liquid penetrant examination, the surface to be examined and all adjacent areas within one inch will be dry and free of any dirt, grease, lint, scale, welding flux, weld spatter, oil or any other extraneous matter that could obscure surface openings or otherwise interfere with the examination. A cleaning solution may be used.

#### 6.3 Drying After Cleaning/Preparation

The surfaces to be examined will be dried by normal evaporation or with forced hot or cold air. Prior to application of the penetrant, a minimum period of five minutes will be observed to ensure that the cleaning solution has completely evaporated.

#### 6.4 Penetrant Application

The penetrant will be sprayed on using aerosol cans or brushed on the inspection areas or items. Throughout the whole examination period, the temperature of both the test piece and the penetrant will be between 50°F and 125°F.

#### 6.5 Penetration Time

The minimum penetration time will be as required in Table T-672 (attached) or as qualified by demonstration for specific purposes.

<u>Table T-672 - Minimum Dwell Times</u>	<u>Penetrant</u>
Castings & welds	5
Wrought materials - extrusions, forgings & plate	10

#### 6.6 Excess Penetrant Removal

After the specified penetration time has elapsed, excess penetrant will be removed by a water spray rinse at a temperature not exceeding 110°F and with a line pressure of 50 pounds per square inch maximum.

#### 6.7 Drying After Excess Penetrant Removal

Surfaces may be dried (for a minimum of 15 minutes and a maximum of 60 minutes) by blotting with a clean cloth, absorbent towel or by circulating air, provided the temperature of the surface is not raised above 125°F.

#### 6.8 Developer Application

The developer will be applied as soon as possible after penetrant removal. The developer will be sprayed on using aerosol cans or brushed on the inspection areas or items. During the application of the developer, the areas will be carefully watched to detect any irregularities that tend to bleed out profusely. Care will be taken that coating thickness is sufficient to draw the penetrant out of discontinuities, conversely excessive coating thickness may mask indications.

#### 6.9 Developing Time

Developing time for final interpretation begins immediately after the developer coating is dry. The minimum developing time will be as per Table T-672 (attached) requirements.

<u>Table T-672 - Minimum Dwell Times</u>	<u>Developer</u>
Castings & welds	10
Wrought materials - extrusions, forgings & plate	10

#### 6.10 Interpretation

The inspection of components will be carried out in daylight or good illumination at a mean temperature of between 50°F and 125°F. Examination of area/items will begin within 10 minutes to 60 minutes after the requirements of 6.9 are met. If the surface to be examined is large enough to preclude complete examination within the prescribed or established time, the examination shall be preformed in increments.

During inspection of components adequate illumination is required to ensure no loss in the



sensitivity of the examination. A minimum light intensity at the examination site of 100 foot candles (1000 Lx) is recommended.

The acceptance criteria will be in accordance with the specification outlined previously in Section 3.1 of this procedure.

Rejectable indications shall be recorded. As a minimum the type of indications (linear or rounded) location and extent (length and diameter or aligned) shall be recorded.

#### **6.11 Post Examination Cleaning Operation**

Cleaning will proceed (as soon as the areas/items have been thoroughly examined and recorded) with a water spray rinse not to exceed 110°F and a line pressure of 50 pounds per square inch maximum. After removing all traces of penetrant and developer, the area/items will be dried with clean compressed air. Other cleaning processes are permissible if they do not adversely affect the part.

### **7.0 Qualification of Personnel**

All technicians working on this project will be qualified personnel, according to C.G.S.B. Standard 48.9712 and SNT TC 1A (2006 Edition). Level II or Level III personnel will evaluate results.

Each examiner will have vision (with corrections if necessary) to enable him to read a Jaeger Type No. 2 standard chart at a distance of no less than 12 inches and be capable to distinguishing a differentiating contrast between colours used. These requirements will be checked annually.

### **8.0 Documentation**

\_\_\_\_\_ A suitable report of conformance shall be signed and issued by the qualified technician, stating whether the inspected area/items are acceptable or unacceptable to the appropriate standard. The report shall indicate and include:

- i) procedure identification and revision
- ii) liquid penetrant type (visible or fluorescent)
- iii) type (number of letter designation) of each penetrant, penetrant remover, emulsifier and developer used.
- iv) technician identification and qualification level.
- v) record of indications
- vi) material and thickness
- vii) lighting equipment used
- viii) date of examination

### **9.0 Procedure Certification**

This standard inspection and weld test procedure is prepared in accordance with T-150, ASME V, Article 1 (2010 Edition, 2011a Addendum).

### **10.0 Revisions:**

- 00 June 2010
- 01 February 2011
- 02 September 2011

### **11.0 Attachments**

- i) Table T-672
- ii) Liquid Penetrant Inspection report form.

TABLE T-672 MINIMUM DWELL TIMES

Material	Form	Type of Discontinuity	Dwell Times [Note (1)] (minutes)	
			Penetrant	Developer
Aluminum, magnesium, steel, brass and bronze, titanium and high- temperature alloys	Castings and welds	Cold shuts, porosity, lack of fusion, cracks (all forms)	5	10
	Wrought materials — extrusions, forgings, plate	Laps, cracks (all forms)	10	10
Carbide-tipped tools		Lack of fusion, porosity, cracks	5	10
Plastic	All forms	Cracks	5	10
Glass	All forms	Cracks	5	10
Ceramic	All forms	Cracks	5	10

## NOTE:

(1) For temperature range from 50°F to 125°F (10°C to 52°C).

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Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697

Liquid Dye Penetrant Inspection  
Report  
PT

Specification - Acceptance Criteria

General Data

Customer		Date	
Location		P. O. #	
Project		Shop Order #	
Procedure		Worksheet #	
Technician		CGSB Level II, Reg #	ASNT/SNT-TC-1A Level

Technical Data - Liquid Dye Penetrant (PT)

Material Type	<input type="radio"/> Carbon Steel	<input type="radio"/> Stainless Steel	<input type="radio"/> Other	Material Thickness	
---------------	------------------------------------	---------------------------------------	-----------------------------	--------------------	--

Equipment & Method

Penetrant	<input type="radio"/> Chemetall Oakite 906	<input type="radio"/> Visible	Light meter
	<input type="radio"/> Chemetall Oakite 996	<input type="radio"/> Fluorescent	
	<input type="radio"/> Chemetall Oakite P131E		
Cleaner	<input type="radio"/> Chemetall Oakite 9PR50	<input type="radio"/> Water Washable	Type:
Developer	<input type="radio"/> Chemetall Oakite 9D1B	<input type="radio"/> Solvent Removable	Serial #:
			Intensity: Lx

Lighting Equipment Description:

Inspection

Description:



Item #	Description of Weld/Test Area	Defect Location	Interpretation
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KV Inspection Technician		Date	
Customer Representative		Date	



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Hydrostatic Test Procedure

 <b>MEG ENERGY</b>	<b>CHRISTINA LAKE REGIONAL PROJECT</b> <b>Phase 3A EPC for Central Plant Facilities</b>	 <b>SNC-LAVALIN</b>
	<b>SLI Project No. 511036</b>	

 <b>SNC-LAVALIN</b>	<input type="checkbox"/> <b>A1</b> Not suitable to initiate fabrication; modify as noted; resubmit for review.
	<input type="checkbox"/> <b>B1</b> Suitable to initiate fabrication as noted; modify as noted; resubmit for review.
Vendor's drawing review for conformity with specifications and design drawing.	<input type="checkbox"/> <b>C1</b> Suitable to fabricate to completion as noted; submit final documents including as-builts as required.
This review does not relieve the vendor of his responsibility for errors in design and detailing as detailed in his contract.	<input type="checkbox"/> <b>D1</b> Suitable to fabricate to completion; submit final documents including as-built documents as required.
	<input type="checkbox"/> <b>E1</b> Not suitable as final documents as noted; modify as noted and resubmit.
	<input checked="" type="checkbox"/> <b>F1</b> Suitable as final documents; no further resubmittal required (unless revised by vendor).
Vendor: Ecodyne Limited ( Canada ) - 12123      No.: 32125-A-2911      Rev: A      Date Rec'd 2013-03-11	
Doc. Title: M00.10 - HYDRO PROCEDURE - Tag:All	
Client Code:	Project: MEG Phase 3A EPC
Reviewed by: <i>Lee Chen</i>	Document No
Date: <i>Mar 18, 2013</i>	P-5675-02-0044
	Submittal 01

AFTER FILTERS & WAC  
3A-F-208 A to G & 3A-V-211 A to F  
**Hydrostatic Test Procedure**  
**ASME Vessels**

Contents:

Cover  
Hydrostatic Test Procedure (Lesena) QCP 010

1 Page  
2 Pages

				<p>Title</p> <p style="text-align: center;"><b>NDE Procedures</b></p> <p style="text-align: center;">After Filters &amp; WAC 3A-F-208 A to G &amp; 3A-V-211 A to F</p> <p style="text-align: center;">P.O.# P-5675-02</p>				<p>Customer</p> <p style="text-align: center;"><b>MEG ENERGY CORP.</b> CALGARY, ALBERTA</p> <p style="text-align: center;">CHRISTINA REGIONAL PROJ. PHASE 3A- CPF</p> <p style="text-align: center;">ENG.: SNC- LAVALIN</p>			
				SCALE -				<p style="text-align: center;"><b>ECODYNE</b> Limited</p> <p style="text-align: center;"><small>A Mermon Water/Berkshire Hathaway Company</small></p> <p style="text-align: center;"><small>THIS DRAWING IS THE PROPERTY OF ECODYNE LIMITED. IT IS NOT TO BE USED FOR ANY PURPOSES DETRIMENTAL TO THE INTEREST OF THIS COMPANY AND IS SUBJECT TO RETURN UPON REQUEST.</small></p>			
						BY	DATE				
						DRN	TP	MAR 07 2013		<p>DWG. NO.</p> <p style="text-align: center;"><b>32125-A-2911</b></p>	
						CHKD	TM	MAR 07 2013			
						APPD	AV	MAR 07 2013		<p>REV.</p> <p style="text-align: center;"><b>A</b></p>	
REV	DATE	REMARKS		BY	CHKD						

# LESENA STEEL LTD

Procedure No. QCP 010

4	ASME Edition changed	Jun 30, 11	T.P.	T.P.
3	Per A.I. comments	Jan 31, 07	C. B.	T. P.
2	Per customer's comments	May 28, 04	C. B.	T. P.
1	Per customer's comments	Mar. 30, 00	R. C.	T. P.
0	Original	Nov.30, 99	R. C.	T. P.
Rev.	Description	Date	Prepared By	Approved by

Page 1 of 2

## HYDROSTATIC TEST PROCEDURE

In accordance 2010 Edition ASME Code, Section VIII, Division I.

The hydrostatic test pressure shall be in accordance with the design drawing. Test pressure, test medium and special requirements, if any, shall be marked on the examination and inspection program by the Q.C.I. or his designee.

All pressure boundary fabrication shall be completed prior to the test, which shall be witnessed by the A.I.

Vents shall be provided at all high points of the vessel in its testing position to purge possible air pockets during filling.

The current calibrated pressure gauges to be used for the test shall be graduated not more than four (4) times the maximum test pressure, but not less than 1-1/2 times that pressure. One of the gauges shall be installed at the top of the vessel in its testing position.

The pressure gage used for the hydrostatic test shall be calibrated in accordance with Section 12 of Q.C. Manual

The test pressure shall not be applied until the vessel and its contents are at about the same temperature and the test equipment is examined for tightness. All low-pressure filling lines and appurtenances, not to be subjected to the test pressure, shall be disconnected. The test pressure shall be applied in a controlled and uniform manner.

The test pressure shall be maintained as per code or customer requirement. A visual inspection shall be made to all joints and connections during pressure maintaining.

The nozzle welds to the vessel must be tested, and should not be internally blanked off. The nozzles may be plugged, or blanked off internal to the nozzle. Blanking the nozzle off internally to the nozzle would mean part of the nozzle pipe would not be tested. This is acceptable as these nozzles are merely pipe. For nozzles that extend inside the vessel, this internal blank would need to be placed beyond the weld to the vessel (outside to the vessel weld), in order to test the pipe for any problems that may have occurred with welding the pipe to the vessel.

Leakage is not allowed at the time of visual inspection except for the leakage that might occur at temporary test closures for those openings intended for welded connections.



# LESENA STEEL LTD

Page 2 of 2

## HYDROSTATIC TEST PROCEDURE

In accordance with ASME Code, Section VIII, Division 1, 2010 Edition

Upon acceptance of the hydrostatic test the Q.C.I. and the A.I. shall sign off Hydrostatic Test Certificate (EXHIBIT 6-8, Rev.2 QC Manual) and the Traveler.

The metal temperature during hydrostatic test shall be maintained at least 30 °F above the minimum design metal temperature, to a maximum of 120 °F.



Once the hydrostatic test is rejected, the nonconformity procedure shall be followed and a nonconformity report issued by the Quality Control Inspector.


After the hydrostatic test the test medium shall be released gradually and safely. The vessel shall be cleaned and air dried.



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Surface Preparation & Coating Procedure

 <b>MEG ENERGY</b>	<b>CHRISTINA LAKE REGIONAL PROJECT</b> <b>Phase 3A EPC for Central Plant Facilities</b> <b>SLI Project No. 511036</b>	 <b>SNC-LAVALIN</b>

 <b>SNC-LAVALIN</b> Vendor's drawing review for conformity with specifications and design drawing. This review does not relieve the vendor of his responsibility for errors in design and detailing as detailed in his contract.	<input type="checkbox"/> A1	Not suitable to initiate fabrication. modify as noted, resubmit for review.
	<input type="checkbox"/> B1	Suitable to initiate fabrication as noted. modify as noted, resubmit for review.
	<input type="checkbox"/> C1	Suitable to fabricate to completion as noted. submit final documents including as-builts as required.
	<input type="checkbox"/> D1	Suitable to fabricate to completion. submit final documents including as-built documents as required.
	<input checked="" type="checkbox"/> E1	Not suitable as final documents as noted. modify as noted and resubmit.
<input checked="" type="checkbox"/> F1	Suitable as final documents. no further resubmittal required (unless revised by vendor)	
Vendor: Ecodyne Limited ( Canada ) - 12123      No.: 32125-A-2941      Rev: B      Date Rec'd 2013-03-28		
Doc. Title: M00.18 - SURFACE PREPARATION & COATING PROCEDURE - Tag: 3A-V-211A/B/C/D/E/F		
Client Code:		Project: MEG Phase 3A EPC
Reviewed by: <i>[Signature]</i>		Document No
Date: Apr 12, 2013		P-5675-02-0038
		Submittal 02

# Title: Surface Preparation and Coating Procedure

Applicable for seven After Filter vessels, tags:  
3A-F-208 A to G

And six WAC vessels, tags:  
3A-V-211 A to F

## Index:

Ecodyne Cover sheet	1 page
Surface Preparation and Coating Procedure	14 pages
MSDS for Grit/Shot MG40/S230	4 pages

## Notes:

1. Reference Paint Spec 32125-A-2013 for applicable coating systems.
2. Holiday test on the exterior paint is not required, as these vessels will never be pin-hole free due to the design, lifting and handling.
3. Grit/Shot MG40/S230 is used by Brant Corrosion Control for blasting.
4. Page 2, item 150-3.1 – "SSPC-SP6" should read "SSPC-SP10".
5. Page 9, D-1.2 – Refer to document 32125-A-2013 for Paint Specification.

					<b>CUSTOMER</b> <b>MEG Energy Corporation</b>  <b>c/o SNC-Lavalin</b>  <b>Christina Lake Phase 3A</b>  <b>PO No. P-5675-02</b>		
					<b>ECODYNE</b> Limited <small>A Marmon Water/Berkshire Hathaway Company</small> <small>THIS DRAWING IS THE PROPERTY OF ECODYNE LIMITED. IT IS NOT TO BE USED FOR ANY PURPOSES DETRIMENTAL TO THE INTEREST OF THIS COMPANY AND IS SUBJECT TO RETURN UPON REQUEST.</small>		
					<b>SCALE - N/A</b>		
						<b>BY</b>	<b>DATE</b>
<b>B</b>	2013 Mar 28	ADDED NOTES PER CLIENT MARK-UPS	BCC	AV	DRN	BCC	2010 Nov 8
<b>A</b>	2013 Feb 14	FIRST ISSUE	BCC	AV	CHKD	AV	2013 Feb 14
<b>REV</b>	<b>DATE</b>	<b>REMARKS</b>	<b>BY</b>	<b>CHKD</b>	<b>APPD</b>	<b>AV</b>	<b>DATE</b>
							<b>DWG. NO.</b>  <b>32125-A-2941</b>
							<b>REV.</b>  <b>B</b>



### BASIC PROCEDURES (BRANT - BP'S)

A. PURPOSE

To establish a set of basic procedures which together form a shop manual for the application of protective coatings and linings on all Brant projects.

B. SCOPE

This document sets out the index of all published Brant Corrosion Control Inc. Basic Procedures (BRANT - BP'S).

C. APPLICABLE DOCUMENTS

See each Basic Procedure.

D. PROCEDURE

These procedures will be developed jointly by all personnel at Brant Corrosion Control and by reference to all available support information from suppliers and associations. Copies of Basic Procedures will be made available to and reviewed with each employee.

E. PERSONNEL

All procedures, testing and inspection to be carried out by Brant Corrosion Control trained employees.

F.

### INDEX OF BRANT BP'S

	NUMBER OF PAGES	APPLICABLE TO THIS CONTRACT
#150 Surface Preparation	2	After Filters & WACs
#250 Adhesive System	1	WACs
#350 Rubber Lining Application and Curing	3	WACs
#390 Paint Application and Testing	2	After Filters & WACs
#395 Paint Repair Procedure	1	After Filters & WACs
#450 Lining Inspection	2	WACs
#451 Lining Repair Procedure	2	WACs

## BRANT BP 150 - SURFACE PREPARATION

### A. PURPOSE

To establish procedures, which, will generate a steel substrate suitable for linings and coatings.

### B. SCOPE

This procedure will cover preparation and inspection of fabricated components, cleaning of the steel and blasting in preparation for linings and coatings.

### C. APPLICABLE DOCUMENTS (Latest Edition)

SSPC-SP - Standards of surface preparation - NACE RPO288 Inspection of linings,  
NACE RP0178 - Fabrication Details, NACE RP0298 Sheet linings

### D. PROCEDURE

#### 150-1 INSPECTION OF STEEL SUBSTRATE

150-1.1 Steel works received not to the following standards will be referred back to the customer for further revisions, rework etc.

150-1.2 All welds should be continuous free from pinholes and porosity. All sharp edges and corners shall be ground to achieve a minimum of 5mm radius.

150-1.3 Any surface defects, particularly surface laminations such as scars and scales, shall be removed by suitable dressing. All welds are to be inspected and defects repaired prior to final blast cleaning. All welds to be ground by fabricator for lining system being applied (contact BCC for clarification).

150-1.4 Cuttings/heat application often produces hard zones on edges of plates and flanges. Grinding is often required where such zones occur i.e. when normal blasting is insufficient to obtain the required profile.

150-1.5 All weld splatter must be removed and welds rounded and contoured to obtain a smooth radius.

#### 150-2 CONTAMINATION

150-2.1 Metal surfaces to be blasted shall be free from all visible oil, grease or other foreign matter. Cleaning the surface can be accomplished by using steam, flame, buffing or washing with solvent per SSPC-SP1

#### 150-3.0 BLASTING

150-3.1 All surfaces to be lined and coated are to be blasted as follows: SSPC-SP5 for the interior linings and SSPC-SP6 for the exterior coatings. Blast profiles are dependent on specific lining/coating being applied.

150-3.1a Interior profile will be confirmed in the "Inspection Traveler" by using testex press-o-film in accordance to ASTM D4417. All strips must be retained. External surfaces will be inspected for surface profile utilizing a surface profile comparator, unless otherwise specified.

150-3.1b The surface cleanliness may be confirmed if necessary by comparison to SSPC VIS-1-89.

150-3.1c Post blast inspection will be carried out by BCC Q.A. Blasted surfaces will conform to above sub-sections or be subject to rejection.

- 150-3.2 Blasting Media must be clean, new material or properly separated to remove fines to ensure a proper profile and clean surface. Mineral and slag abrasives shall meet the requirements of SSPC-AB1. Media should be checked at the beginning of each shift. Blast media is checked for contamination by depositing in water and checking for oil flotation.
- 150-3.3 The temperature of the substrate shall be a minimum of 3 degrees C or 5 degrees F above the dew point during surface preparation. The relative humidity shall not exceed 85%. This shall be monitored at the beginning and every four hours during continuous blasting.
- 150-3.4 After blasting, grit particles shall be removed from the steel by brushing, vacuuming or blowing with compressed air.
- 150-3.5 Air used for blasting and blowing shall be clean. Cleanliness can be determined by discharging air against a clean white absorbent collector. Test to be carried out in accordance to ASTM D4285.



# BRANT BP 250 ADHESIVE SYSTEM FOR RUBBER LINED EQUIPMENT

## A. PURPOSE

To establish a procedure for the application of the adhesive system.

## B. SCOPE

This procedure covers the timing and application guidelines for the primer, intermediate and adhesive components of the lining system.

## C. APPLICABLE DOCUMENTS

Manufacturers Specifications and Data Sheets.

## D. PROCEDURE

250-1 The table below will show the adhesive system for this project.

250-1.1 Primer should be applied within 4 hrs of finish blast or before flash rusting occurs.

Adhesive	Name	Coverage	Dry Time	Max Recoat Time	Surface

250-2 The mixing, applying, drying and curing of the primers and adhesives shall be in accordance with the manufacturers latest published instructions. If overcoat times are exceeded refer to data sheet.

250-3 Prior to priming ensure that the surface is clean, dry and dust free. Primer must be applied immediately after blasting.

250-4 Apply primer/intermediate using brush or roller being careful to ensure that all surfaces including corners and boltholes are fully covered.

250-5 Storage of adhesives will be as prescribed by the manufacturer.

250-6 Avoid exposure to weather or sunlight. The relative humidity should be between 50 and 85% during application. Ambient conditions shall be checked at the beginning of the shift and every 4 hours thereafter.

## BRANT BP 350 - RUBBER LINING APPLICATION AND CURING

### A. PURPOSE

To establish a procedure for the application of the rubber lining to vessels and other steel fabrications.

### B. SCOPE

This procedure will define the steps involved in the application of sheet rubber linings.

### C. APPLICABLE DOCUMENTS - (Latest Edition)

Manufacturers specifications and data sheets.

RMA Bulletin # 4 (1987) -- Application of elastomeric lining.

NACE RP0298-98

### D. LINING APPLICATION AND CURING

350-1 Verify the correct rubber compound is being applied by checking labels and shop work order instructions.

350-1.1 Rubber is to be stored per manufacturer's recommendations.

350-1.2 The table below will show the rubber compound for this project.

Number	Type	Manufacturer	Thickness	Cure Cycle	Durometer

350-2 Linings will be applied when the substrate temperature is a minimum 5°F/3°C above the dew point and humidity is less than 85%. The substrate temperature during lining application shall be between 50° F/10°C to 90° F/32°C. The rubber should be min. 60°F/15° C when applying. Ambient conditions must be monitored at the beginning of the shift and every 4 hours thereafter.

350-3 Cut rubber sheet to desired size and shape. If preshrinking of rubber is required, it should be carried out before cutting the sheet.

350-4 The tie gum side of the rubber (if applicable), should be coated with toluol or appropriate adhesive. The lining is then rolled in a lint-free liner. The rubber should then be positioned on the cemented metal while at the same time gradually removing the lint-free liner. After the sheet is partially tacked in place, it should then rolled with a steady, firm, overlapping stroke. The rolling should be started in the centre of the piece and worked toward the edges. It is essential that the rubber lining be rolled tightly against the metal to remove any trapped air to assure complete contact between rubber and metal. Air blisters that are found shall be punctured with a hypodermic needle dipped in toluol and vented. Patch the puncture hole by applying a button patch approximately 2" around the periphery of the hole.

350-5 Stretching or applying tension to the rubber sheet must be avoided. Special care must be taken to prevent stretching in the corners of right-angled junctions. A properly shaped piece of stock can be used as a fillet in sharp inside corners where stretching is a concern.

350-6 Rubber sheets shall be joined together by making a skived lap of approximately 1" - 1 ½" where practical. The edge of the underlying sheet is upskived at a minimum of 45 degrees and the overlapping edge has a down skive of the same slope. When making lap joints, the overlaps shall be in the direction of product flow wherever possible.

350-7 Replacement of seams/joints are dependant on the process and the equipment's design. They will be located to minimize any stress on the lining. (i.e.: flow, nozzle and pad location etc.)

- 350-8 Lining nozzles and pad connections will consist of making a tube of rubber and inserting it through the nozzle or pad and stitching it down to remove any trapped air.
- 350-9 Flange faces will be a separate piece cut to the O.D. of the flange. It will be applied to the flange and turned into the bore of the nozzle or pad connections overlapping the interior tube.
- 350-10 For internal clips a cut will be made in the lining panel to the length of the clips and pushed over to the substrate. The area around the clip will be stitched to remove trapped air, then a 2" strip will be applied to seal around the clip.
- 350-11 Curing of the rubber should commence only after completion of a pre-cure inspection and repair (BRANT BCP 450) as necessary. There are basic methods for steam curing; autoclave, internal steam and atmospheric steam. The specific method used will depend on the nature and size of the item to be lined. The rubber manufacturers specifications should be followed for cure times and temperatures and adjusted only to accommodate the ultimate goal of reaching the required hardness.
- 350-12.a **AUTOCLAVE CURE**  
This refers to vulcanization where the rubber lined vessel is placed inside a pressure vessel and subjected to controlled steam under pressure. Air should be purged from the autoclave before cure is started. To obtain the most accurate and uniform cure, it is desirable to have the autoclave equipped with instrument controls on air pressure, steam and temperature indicators. Sufficient boiler capacity should be available to raise the temperature from ambient to cure in a relatively short period of time. At termination of cure, it is recommended the rubber lined vessel be cooled down by using water and/or air. Proper cool down of autoclaves will prevent post curing and preclude the possibility of blistering and cracking hard rubbers. During cool down it is important to maintain pressure equal to or greater than the steam pressure. The recording charts should be properly identified and dated.
- 350-12.b **INTERNAL STEAM CURE**  
Internal steam cures can be used on vessels that are designed for pressure and are too large to be placed in an autoclave. The vessel should be positioned during cure so that complete condensate drainage is obtained. Bottom outlets should be left open long enough so that all air is evacuated before building up pressure. Sufficient boiler capacity should be available to raise the temperature from ambient to cure in a relevantly short period of time. A thermometer and pressure gauge should be placed in a blind flange near the bottom of the tank. Prior to introducing steam into the vessel, all outlets should be blanked off. Chemical cure lining can be used on the flanges and precured. The procedure will allow the vessel to be bolted up under pressure without undue distortion of rubber on the face of the flange. Cool down internal steam cures by introducing air until cold. Some natural rubber compounds tend to develop tacky surfaces when air is introduced into the vessel. If this occurs, the curing pressure should be allowed to drop 5 to 10 PSI before air is introduced. The air pressure must be maintained at five pounds higher than the curing pressure.
- 350-12.c **ATMOSPHERIC STEAM CURE**  
Atmospheric steam is normally used for vessels that have open tops and/or bottoms, vessels that do not withstand pressure or vessels that are too large to fit into an autoclave. A 6mm poly sheeting is used to cover the vessel. Steam should be introduced under the poly sheeting by means of a steam line. It is absolutely essential that provisions be made to drain all condensate from the vessel during cure. The steam should not impinge directly on the rubber. After an initial

minimum warm up period, generally 24 hrs dependant on the thickness of the steel, the steam should then be maximized to exhibit a tight bubble under the covering for the required curing period. Rubber compound data sheets must be referred to for curing times and temperatures.

**BRANT BP 390 - PAINT APPLICATIONS AND TESTING****A. PURPOSE**

To establish a procedure for applying liquid paint coating systems

**B. SCOPE**

This procedure will identify the steps involved in preparing paint, applying it and testing for successful application.

**C. APPLICABLE DOCUMENTS**

Manufacturers data sheets.

**D. PROCEDURE****D-1 APPLICATION**

D-1.1 Verify that you are using the correct paint by checking labels and your work order.

D-1.2 The table below will show the coating system.

Coating	Type	MFG	Colour	Coats/Mils	Interval	TDFT

D-1.3 Read manufacturers data sheet thoroughly.

D-1.4 Mix paint thoroughly following any special instructions on data sheet for paints with which you are unfamiliar with.

D-1.5 Brush stripe all difficult to reach areas such as behind clips, in sharp corners, behind flanges etc. All areas behind legs on vessels shall receive extra coats due to design and inaccessibility. For immersion applications stripe all welds, corners and edges with a dilute coat of material. The objective being to ensure that all surfaces receive full coverage.

D-1.6 Apply the paint holding the gun at 90 degrees to the surface and 12" from the surface. Use full passes, triggering at each end and allow 50 percent overlap on each pass. Use cross passes where called for by the manufacturer. On irregular surfaces coat the edges first making an extra pass later.

D-1.7 Use a wet film gauge @ 1 check per 100 sq.ft. to check thickness while spraying in order to ensure consistency and proper dry film thickness.

D-1.8 When inorganic zinc coatings are used test for cure prior to the application of midcoat/topcoat by rubbing MEK on the surface for one minute with a clean cloth. A mist coat may be required prior to topcoat to prevent gassing.

D-1.9 Coatings should only be applied when the surface temperature is 5 degrees C above the dew point and between 10 degrees C and 40 degrees C with relative humidity not exceeding 80%. This should be checked prior to the commencement of spraying in accordance to ASTM E337 and every four hours during continuous paint application.

D-1.10 Handle and store materials according to the latest manufacturer's data sheet. The coating shall be used within the published shelf life.

D-1.11 Air used for paint equipment shall be clean. Cleanliness can be determined by discharging air against a clean white absorbent collector. Test to be carried out in accordance to ASTM D4285.

**D-2      INSPECTION**

- D-2.1    Inspect visually each coat for runs, sags, fish eyes, contamination and foreign objects. Sand or grind out and reapply coating using brush or spray depending on the location of the area.
- D-2.2    Verify that the dry film thickness of each coat is in accordance per SSPC-PA2 and is within specification limits.
- D-2.3    The instrument should be calibrated against known thickness foils traceable to National Standards and on a representative blasted plate.
- D-2.4    Check all flange mating surfaces for flatness, this is critical for proper sealing of the unit.
- D-2.5    For immersion service the coating must also be checked for full continuity in accordance to ASTM D5162 by passing a low/high voltage holiday detector over the surface. Detected pinholes will be apparent by a distinct "beeping" sound.
- D-2.6    Detected pinholes must be recoated as per BRANT BP-395.
- D-2.7    Holidays must be retested per D-2.5 Baked tanks shall be entirely retested due to the re-introduction of heat to cure out repair material. This could cause holidays in areas of undercut and weld pinholes that were previously tested.

BRANT BP 395 - PAINT REPAIR

- A. PURPOSE  
Establish a procedure for repairing coating systems.
- B. SCOPE  
This procedure will identify the steps involved in repairing coatings.
- C. PROCEDURE
  - C-1.1 Test a small area with solvent for resistance to softening or blistering.
  - C-1.2 Any loosely adhering coating in the damaged or defective area will be removed. Wetting agent will be removed prior to mechanical cleaning and coating touch-up.
  - C-1.3 Repairs to internal lining and external coatings that do not expose metal shall be prepared to SSPC SP3 and the adjacent of coating to SSPC SP-3 and roughened suitably for adhesion of the repair coating. Repairs requiring the removal of internal lining to bare metal include pinholes, blisters, loss of adhesion etc., require the surface to be prepared to SSPC SP11 and to achieve a minimum profile per ASTM D4417. All internal repairs/defects shall be performed per the manufacturers recommended guidelines.
  - C-1.4 Clean area with the appropriate solvent. Mask area with tape. Prepare area to avoid overspray when necessary.
  - C-1.5 Apply material by brush, roller or spray as required.
  - C-1.6 Specified thickness per data sheet should be verified in accordance to BRANT BP 390 D-2.
  - C-1.7 Material to be stored per manufacturers data sheets.
  - C-1.8 The coating dry times as per above table-- BP 390

BRANT BP 450 - INSPECTIONA. PURPOSE

To establish a procedure for the inspection of rubber linings.

B. SCOPE

This procedure will cover the inspection practices of visual examination, spark testing and hardness checking for both pre and post vulcanization.

C. APPLICABLE DOCUMENTS (Latest Editions)

RMA Bulletin #5 (1987) - Lining inspection before and after vulcanization

RMA Bulletin #6 (1986) - Standard for surface appearance of linings

RMA Bulletin #13 (1987) - Procedure for spark testing.

RMA Bulletin #18 (1988) - Procedure for use of durometer.

ASTM procedures - D 5162

NACE SP0188 - Standard practice for discontinuity of protective coatings

D. TEST PROCEDURES450-1 VISUAL

Upon completion of the application the equipment will be given a visual inspection with special attention given to the following areas.

450-1.1 The lining will be checked against the blueprints to ensure that all areas are lined according to specific drawing details and instructions.

450-1.2 The general appearance of the rubber surface should be checked for wrinkles, blisters, depressions and delaminations including nozzles, plates, clips, bars etc.

450-1.3 All joints shall be inspected for looseness and uniformity. Whenever combination stocks are used, a solid well-stitched-down splice is necessary for protection of the rubber tie gum backing.

450-1.4 Blisters can be detected by holding a light near the surface of the rubber and looking for shadow areas caused by the trapped air forming high spots. All trapped air should be removed before cure and a repair made if necessary, as per BRANT BP 450-4.

450-2 SPARKTESTING

Before and after the rubber lining is cured, it must be tested with an electrostatic spark tester in accordance to ASTM 5162, NACE SPO188 and RMA bulletin #13. The purpose of this test is to determine the presence of pinhole leaks, punctures, cuts etc. that expose passages to the base metal. See manufacturers data sheets for specific voltages.

450-2.1 TESTING EQUIPMENT

There are various models of high frequency spark testers used for detecting pinholes in the rubber. Output voltage can be fixed or variable depending on the particular test equipment. A variety of electrode accessories are available, but normally a T or L-shaped electrode is used on a large lap free surface. This equipment should be calibrated to a standard traceable to a National Standard.

450-2.2 A conventional volt meter cannot be used to register the voltage output from a spark tester. It is recommended that the equipment be calibrated for testing through the use of a metal lined test plate. The test plate lining thickness must be equal to that of the lined equipment. The lining material on the coupon shall have a pinhole to the metal substrate made with a 22 gauge hypo dermic needle or comparable piercing tool. After the voltage output has been selected move the spark tester, with



the wand laying flat across the rubber section, over the lining. The spark tester can be adjusted to allow for ample spark discharge for that lining thickness. Work with the lowest setting for 3/16" rubber that will yield a 1/2 inch spark.

#### 450-2.3 TEST PROCEDURE

Keep electrode in light contact with rubber and move back and forth at the rate of approximately 1 foot per second. The electrode shall be kept moving without stopping to long in one position, otherwise, there will be a chance of dielectrically breaking down the rubber. During testing the spark will be a bluish colour and the sound will be an even buzzing. If fault or pinholes are present the corona discharge will start to fade and the spark will change to a white colour. The white spark will then be concentrated in a line to the pinhole and the sound will change to a sputtering and cracking noise. Mark each area with chalk for repair.

No moisture should be present at the time of testing and all surfaces must be free of grit, dirt or foreign matter.

In the case of pipe spools or fittings the electrode length and configuration can be adjusted to suit the physical dimensions of the equipment being tested. The electrical strength will not change due to the added lengths.

450-2.4 Curing shall not be done until the completed items have been inspected, repairs made and the repairs re-inspected.

#### 450.3 HARDNESS/DUROMETER INSPECTION

450-3.1 The hardness of the rubber is an indication of proper cure. The lining should be checked to determine the optimum state of cure. Durometer readings shall be made after the cured rubber has cooled to an ambient temperature. Durometer test values below manufacturers recommendations shall be cause for re-curing until minimum hardness is achieved.

450-3.2 Make firm contact between the durometer gauge and the rubber surface, making sure to record the initial highest reading.

450-3.3 Record one reading per 100 square feet to ensure representative readings and in accordance to ASTM 2240, RMA bulletin #18

450-3.4 Compare the readings obtained with those specified by the rubber manufacturer.

450-3.5 The durometer will be calibrated to a standard traceable to a national standard.

When requested: Test coupons (Samples) shall be lined and cured with the equipment in process. The abrasive blasting, rubber lining and curing process will be identical and in conjunction with that of the process intended for the original equipment. Destructive testing will be conducted on the cured sample plate to determine degree of cure (hardness) and pull-strength (adhesion) to metal substrate. See RMA Bulletin #18 – Procedure for use of Durometer & NACE Specification RP0298-98 Section 8: Inspection and Testing, Subsection 8.8.1 Adhesion Test.

## BRANT BP 451 - REPAIR

### A. PURPOSE

To establish a procedure for the repair of rubber linings.

### B. SCOPE

This document will cover the repair procedures for pre and post vulcanization of rubber linings.

### C. APPLICABLE DOCUMENTS

RMA BULLETIN #19(1988) -- Repairs to linings

ASTM D5162

### D. PROCEDURE

- 451-4.0 Prior to cure, repairs will always be made using the original rubber compound and adhesive system. After cure chemically cured compounds may be used as recommended by the manufacturer. Uncured patches will cover two inches outside the periphery of the damaged area.
- 451-4.1 Regardless of the precautions taken in the original cure and maintenance of rubber lined equipment, rubber lining will sometimes blister during cure and will eventually need repair. Fortunately rubber linings in general can be easily and successfully repaired. Repair areas can vary from small blisters or cracks to major failures in numerous panels of rubber. The methods of repair are dictated by the type of original lining, extent of repair, intended service and the facilities available. For these reasons there are no standard methods of repair, especially when considering field repairs. Major repair should be guided by the manufacturers recommendations. The following standards have to be met regardless of the type of repairs that are made.
- 451-4.2 Pinhole repairs following cure must be prepared by buffing and grinding. The surface of the rubber adjacent to the repair area should be buffed back for a minimum of 4" inches around the periphery to ensure a good bond between the parent material and the repair material. Repair patch to be applied 2" outside periphery.
- 451-4.2B If a defect is found after cure the defective lining will be cut away and the peripheral exposed surface buffed and feathered for a minimum of 4" to ensure good bond between the parent material and the repair material. Grinding of the metal substrate will restore the original degree of cleanliness and produce suitable roughness for bonding. The degree of cleanliness shall be verified by SSPC-Vis-3. Abrasive blasting is preferred but the adjacent areas must be protected.
- 451-4.2C Before cementing, the entire work area must be cleaned. All buffing dust grindings, moisture, acid fumes, etc. must be removed from the direct area and any adjacent area where it might be carried or blown.
- 451-4.2D Apply two coats of primer and 2 coats of cement to the buffed rubber and allow to dry between each coat, see manufacturers data sheets for dry times. The prepared bare metal is to be coated with 1 coat primer/1 coat intermediate/2 coats cement.
- 451-4.2E Cut a piece of the repair rubber to conform to the size and shape of the repair area. Skive the repair material on a 45 degree bevel, remove plastic backing and apply cement to the backside area.

- 451-4.2F Inlay the repair material onto the bevelled edges of the buffed rubber. Carefully roll and stitch the inlayed patch ensuring not to trap any air. Once the patch has been completed spark test entire patched surface to ensure there are no voids/leaks.
- 451-4.2G Brush a coat of the cement to the top of the inlay and allow to dry.
- 451-4.2H Cut another piece of repair material slightly larger in size and shape of the repair area. Skive the edges on a 45 degree bevel and apply the cement as described above.
- 451-4.2I Apply the rubber over the initial inlay.
- 451-4.2J The repair compounds must be carefully rolled and stitched down and all trapped air removed. Once overlay is completed re spark test to ensure it does not leak. Chemical cure activator is then applied to the entire repair area to begin the curing process. It is recommended that a minimum of three coats of activator be applied and allowed to dry a minimum of 30 minutes between coats.
- 451-4.3 When utilizing chemical cure stock it is important to realize that even with the application of the chemical cure activator normally it takes about one week to fully cure at 70 degrees F. If the lining is to be put into service above 150 degrees F the lining can be used immediately as curing will take place rapidly at this temperature. Care should be taken if a chemical cure patch is put into a service condition that is very physically demanding such as an abrasive or impinging type of service. Such a service can sometimes peel the patch off. In this case it is recommended that an additional source of external heat (steam, dry air, heat lamps, etc.) be used to help cure the patch. Alternately if external heat cannot be used, the patch will have to air cure. The amount of dry time depends on the ambient temperature. Contact rubber manufacturer to discuss specific details.

# ERVIN AMASTEEL

"The World's Standard for Quality."

The following are paraphrased as condensations of the Society of Automotive Engineers specifications J-827 Cast Steel Shot, J-1993 for Cast Steel Grit, J-444 Cast Steel Shot and Grit Sizes, and include all of the essential features of these specifications. For additional details, request copies of these complete specifications from your Ervin Representative.

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## SOCIETY OF AUTOMOTIVE ENGINEERS J827 Cast Steel Shot and J1993 Cast Steel Grit.

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### Chemical Analysis

Carbon	.80 - 1.2%
Manganese	
S-70 - S-110	0.35 - 1.2%
S-170	0.50 - 1.2%
S-230 and Larger - All Grit	0.60 - 1.2%
Silicon	0.4% minimum
Sulfur	0.05% maximum
Phosphorous	0.05% maximum

### Microstructure

The Microstructure of cast steel shot and grit shall be uniform Martensite, tempered to a degree consistent with the hardness range, with fine well distributed carbides, if any.

### Hardness

#### Shot

Ninety percent of random hardness check performed on a representative sample shall fall within the range of 402-558 Knoop hardness number (40-51 HRC)

#### Grit

Ninety percent of random hardness check performed on a representative sample shall fall within the following ranges. S hardness range of 402-558 Knoop hardness number (40-51 HRC), M hardness range of 495-650 Knoop (47-56 HRC), L hardness range 612-754 Knoop (54-61 HRC), and H hardness of 732 Knoop minimum (60 HRC).

The hardness may be determined by any of the various methods applicable to small sections such as Micro Hardness Tester with a Knoop Indenter, at loads determined to provide a reliable conversion to Rockwell C.

### Density

The density of cast steel shall be not less than 7.3 gm/cc Grit and 7 gm/cc for shot.

### General Appearance

The cast steel shot shall be as nearly spherical as commercially possible and no more than 20% of the shot particles shall have objectionable defects.

### Voids for Shot

No more than 10% of the cast steel shot particles shall contain voids as determined at 10X magnification. A void must be greater than 10% of the area of the abrasive particle to be considered harmful.

### Shrinkage

No more than 10% of cast steel shot particles shall contain shrinkage as determined at 10X magnification. Shrinkage is an internal cavity with irregular dendritic surface, whose area is larger than 40% of the particle area.

### Cracks

No more than 15% of cast steel shot and 40% of the cast steel grit particles shall have cracks as determined at 10X magnification. A crack is a linear discontinuity whose length is greater than 3 times its width and radial in direction.

### Particle Shape of Shot

When examined at 10X magnification, no more than 5% of the shot particles will have a length that is in excess of twice the cross section.

### Mechanical Tests

Several designs of shot testing machines are available commercially for application to routine procedures. See SAE J445 for methods of checking uniformity of shipments of shot or grit to determine relative fatigue life and energy transfer of different types of shot or grit.

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### Ervin AMASTEEL Special Hardness

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M hardness - 90% minimum 495-650 KHN (47-56 HRC)  
L hardness - 90% minimum 612-754 KHN (54-61 HRC)  
H hardness - 90% minimum 732 KHN (60 HRC minimum)

AMASTEEL is also available in other hardness ranges. For these requirements, the hardness of 90% of the representative sample will be within a range of 7 HRC points.

Ervin AMASTEEL Shot and Grit products meet or exceed all of the requirements of SAE specifications. The Ervin AMASTEEL Division is also capable of producing material to meet special customer specifications or requirements.

# AMASTEEL

"The World's Standard for Quality."

## S.A.E SPECIFICATIONS FOR SHOT AND GRIT SCREENINGS

SAE Size No.	SAE J444 SHOT Tolerances	Screen Opening In-mm		SAE Size No.	SAE J444 GRIT Tolerances	Screen Opening In-mm	
<b>S780</b>	All Pass No. 7 Screen.....	.1110 - 2.80		<b>G10</b>	All Pass No. 7 Screen.....	.1110 - 2.80	
	85% Min on No. 10 Screen....	.0787 - 2.00			80% Min on No. 10 Screen....	.0787 - 2.00	
	97% Min on No. 12 Screen....	.0661 - 1.70			90% Min on No. 12 Screen....	.0661 - 1.70	
<b>S660</b>	All Pass No. 8 Screen.....	.0937 - 2.38		<b>G12</b>	All Pass No. 8 Screen.....	.0937 - 2.38	
	85% Min on No. 12 Screen....	.0661 - 1.70			80% Min on No. 12 Screen....	.0661 - 1.70	
	97% Min on No. 14 Screen....	.0555 - 1.40			90% Min on No. 14 Screen....	.0555 - 1.40	
<b>S550</b>	All Pass No. 10 Screen.....	.0787 - 2.00		<b>G14</b>	All Pass No. 10 Screen.....	.0787 - 2.00	
	85% Min on No. 14 Screen....	.0555 - 1.40			80% Min on No. 14 Screen....	.0555 - 1.40	
	97% Min on No. 16 Screen....	.0469 - 1.18			90% Min on No. 16 Screen....	.0469 - 1.18	
<b>S460</b>	All Pass No. 10 Screen.....	.0787 - 2.80		<b>G16</b>	All Pass No. 12 Screen.....	.0661 - 1.70	
	5% Max on No. 12 Screen....	.0661 - 1.70			75% Min on No. 16 Screen....	.0469 - 1.18	
	85% Min on No. 16 Screen....	.0469 - 1.18			85% Min on No. 18 Screen....	.0394 - 1.00	
	96% Min on No. 18 Screen....	.0394 - 1.00		<b>G18</b>	All Pass No. 14 Screen.....	.0555 - 1.40	
<b>S390</b>	All Pass No. 12 Screen.....	.0661 - 1.70			75% Min on No. 18 Screen....	.0394 - 1.00	
	5% Max on No. 14 Screen....	.0555 - 1.40			85% Min on No. 25 Screen....	.0278 - 0.710	
	85% Min on No. 18 Screen....	.0394 - 1.00		<b>G25</b>	All Pass No. 16 Screen.....	.0469 - 1.18	
	96% Min on No. 20 Screen....	.0331 - 0.850			70% Min on No. 25 Screen....	.0278 - 0.710	
<b>S330</b>	All Pass No. 14 Screen.....	.0555 - 1.40			80% Min on No. 40 Screen....	.0165 - 0.425	
	5% Max on No. 16 Screen....	.0469 - 1.18		<b>G40</b>	All Pass No. 18 Screen.....	.0394 - 1.00	
	85% Min on No. 20 Screen....	.0331 - 0.850			70% Min on No. 40 Screen....	.0165 - 0.425	
	96% Min on No. 25 Screen....	.0278 - 0.710			80% Min on No. 60 Screen....	.0117 - 0.300	
<b>S280</b>	All Pass No. 16 Screen.....	.0469 - 1.18		<b>G50</b>	All Pass No. 25 Screen.....	.0278 - 0.710	
	5% Max on No. 18 Screen....	.0394 - 1.00			65% Min on No. 50 Screen....	.0117 - 0.300	
	85% Min on No. 25 Screen....	.0278 - 0.710			75% Min on No. 80 Screen....	.0070 - 0.180	
	96% Min on No. 30 Screen....	.0234 - 0.600		<b>G80</b>	All Pass No. 40 Screen.....	.0165 - 0.425	
<b>S230</b>	All Pass No. 18 Screen.....	.0394 - 1.00			65% Min on No. 80 Screen....	.0070 - 0.180	
	10% Max on No. 20 Screen....	.0331 - 0.850			75% Min on No. 120 Screen...	.0049 - 0.125	
	85% Min on No. 30 Screen....	.0234 - 0.600		<b>G120</b>	All Pass No. 50 Screen.....	.0117 - 0.300	
	97% Min on No. 35 Screen....	.0197 - 0.500			60% Min on No. 120 Screen...	.0049 - 0.125	
<b>S170</b>	All Pass No. 20 Screen.....	.0331 - 0.850			70% Min on No. 200 Screen...	.0029 - 0.075	
	10% Max on No. 25 Screen....	.0278 - 0.710					
	85% Min on No. 40 Screen....	.0165 - 0.425					
	97% Min on No. 45 Screen....	.0139 - 0.355					
<b>S110</b>	All Pass No. 30 Screen.....	.0234 - 0.600					
	10% Max on No. 35 Screen....	.0197 - 0.500					
	80% Min on No. 50 Screen....	.0117 - 0.300					
	90% Min on No. 80 Screen....	.0070 - 0.180					
<b>S70</b>	All Pass No. 40 Screen.....	.0165 - 0.425					
	10% Max on No. 45 Screen....	.0139 - 0.355					
	80% Min on No. 80 Screen....	.0070 - 0.180					
	90% Min on No. 120 Screen...	.0049 - 0.125					

# ERVIN INDUSTRIES

Ervin Industries, Inc. • P.O. Box 1168 • Ann Arbor, MI 48106-1168  
Toll Free: 800-748-0055 • Telephone: 734-769-4600 • Fax: 734-663-0136  
[www.ervinindustries.com](http://www.ervinindustries.com)

Screen Opening Sizes and Screen Numbers with Max and Min Cumulative Percentages  
Allowed on Corresponding Screens. ASTM-E-11 and ISO 565 Test Sieves.

# MATERIAL SAFETY DATA SHEET

# ERVIN

ERVIN INDUSTRIES, INC. 3893 RESEARCH PARK DRIVE ANN ARBOR, MI 48108-2217		TELEPHONE: (734) 769-4600 FAX: (734) 663-0136	
Revision Date: 12/9/09	Replaces Date: 5/28/2008	Revision Level: S	
PREPARED BY: Dennis Scharer		Ervin Industries	


SECTION I	PRODUCT IDENTIFICATION		
Product Name	Chemical Family		
AMASTEEL SHOT	AMABRASIVE	FERROUS	
AMASTEEL GRIT	(SHOT / GRIT MIX)		

SECTION II	COMPOSITION / INGREDIENTS			
Chemical Name	CAS Registry No	% Weight	ACGIH - TLV (mg/m <sup>3</sup> )	OSHA - PEL (mg/m <sup>3</sup> )
Iron - Fe Oxide fume as Fe	7439-89-6	>96	5	10
Carbon - C	7440-44-0	<1.2	none estab.	none estab.
Manganese - Mn Elemental, Inorganic Compounds as Mn Fume as Mn	7439-96-5	<1.3	0.2 none estab.	5 (ceiling) 5 (ceiling)
Silicon - Si as total dust Respirable fraction	7440-21-3	<1.2	10 none estab.	15 5
Chromium - Cr Elemental, Inorganic Compounds as Cr metal Cr II compounds - as Cr Cr III compounds - as Cr Cr VI compounds - water soluble Cr VI compounds - insoluble Chromic Acid and Chromates as CrO <sub>3</sub> Cr VI (hexavalent chromium) in product as shipped	7440-47-3	<0.25	0.5 none estab. 0.5 0.05 0.01 none estab.	1 0.5 0.5 5 ug 5 ug 0.1 (ceiling)
Copper - Cu Fume Dust & mists	7440-50-8	<0.25	0.2 1	0.1 1
Nickel - Ni Elemental metal Insoluble as Ni Soluble compounds as Ni	7440-02-0	<0.20	1.5 0.1 0.2	1 1

SECTION III	PHYSICAL DATA	
Cast steel shot and grit are non-hazardous as received. Fine metallic dust is generated as the abrasive breaks down from impact and wear during normal use. Since the ferrous content is >96%, dust or fumes will consist mainly of iron or iron oxide. In addition, the fine steel dust created can be a mild explosion hazard (see section V).		
Boiling Point - 2850-3150 Degrees C	Melting Point - 1371-1483 Degrees C	
Specific Gravity (at 60 Degrees F) >7.6	Vapor Pressure - Not Applicable	
% Volatile by Volume - Not Applicable	pH - Not Applicable	
Appearance and Odor - Spherical - no odor	Percent Solid by Weight - 100%	

SECTION IV	REACTIVITY DATA	
Stability - Stable Shot will break down into progressively smaller particles and dust during normal use.	Hazardous decomposition products - None Hazardous Polymerization - will not occur	

## MATERIAL SAFETY DATA SHEET

<b>SECTION V</b>	<b>FIRE AND EXPLOSION HAZARD DATA</b>
Flash Point - Not Applicable	Auto Ignition Temperature (solid iron exposed to Oxygen) -930 degree C
Flammability Limits - Not Applicable	Cast steel shot will not burn or explode
A mild fire or explosion hazard situation may be created from fine metal dust. Fire Extinguishing method for dust created due to use - use Class D extinguishing agents or dry sand to exclude air. Do not use water or other liquids, or foam.	
 NFPA Hazard Rating: 0 = Insignificant 1 = Slight 2 = Moderate 3 = High 4 = Extreme Health (blue) = 0 Flammability (red) = 0 Reactivity (yellow) = 0 Special (colorless)	

<b>SECTION VI</b>	<b>HEALTH HAZARD DATA</b>
<b>Emergency and First Aid Procedure</b> - If inhaled, move out of area into fresh air. Flush eyes with running water, have any remaining particles removed from eyes by a qualified medical person; call 911 for immediate medical assistance.	
The end user should have an industrial hygiene evaluation to determine the proper personal protective equipment for each application or blasting operation. Threshold Limit Values - Permissible Exposure Limits - see Section II	
<b>Primary Routes of entry</b> - Inhalation of dust or dust particles in eyes. <b>Target Organs</b> - Lung for chromium and lung & nasal for Nickel. Metallic Nickel is reasonably anticipated to be a human carcinogen.	
Over exposure to dust and fumes may cause mouth, eye, and nose irritation. Prolonged overexposure to manganese dust or fume affects the central nervous system. Prolonged overexposure to iron oxide fume can cause siderosis, or "iron pigmentation" of the lung. It can be seen on a chest x-ray but causes little or no disability.	
Fumes generated by welding or flame cutting a surface containing new or used abrasive or the dust created by use of the abrasive may convert a small portion of chromium to hexavalent chromium. IARC reports welding fumes are possibly carcinogenic to humans.	

<b>SECTION VII</b>	<b>PERSONAL PROTECTION INFORMATION</b>
<b>Ventilation</b> - General ventilation and local exhaust should be provided to keep the dust levels below the limits shown in Section II.	
<b>Respiratory protection</b> - If an industrial hygiene evaluation shows dust exceeds OSHA PEL's indicated in Section II, a NIOSH approved respirator with appropriate filters should be worn as determined by the end user.	
<b>Eye protection</b> - Approved safety glasses w/side shields should always be worn. Other protective equipment determined by the end user.	

<b>SECTION VIII</b>	<b>SPILL / LEAK PROCEDURES AND WASTE DETERMINATION</b>
Shot spilled or leaked onto floors can create hazardous walking conditions. When cleaning up quantities of dust; if exceeding OSHA permissible exposure limits, an approved respirator with appropriate filters should be used.	
Dust from blasting or peening operations always contain contaminants. The dust must be tested to determine if it is hazardous or non-hazardous waste. After such determination, the dust must be disposed of according to appropriate local, State or Federal regulations.	

<b>SECTION IX</b>	<b>SPECIAL PRECAUTIONS</b>
Precautions to be taken in handling and storing - Keep dry to reduce rusting. Observe maximum floor loading limitations.	

<b>SECTION X</b>	<b>TRANSPORTATION</b>
DOT Classification - Not a regulated material	Proper Shipping Name - N/A DOT ID # - Not regulated

<b>SECTION XI</b>	<b>REGULATORY</b>
a) CERCLA Hazardous Substance <span style="float: right;">_____ yes    <input checked="" type="checkbox"/> no</span> b) SARA, Title III, Extremely Hazardous Substance <span style="float: right;">_____ yes    <input checked="" type="checkbox"/> no</span> c) Toxic Chemical Release Report <span style="float: right;">_____ yes    <input checked="" type="checkbox"/> no</span>	
Nickel & Manganese are subject to requirements of Section 313 of the Community Right-to-know Act of 1986 & 40CFR Part 372.	



The information presented here has been compiled from sources considered to be reliable and accurate to the best of our knowledge and belief, but is not guaranteed to be so.






PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **Preservation & Storage Procedure**


 <b>MEG ENERGY</b>	<b>CHRISTINA LAKE REGIONAL PROJECT</b> <b>Phase 3A EPC for Central Plant Facilities</b> <b>SLI Project No. 511036</b>	 <b>SNC-LAVALIN</b>

 <b>SNC-LAVALIN</b>	<input type="checkbox"/> A1 Not suitable to initiate fabrication; modify as noted; resubmit for review
	<input type="checkbox"/> B1 Suitable to initiate fabrication as noted; modify as noted; resubmit for review
Vendor's drawing review for conformity with specifications and design drawing	<input type="checkbox"/> C1 Suitable to fabricate to completion as noted; submit final documents including as-builts as required
This review does not relieve the vendor of his responsibility for errors in design and detailing as detailed in his contract	<input type="checkbox"/> D1 Suitable to fabricate to completion; submit final documents including as-built documents as required
	<input type="checkbox"/> E1 Not suitable as final documents as noted; modify as noted and resubmit
	<input checked="" type="checkbox"/> F1 Suitable as final documents; no further resubmittal required (unless revised by vendor)
Vendor: Ecodyne Limited ( Canada ) - 12123      No.: 32125-A-1023      Rev: B      Date Rec'd: 2013-06-18	
Doc. Title: SDR? - RUST PREVENTIVE SPEC, AFTER FILTERS - Tag: 3A-F-208AtoG	
Client Code:	Project: MEG Phase 3A EPC
Reviewed by: <i>C. Simons</i>	Document No: P-5675-02-0065
Date: <i>24 June 13</i>	Submittal: 01

Number of vessels: 7  
 Tags: 3A-F-208 A to G

Reference drawing: 32125-D-2202-01

Index:  
 Cover page 1 page  
 Rust Preventive Treatment Procedure 1 page  
 VpCI-337 cat sheet 1 page  
 VpCI-368 cat sheet 1 page

TITLE					CUSTOMER		
RUST PREVENTIVE SPEC, AFTER FILTERS					MEG Energy Corporation c/o SNC-Lavalin Christina Lake Phase 3A		
					PO No. P-5675-02		
					 <b>ECODYNE</b> Limited <small>A Marmcon Water/Berkshire Hathaway Company</small>		
SCALE - N/A					<small>THIS DRAWING IS THE PROPERTY OF ECODYNE LIMITED. IT IS NOT TO BE USED FOR ANY PURPOSES DETRIMENTAL TO THE INTEREST OF THIS COMPANY AND IS SUBJECT TO RETURN UPON REQUEST.</small>		
					BY	DATE	
B	13 June 2013	ADDED CAT SHEETS	AV	1/11	DRN	AV	APR 26 2013
A	APR 26 2013	FIRST ISSUE	AV		CHKD	1/11	13 June 2013
REV	DATE	REMARKS	BY	CHKD	APPD	1/11	13 June 2013
DWG. NO.							REV.
32125-A-1023							B

## Rust Preventive Treatment

### Vapour Phase Corrosion Inhibitors (VpCI):

**NOTE:** Vapour Phase Corrosion Inhibitors (sometimes called Volatile Corrosion Inhibitors) protect metals against corrosion by chemically preventing the corrosion reaction from taking place. (Compared to barriers like paint, which prevent the corrosion causing chemicals from reaching the metal). Because they are volatile, the inhibiting chemicals can move out from the film or package and eventually forming a film on the metal. Therefore even metal parts that have not been coated will receive the same corrosion protection as parts which are in direct contact with the inhibitor at the time of packaging.

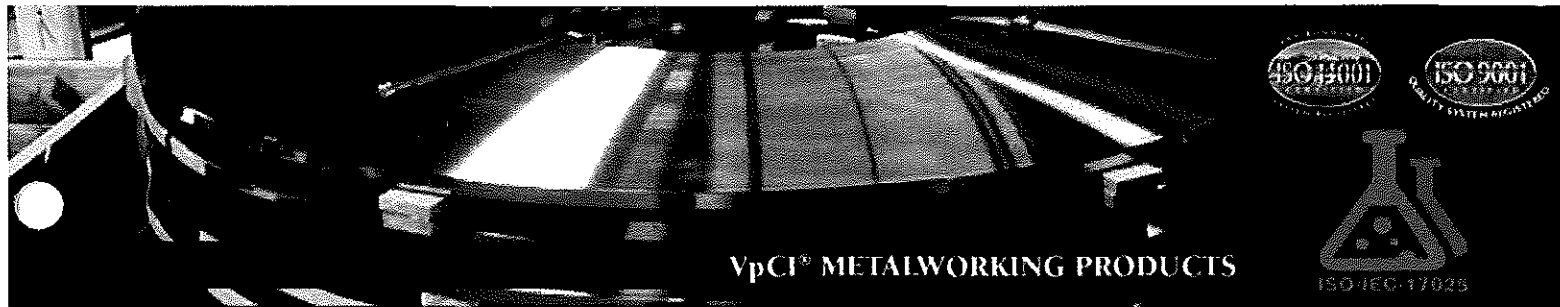
Cortec VpCI-337 is applied to interior vessel surfaces by fogging technique.

Cortec VpCI-368 aerosol is applied to all the bare flange faces.

All the nozzles are blanked off with gaskets for storage.

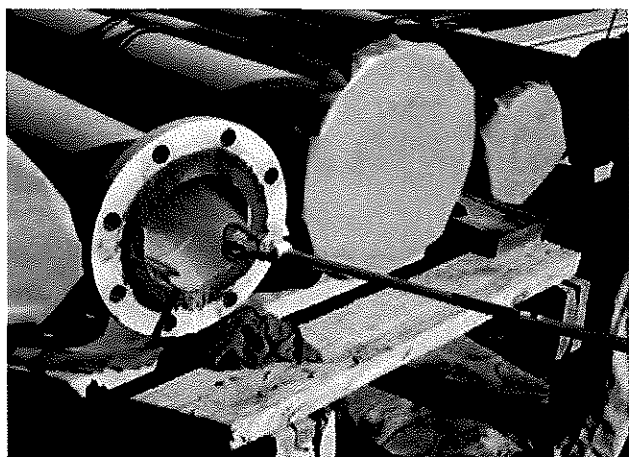
Vessels are to be stored outdoors after insulation and cladding.

Reference the attached products catalogue sheets.



VpCI® METALWORKING PRODUCTS

# VpCI®-337/337 Winterized



## PRODUCT DESCRIPTION

VpCI-337 is a ready-to-use waterborne corrosion inhibitor for indoor use. Vapor phase corrosion inhibitors in VpCI-337 migrate and protect metal surfaces, resulting in time and cost savings. The VpCI-337 is used to protect edges of coils and stacks or to fog void spaces, tanks, containers, packages, and enclosures. These labor-saving techniques use a minimum of product to protect large areas or volumes. VpCI-337 is effective on ferrous and non-ferrous metals as well as aluminum, plated steels, and copper. VpCI-337 is consistently successful in providing protection to the basic metals, metalworking, and packaging industries.

In most cases, products protected by VpCI-337 are ready-to-use. No degreasing or stripping is necessary by most end users. The metal will retain a clean, rust-free surface. In most cases, the thin protective film will not affect paintability, conductivity, appearance, or any other important property of metals or alloys.

VpCI-337 is also available in a cold weather version. VpCI-337 Winterized has a lower freezing point for the convenience of application and storage in cold temperatures.

## FEATURES

- Biodegradable (87% biodegradation in 28 days)
- Contains vapor phase inhibitors which provide multimetal corrosion protection
- Leaves a thin, self-healing film that is environmentally approved for use
- Ready-to-use
- Protection is immediate, convenient to apply, and easy to remove if required
- Gives up to 12 months indoor protection

## TYPICAL APPLICATIONS

- In-process protection
- Edge spray of coils and sheet stock
- Into void spaces
- Double wall void spaces
- Fogging

## TYPICAL PROPERTIES

### VpCI-337

Appearance	Clear to hazy amber liquid
Carrier	Water
Coverage	935-1870 ft <sup>2</sup> /gal (23-46 m <sup>2</sup> /l)
Film Type	Thin, soft film
Film Thickness	0.25-0.5 mil (6.3-12.5 microns)
Flash Point	> 200 F (93 C)
Freeze Point	32 F (0 C)
Non-volatile Content	28-33%
pH	8.2-8.8
Weight per Gallon	8.7-8.9 lb/gal (1.04-1.06 kg/l)

### VpCI-337 Winterized

Carrier	Water + Ethylene Glycol
Freeze Point	-26 F (-32 C)
Non-volatile Content	20-25%
pH	8.0-8.3
Weight per Gallon	8.8-9.0 lb/gal (1.05-1.08 kg/l)

Note: Product may become hazy after a few days.

## METALS PROTECTED

- Hot/cold-rolled steel
- Silicon steel
- Stainless steel
- Cast iron
- Zinc
- Aluminum
- Copper
- Brass

## APPLICATION

### Material Handling:

Fog or mist without dilution into containers, boxes, crates, and shrouded packages at a rate of 1 oz./ft<sup>3</sup> (1 L/m<sup>3</sup>) of enclosed space. Spray on cardboard, wood pallets, closed and open cell foams, and other packaging materials. Always spray VpCI-337 uniformly within enclosure and allow direct access of vapors to metal surfaces to be protected.

### Product Preparation:

Mix thoroughly if separation or settling has occurred.

### Methods for Monitoring Solution:

Refractometer, pH

### Dry Time:

VpCI-337

< 45 minutes

VpCI-337 Winterized

3 hours

### Product Cleanup:

Use soap and water to clean equipment.

## PACKAGING AND STORAGE

VpCI-337 is packaged in 10-14 oz. net wt. (284-397g) recyclable aluminum cans (12/carton), 5 gallon (19 liter) plastic pails, 55 gallon (208 liter) metal drums, totes, and bulk.

Minimum storage temperature: 12 F (-12 C)

Maximum storage temperature: 120 F (49 C)

VpCI-337 Winterized is packaged in 5 gallon (19 liter) plastic pails, 55 gallon (208 liter) metal drums, totes, and bulk.

Minimum storage temperature: -26 F (-32 C)

Maximum storage temperature: 120 F (49 C)

Shelf life is 24 months.

## FOR INDUSTRIAL USE ONLY

KEEP OUT OF REACH OF CHILDREN

KEEP CONTAINER TIGHTLY CLOSED

NOT FOR INTERNAL CONSUMPTION

CONSULT MATERIAL SAFETY DATA SHEET FOR  
MORE INFORMATION

## LIMITED WARRANTY

All statements, technical information and recommendations contained herein are based on tests Cortec Corporation believes to be reliable, but the accuracy or completeness thereof is not guaranteed.

Cortec Corporation warrants Cortec® products will be free from defects when shipped to customer. Cortec Corporation's obligation under this warranty shall be limited to replacement of product that proves to be defective. To obtain replacement product under this warranty, the customer must notify Cortec Corporation of the claimed defect within six months after shipment of product to customer. All freight charges for replacement products shall be paid by customer.

Cortec Corporation shall have no liability for any injury, loss or damage arising out of the use of or the inability to use the products.

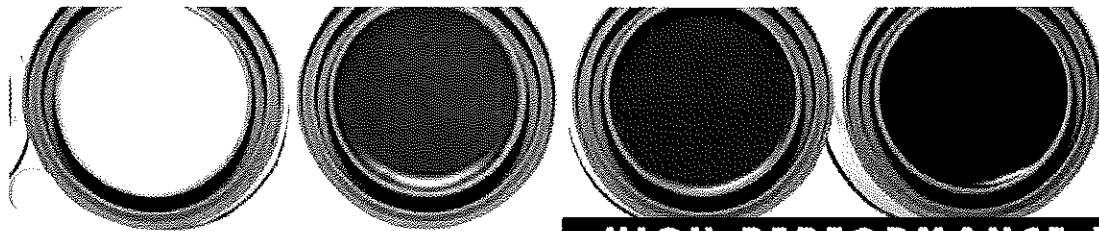
BEFORE USING OR USER SHALL DETERMINE THE SUITABILITY OF THE PRODUCT FOR THE PARTICULAR USE, AND DO NOT USE THE PRODUCT FOR ANY PURPOSES OTHER THAN THOSE FOR WHICH IT WAS DESIGNED. NO REPRESENTATION OR RECOMMENDATION NOT CONTAINED HEREIN SHALL HAVE ANY FORCE OR EFFECT UNLESS IN A WRITTEN DOCUMENT SIGNED BY AN OFFICER OF Cortec Corporation.

THE FORTHGOING WARRANTY IS EXCLUSIVE AND NON-TRANSFERABLE. IT IS THE SOLE RESPONSIBILITY OF THE USER TO MAINTAIN THE PRODUCT IN A SAFE AND SOUND CONDITION. NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER WARRANTY, SHALL APPLY TO THE PRODUCT OR TO THE USER'S USE THEREOF.



4119 White Bear Parkway, St. Paul, MN 55110 USA  
Phone: (651) 429-1100, Fax: (651) 429-1122  
Toll Free: (800) 4-CORTEC, E-mail: info@cortecvci.com  
Internet: http://www.cortecvci.com

Distributed by:



## HIGH PERFORMANCE VpCI™ COATINGS

# VpCI®-368

### PRODUCT DESCRIPTION

VpCI-368 is a time-proven coating that provides excellent protection to metal substrates exposed to harsh outdoor conditions. VpCI-368 leaves a firm, wax-like film that can be removed by mineral spirits or alkaline cleaners such as Cortec® VpCI-414.

### FEATURES

- Flexible
- Excellent salt spray protection
- Excellent outdoor protection
- Multimetal protection
- Excellent UV resistance
- Moisture displacing
- Cured film is heat stable up to 392°F (200°C)
- Conforms to MIL-PRF-16173E (Grades 1 and 2)
- NATO 6850-66-132-5848
- NATO 6850-66-132-6099
- NSN 8030-00-062-6950
- NSN 8030-00-231-2345
- NSN 8030-00-244-1300
- NSN 8030-01-470-2601

### TYPICAL APPLICATIONS

- Pipe coating
- Parts storage
- Underbody coating
- Wire rope
- Steel plate
- Machined parts

### METALS PROTECTED

- Carbon Steel
- Stainless Steel
- Copper
- Aluminum
- Cast Iron

### PROTECTION PROPERTIES

	ASTM	DFT	Carbon Steel (1010)
Salt Spray	B-117	2-3 mils (50-75 microns)	900-1500 hr.
Prohesion	G-85	4-7 mils (100-175 microns)	2000 hr.
Humidity	D-1748	2-3 mils (50-75 microns)	2500+ hr.

### APPLICATION

VpCI-368 may be applied by brushing or spraying. A film thickness of at least 2-3 mils (50-70 microns) is recommended for uncovered outdoor storage.

#### Surface Preparation:

NACE	SSPC	ARS
3 or 4	6 or 7	High B-2

#### Product Cleanup:

- Use solvents or mineral spirits for cleanup of equipment.
- Solvent, wax strippers, or alkaline cleaners such as VpCI-414 can be used for clean up of overspray.

### TYPICAL PROPERTIES

Appearance	Dark brown viscous liquid
Coverage	300-330 ft <sup>2</sup> /gal @ 3 mils (7-8 m <sup>2</sup> /l @ 75 microns)
Dry Film Time	12-24 hours
Drying to Touch Time	0.5-3 hours
Film Type	Firm, wax-like
Removal Method	Petroleum solvents
Carrier	Mineral spirits
Shelf Life	24 months @ 75°F (24°C)
Non-volatile Content	57-62%
Viscosity at 23°C	600-5,000 cps (6 rpm) Spindle #2
VOC	2.9-3.1 lb/gal (347-372 g/l)
Density	7.4-7.7 lb/gal (0.89-0.92 kg/l)

*Note: Coating dry time is affected by temperature, air-flow and humidity.*

### PACKAGING AND STORAGE

VpCI-368 is available in 5 gallon (19 liter) steel pails, 55 gallon (208 liter) metal drums, totes, and bulk.

Available as CorShield® VpCI-368 in 11 oz. (312 g) aerosol cans.



## RECOMMENDED SPRAY EQUIPMENT

This information is based on spraying VpCI-368 at 3 parts concentrate to 1 part mineral spirits. A ready-to-use version of VpCI-368 is also available. The viscosity range is between 100-1,000 cps. If using a dilution other than this, please consult a Cortec or Graco representative.

Model	510 Airless/AA Plus
Pump	30:1 President
Tip	0.011-0.015 in (0.028-0.038 cm)
Cap	Standard
Filter	60 Mesh High Pressure
Air Pressure	80 psi
Fluid Hose	3/8" x 10' with 1/4" whip hose for ease of handling
Fluid Pressure (Supply/Gun)	2000/1700 psi (138/117 bar)

The minimum fluid atomization pressure required is 1500 psi (103 bar), which gives 2-4 mils (50-100 microns) WFT/pass.

## FOR INDUSTRIAL USE ONLY

**KEEP OUT OF REACH OF CHILDREN**

**KEEP CONTAINER TIGHTLY CLOSED**

**NOT FOR INTERNAL CONSUMPTION**

**CONSULT MATERIAL SAFETY DATA SHEET FOR MORE INFORMATION**

## LIMITED WARRANTY

All statements, technical information and recommendations contained herein are based on tests Cortec Corporation believes to be reliable, but the accuracy or completeness thereof is not guaranteed.

Cortec Corporation warrants Cortec® products will be free from defects when shipped to customer. Cortec Corporation's obligation under this warranty shall be limited to replacement of product that proves to be defective. To obtain replacement product under this warranty, the customer must notify Cortec Corporation of the claimed defect within six months after shipment of product to customer. All freight charges for replacement products shall be paid by customer.

Cortec Corporation shall have no liability for any injury, loss or damage arising out of the use of or the inability to use the products.

BEFORE USING, USER SHALL DETERMINE THE SUITABILITY OF THE PRODUCT FOR ITS INTENDED USE, AND USER ASSUMES ALL RISK AND LIABILITY WHATSOEVER IN CONNECTION THEREWITH. No representation or recommendation not contained herein shall have any force or effect unless in a written document signed by an officer of Cortec Corporation.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE. IN NO CASE SHALL CORTEC CORPORATION BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.



Distributed by:

4119 White Bear Parkway, St. Paul, MN 55110 USA  
Phone (651) 429-1100, Fax (651) 429-1122  
Toll Free (800) 4-CORTEC, E-mail [info@cortecvci.com](mailto:info@cortecvci.com)  
Internet <http://www.cortecvci.com>

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PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **N51 – Test & Certification Reports**



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Mill Test Reports

# LESENA STEEL LTD

## PLATES AND HEAD INSPECTION REPORT

CUSTOMER ECODYNE LTD.

SERIAL No: 0411

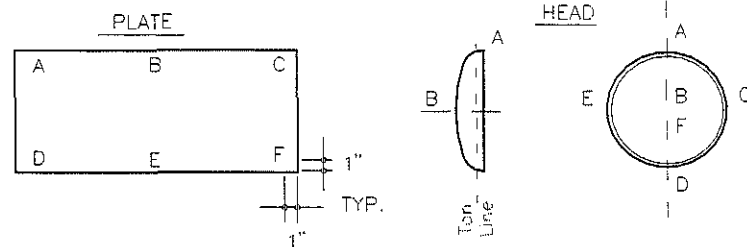
JOB No: 12-32 A

DATE: FEB/4/2013

CUST. P. O. No: 321253503

INSPECTED BY: Arie Willemssen

ITEM	HEAT No.	MATERIAL TYPE AND MFG.	THICKNESS (INS)					
			A	B	C	D	E	F
TOP HEAD S/N 1016553-1	3500933-03 2P279-902	NUCOR/EVRAZ SA-516-70N	.906	.789	.902	.885	.904	.757
BTM HEAD S/N 101554-1	3500933-01 2T133-304	NUCOR/EVRAZ SA-516-70N	1.002	.880	.992	.996	1.001	.896
SHELL CSE LONG	3442P3-AC1661	SA-516-70N / ESSAR	.755	.765	.754	.763	.760	.754



(B & F at nozzle cutouts)

**NB.** THICKNESS WAS MEASURED WITH "T" MIKE PROGRAMABLE

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER TOP HEAD  
PRODUCTION # 1016553

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

2- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 18.2mm MIN. THK. W/ 50.8mm SF.

**HEAT NUMBER**

-----  
3500933-03  
2P278-104  
2P279-902

**CERTIFICATE OF COMPLIANCE**


ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB

LESENA QUALITY CONTROL	
JOB:	12-32 A/B
ITEM:	(2) Top Heads
ACCEPTED DATE:	4/4/13
SIGNATURE:	

**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 1

**NUCOR**  
It's our Nature.

Issuing Date : 02/07/2013 B/L No. : 348434 Load No. : 350449 Our Order No. : 107909/1 Cust. Order No. : 4500054635  
 Vehicle No: Besi RW5497 Sold To: Enerfab Inc  
 Specification : 0.8750" x 72.000" x 177.000" 4955 Spring Grove Ave  
 ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized CINCINNATI, OH 45232  
 Test Coupons at 1650 F Ship To: BRIGHTON TRU-EDGE HEADS  
 11861 MOSTELLER RD.  
 CINCINNATI, OH 45241

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test									Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"		Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-03	2	3.16	T	46,000	75,300		25.8													
			T	58,200	71,600		27.4	N												

**APPROVED**

LESENA QUALITY CONTROL	
JOB:	12-32 A, B
ITEM:	(2) Top HDs
ACCEPTED DATE:	4/4/13
SIGNATURE:	<i>[Signature]</i>

**Q.C. DEPT**

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-08). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant.  
 DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

*T. A. Depretis*  
 T. A. Depretis, Metallurgist

02/07/2013 3:41:30 PM

# Material Test Report

B/L: 301122

02/15/2013

4001 Philadelphia Pike, Claymont DE 19703

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 231309-01 Cust PO

Part No. G4500034355

**Specifications:**

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

**Products Shipped for Order 231309-01 (sorted by Serial)**

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B08615-1	2P279-902 USA	11.1	0.8750 x 136.0000 x 272.0000	22.23 x 3454.40 x 6908.80	9,180	4,164
B08615-2	2P279-902 USA	11.1	0.8750 x 136.0000 x 272.0000	22.23 x 3454.40 x 6908.80	9,180	4,164
B08616-1	2P278-104 USA	11.1	0.8750 x 136.0000 x 272.0000	22.23 x 3454.40 x 6908.80	9,180	4,164
B08616-2	2P278-104 USA	11.1	0.8750 x 136.0000 x 272.0000	22.23 x 3454.40 x 6908.80	9,180	4,164

Shipment Summary of Order 231309-01: 4 pieces 36,720 lbs (16,656 kg)

**Chemical Analysis for Order 231309-01 (sorted by Heat)**

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2P278	0.178	1.073	0.013	0.011	0.218	0.243	0.114	0.196	0.030	0.016
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.025	0.004	0.001	0.0055	0.023	0.002	0.0005			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2P279	0.164	1.026	0.012	0.002	0.274	0.266	0.116	0.139	0.027	0.019
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.027	0.004	0.001	0.0071	0.026	0.002	0.0005			

**Tensile Tests for Order 231309-01 (sorted by Heat)**

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation			RA %	Head Tail	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM						
B08616-1	2P278-104	0.8750	22.23	76	521	53	362	42	2	50			Tran	1x		310226
B08616-1	2P278-104	0.8750	22.23	76	525	52	361	33	2	50			Tran			310227
B08615-1	2P279-902	0.8750	22.23	74	513	53	363	48	2	50			Tran	1x		310224
B08615-1	2P279-902	0.8750	22.23	76	523	50	345	38	2	50			Tran			310225

**Other Information for Order 231309-01**

Material is 100% melted and manufactured in the USA. No weld repair has been performed. Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

# APPROVED

# Q.C. DEPT

LESENA QUALITY CONTROL	
JOB:	12-32 A, B
ITEM:	(2) Top HDs
ACCEPTED DATE:	4/4/13
SIGNATURE:	<i>[Signature]</i>

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

*[Signature]*

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
 (Name and address of Manufacturer)  
 2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
 (Name and address of Purchaser)  
 3. Location of installation UNKNOWN  
 (Name and address)  
 4. Type ELLIP HEADS 3962.4mm x 22.23mm thk.  
 [Description of vessel part (shell, two-piece head, tube bundle)]  
1016553 - 1,2  
 (Manufacturer's serial number) (GRN)  
PO# 321253501  
 (National Board number) (Drawing number)  
TG# FILTER TOP HD.  
 (Drawing prepared by)  
2013  
 (Year built)  
 5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
 [Edition and Addenda (date)] (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, In.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) <u>SA516-70 (1650°F - 1/2 HOUR PER INCH)</u> (b) _____														
(Material spec. number, grade or type) (H.T. - time & temp.)														
	Location (Top, Bottom , Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
 (Internal) (External) (Internal) (External) Min. design metal temp.   at    
 9. Impact test NO at test temperature of    
 [Indicate yes or no and the component(s) impact tested]  
 10. Hydro., pneu., or comb. test pressure NONE Proof test    
 11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)							
Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
 (Yes or No) (Number) (Number) (Describe) (Where and how)  
 14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 3-20-2013 Name Enerfab, Inc. Signed Richard J. [Signature]  
 (Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 3/21/2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 3/21/2013 Signed [Signature] Commissions NSB001A 01446  
 (Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)



**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016554

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

2- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 19.05mm MIN. THK. W/ 101.6mm SF.

**HEAT NUMBER**

-----  
3500933-01  
2P450-202  
2T133-304

**CERTIFICATE OF COMPLIANCE**

ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB

LESENA QUALITY CONTROL	
JOB:	12-32 A/B
ITEM:	(2) BTM Heads
ACCEPTED DATE:	4/4/13
SIGNATURE:	AW

BRIGHTON TRU-EDGE HEADS  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
MTR COVER LETTER

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN : QC MANAGER  
CUSTOMER P/O: 321253501  
BRIGHTON S/O: 12766  
PRODUCTION ORDER: 1016554

TAG #: FILTER BOTTOM HEAD

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIALS PROVIDED ON YOUR REFERENCED PURCHASE ORDER.

LABOR AND MATL

2.00 - SA516-70 - CS2 2:1 ELLIPTICAL 156" OD 0.75" MIN. THK. WITH 4" SF

HEAT NUMBER(S)

3500933-01

2P450-202

2T133-304

CERTIFICATE OF COMPLIANCE

ALL PLATES WERE NORMALIZED AT 1650° F FOR A HALF HOUR PER INCH AND AIR COOLED.

ALL HEADS WERE COLD FORMED. ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG - 81 AND UCS - 79 (d) AND UG-96 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY ITS COMPOUNDS.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 1-800-543-1644.

VERY TRULY YOURS,

**Rick Seiter**

BRIGHTON TRU-EDGE HEADS  
DIV. OF ENERFAB

MILL TEST REPORTS TO GO WITH SHIPMENT.

Item	Material	Quantity	Weight
Description			
Material Type	SA516-70	X-Ray	100% X-Ray
Style	2:1 ELLIPTICAL	U-2A Form	Yes
Diameter	156" OD	Finish Inside	Mill Finish
Thickness	1" Nom 0.75" Min	Finish Outside	Mill Finish
RD		Circumference	40' 10-1/16" OC
ICR		Weight Each	7,311
SF	4"	Total Weight	14,622
OAH	43.5"	Volume	2,392
Center Hole	None	Form Code	Cold Formed
Bevel	30.0° Inside with .25" Land & 3:1 Inside Taper to 0.75" Shell	Inspection	ASME Code INSP w/ P. Dat Sht

**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 2

 **NUCOR**  
It's our Nature.

Issuing Date : 02/07/2013

B/L No. : 348425

Load No. : 350434

Our Order No. : 107919/3

Cust. Order No. : 4500054637

Vehicle No: FOSTER 821

Sold To: Enerfab Inc

Ship To: BRIGHTON TRU-EDGE HEADS

Specification: 1.0000" x 72.000" x 179.000"

4955 Spring Grove Ave  
CINCINNATI, OH 4523211861 MOSTELLER RD.  
CINCINNATI, OH 45241

ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized


Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test									Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"		Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-01	2	3.65	T	43,700	74,700		23.8													
			T	45,500	71,500		27.4	N												

**APPROVED****Q.C. DEPT**

LESENA QUALITY CONTROL	
JOB:	12-32 A/B
ITEM:	(2) BTM Heads
ACCEPTED DATE:	4/4/13
SIGNATURE:	

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/5) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546.

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

  
T. A. Depretis, Metallurgist

02/07/2013 2:43:33 PM

# Material Test Report

B/L: 311205

4001 Philadelphia Pike, Claymont DE 19703

11/27/2012

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 238753-01 Cust PO

Part No. 4500050485

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 238753-01 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B52315-2	2T133-304 USA	9.6	1.0000 x 121.0000 x 242.0000	25.40 x 3073.40 x 6146.80	8,304	3,767

Shipment Summary of Order 238753-01: 1 piece 8,304 lbs (3,767 kg)

## Chemical Analysis for Order 238753-01 (sorted by Heat)

Heat/Anlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T133	0.174	1.112	0.009	0.009	0.235	0.329	0.256	0.162	0.046	0.025
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.018	0.006	0.004	0.0056	0.017	0.002	0.0002			

## Tensile Tests for Order 238753-01 (sorted by Heat)

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation		RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%				
B52315-1	2T133-304	1.0000	25.40	78	538	55	379	40	2	50		Tran	1x		330190
B52315-1	2T133-304	1.0000	25.40	81	558	54	370	28	2	50		Tran			330191

## Other Information for Order 238753-01

Material is 100% melted and manufactured in the USA. No weld repair has been performed. Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

Shipment Grand Totals of B/L 311205: 4 pieces 39,777 lbs (18,043 kg)

APPROVED

LESENA QUALITY CONTROL

JOB: 12-32 A

ITEM: (1) BTM Head

ACCEPTED DATE: 4/4/13

SIGNATURE: *[Signature]*

DEPT

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

*[Signature]*

Revision:

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
 (Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
 (Name and address of Purchaser)

3. Location of installation UNKNOWN  
 (Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk.  
 (Description of vessel part (shell, two-piece head, tube bundle))

PO# 321253501 TG# FILTER BOTTOM HD. 2013  
 (National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
 (Edition and Addenda (date)) (Code Case number) [Special service per UG-120(d)]

6. Shell (a) No. of course(s): \_\_\_\_\_ (b) Overall length \_\_\_\_\_

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b) \_\_\_\_\_  
 (Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening) \_\_\_\_\_

8. MAWP \_\_\_\_\_ at max. temp. \_\_\_\_\_ Min. design metal temp. \_\_\_\_\_ at \_\_\_\_\_  
 (Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of \_\_\_\_\_  
 [indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test \_\_\_\_\_

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt \_\_\_\_\_ Lugs \_\_\_\_\_ Legs \_\_\_\_\_ Others \_\_\_\_\_ Attached \_\_\_\_\_  
 (Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 3-20-2013 Name Enerfab, Inc. Signed Richard J. [Signature]  
 (Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 3-20-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 3-20-2013 Signed [Signature] Commissions NO 10901A OH 4006  
 (Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006986 000010 2013/02/10	Shipment No. & Date.: 1000029746 2013/02/11	TC No., Date & Time : ESA-47908 2013/02/11 - 16:20:41													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19149-8270 / 1 BOL NO.: 1000029746 Cust. Part No.: Carrier : GARDEWINE GROUP INC. - 1673 85129													
Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 25 min Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs						
0.7500 " x 96.000 " x 493.00 "	AC1659	3442P3-02	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "	AC1660	3442P3-02	10,067 LB	1						
0.7500 " x 96.000 " x 493.00 "	AC1661	3442P3-02	10,067 LB	1											
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3442P3*	0.22	1.01	0.008	0.003	0.250	0.15	0.02	0.04	0.00	0.023	0.000	0.001	0.0002	0.002	0.4200
*****MECHANICAL PROPERTIES*****															
Tensile Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)			
3442P3	AC1659	166"	ALG	0.7500	N	.2	T	B	49.2	74.8	8"	26			
3442P3	AC1660	166"	ALG	0.7500	N	.2	T	B	50.1	75.7	8"	27			
3442P3	AC1661	166"	ALG	0.7500	N	.2	T	B	51.0	75.4	8"	30			

LESENIA QUALITY CONTROL

JOB: 12-32

ITEM: shell 'A'

ACCEPTED DATE: 4/24/13

SIGNATURE: *JB*

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

# LESENA STEEL LTD

## PLATES AND HEAD INSPECTION REPORT

CUSTOMER ECODYNE LTD.

SERIAL No: 0412

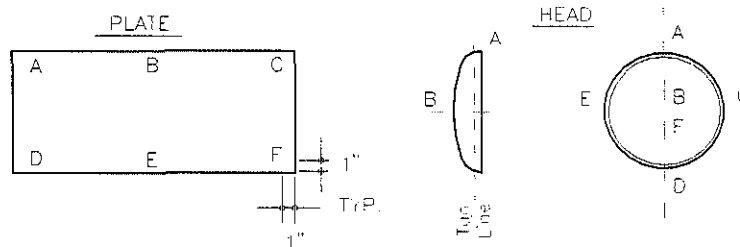
JOB No: 12-32 B

DATE: FEB/4/2013

CUST. P. O. No: 321253503

INSPECTED BY: Arie Willemssen

ITEM	HEAT No.	MATERIAL TYPE AND MFG.	THICKNESS (INS)					
			A	B	C	D	E	F
TOP HEAD S/N 1016553-2	3500933-03 2P278-104	NUCOR /EVRAZ SA-516-70N	.913	.778	.912	.887	.888	.773
BTM HEAD S/N 1016554-2	3500933-01 2P450-202	NUCOR/EVRAZ SA-516-70N	1.019	.885	1.024	1.018	1.026	.893
SHELL CSE LONG	3315P3- AC0695	SA-516-70N / ESSAR	.760	.758	.751	.755	.751	.746



(B & F at nozzle cutouts)

**NB.** THICKNESS WAS MEASURED WITH "T" MIKE PROGRAMABLE



**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER TOP HEAD  
PRODUCTION # 1016553

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

2- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 18.2mm MIN. THK. W/ 50.8mm SF.

**HEAT NUMBER**

-----  
3500933-03  
2P278-104  
2P279-902

**CERTIFICATE OF COMPLIANCE**


ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB

LESENA QUALITY CONTROL	
JOB:	12-32 A/B
ITEM:	(2) Top Heads
ACCEPTED DATE:	4/4/13
SIGNATURE:	

**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 1



Issuing Date : 02/07/2013      B/L No. : 348434      Load No. : 350449      Our Order No. : 107909/1      Cust. Order No. : 4500054635

Vehicle No: Besi RW5497      Sold To: Enerfab Inc      Ship To: BRIGHTON TRU-EDGE HEADS

Specification : 0.8750" x 72.000" x 177.000"      4955 Spring Grove Ave      11861 MOSTELLER RD.

ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized      CINCINNATI, OH 45232      CINCINNATI, OH 45241

Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test									Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"		Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-03	2	3.16	T	46,000	75,300		25.8													
			T	58,200	71,600		27.4	N												

**APPROVED**

LESENA QUALITY CONTROL	
JOB:	12-32 A, B
ITEM:	(2) Top HDs
ACCEPTED DATE:	4/4/13
SIGNATURE:	<i>Ar</i>

**Q.C. DEPT**

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$ Pcm =  $C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

*T. A. Depretis*

T. A. Depretis, Metallurgist

02/07/2013 3:41:30 PM

# Material Test Report

B/L: 301122

4001 Philadelphia Pike, Claymont DE 19703

02/15/2013

Sold To: **ENERFAB, INC.**

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 231309-01 Cust PO

Part No. G4500034355

**Specifications:**

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

**Products Shipped for Order 231309-01 (sorted by Serial)**

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B08615-1	2P279-902 USA	11.1	0.8750 x 136.0000 x 272.0000	22.23 x 3454.40 x 6908.80	9,180	4,164
B08615-2	2P279-902 USA	11.1	0.8750 x 136.0000 x 272.0000	22.23 x 3454.40 x 6908.80	9,180	4,164
B08616-1	2P278-104 USA	11.1	0.8750 x 136.0000 x 272.0000	22.23 x 3454.40 x 6908.80	9,180	4,164
B08616-2	2P278-104 USA	11.1	0.8750 x 136.0000 x 272.0000	22.23 x 3454.40 x 6908.80	9,180	4,164

Shipment Summary of Order 231309-01: 4 pieces 36,720 lbs (16,656 kg)

**Chemical Analysis for Order 231309-01 (sorted by Heat)**

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2P278	0.178	1.073	0.013	0.011	0.218	0.243	0.114	0.196	0.030	0.016
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.025	0.004	0.001	0.0055	0.023	0.002	0.0005			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2P279	0.164	1.026	0.012	0.002	0.274	0.266	0.116	0.139	0.027	0.019
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.027	0.004	0.001	0.0071	0.026	0.002	0.0005			

**Tensile Tests for Order 231309-01 (sorted by Heat)**

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation		RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%				
B08616-1	2P278-104	0.8750	22.23	76	521	53	362	42	2	50		Tran	1x		310226
B08616-1	2P278-104	0.8750	22.23	76	525	52	361	33	2	50		Tran			310227
B08615-1	2P279-902	0.8750	22.23	74	513	53	363	48	2	50		Tran	1x		310224
B08615-1	2P279-902	0.8750	22.23	76	523	50	345	38	2	50		Tran			310225

**Other Information for Order 231309-01**

Material is 100% melted and manufactured in the USA. No weld repair has been performed. Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

**APPROVED**

**Q.C. DEPT**

LESENA QUALITY CONTROL

JOB: 12-32 A, B

ITEM: (2) Top HDs

ACCEPTED DATE: 4/4/13

SIGNATURE: *[Signature]*

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

*[Signature]*

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)
2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)
3. Location of installation UNKNOWN  
(Name and address)
4. Type ELLIP HEADS 3962.4mm x 22.23mm thk.  
[Description of vessel part (shell, two-piece head, tube bundle)]  
PO# 321253501 TG# FILTER TOP HD. 2013  
(National Board number) (Drawing number) (Manufacturer's serial number) (CRN)  
(Drawing prepared by) (Year built)
5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) [Special service per UG-120(d)]
6. Shell (a) No. of course(s): \_\_\_\_\_ (b) Overall length \_\_\_\_\_

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b) \_\_\_\_\_  
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening) \_\_\_\_\_

8. MAWP \_\_\_\_\_ at max. temp. \_\_\_\_\_  
(Internal) (External) (Internal) (External) (Material spec. number, grade, size, number) Min. design metal temp. \_\_\_\_\_ at \_\_\_\_\_
9. Impact test NO at test temperature of \_\_\_\_\_  
[Indicate yes or no and the component(s) impact tested]
10. Hydro., pneu., or comb. test pressure NONE Proof test \_\_\_\_\_
11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)							
Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt \_\_\_\_\_ Lugs \_\_\_\_\_ Legs \_\_\_\_\_ Others \_\_\_\_\_ Attached \_\_\_\_\_  
(Yes or No) (Number) (Number) (Describe) (Where and how)
14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 3-20-2013 Name Enerfab, Inc. Signed Richard J. Carter  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 3/21/2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 3/21/2013 Signed [Signature] Commissions NR1001A 04446  
(Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016554

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

2- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 19.05mm MIN. THK. W/ 101.6mm SF.

**HEAT NUMBER**

-----  
3500933-01  
2P450-202  
2T133-304

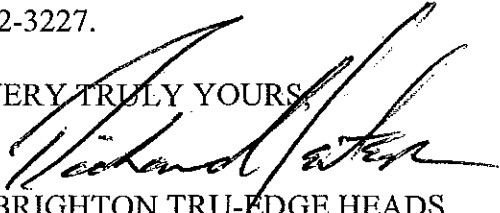
**CERTIFICATE OF COMPLIANCE**

ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB

LESENA QUALITY CONTROL	
JOB:	12-32 A/B
ITEM:	(2) BTM Heads
ACCEPTED DATE:	AW 4/4/13
SIGNATURE:	AW

# Mill Test Report

Page 2

Issuing Date : 02/07/2013 B/L No. : 348425 Load No. : 350434 Our Order No. : 107919/3 Cust. Order No. : 4500054637  
Vehicle No: FOSTER 821 Sold To: Enerfab Inc 4955 Spring Grove Ave Ship To: BRIGHTON TRU-EDGE HEADS  
Specification : 1.0000" x 72.000" x 179.000" CINCINNATI, OH 45232 11861 MOSTELLER RD.  
ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized CINCINNATI, OH 45241  
Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-01	2	3.65	T	43,700	74,700		23.8												
			T	45,500	71,500		27.4	N											

APPROVED

Q.C. DEPT

LESENA QUALITY CONTROL

JOB: 12-32 A/B

ITEM: (2) BTM Heads

ACCEPTED DATE: 4/4/13

SIGNATURE: *[Signature]*

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/5) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$

$Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1B/EN 10204 3.1B(2004). DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546.

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

*T. A. Depretis*  
T. A. Depretis, Metallurgist

02/07/2013 2:43:33 PM

# Material Test Report

B/L: 301794

03/15/2012

4001 Philadelphia Pike, Claymont DE 19703

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 231750-01

Customer PO

Part No. G4500035183

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 231750-01 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B11710-1	2P450-202 USA	9.8	1.0000 x 121.0000 x 242.0000	25.40 x 3073.40 x 6146.80	8,304	3,767
B11710-2	2P450-202 USA	9.8	1.0000 x 121.0000 x 242.0000	25.40 x 3073.40 x 6146.80	8,304	3,767
B11711-1	2P450-302 USA	9.8	1.0000 x 121.0000 x 242.0000	25.40 x 3073.40 x 6146.80	8,304	3,767
B11711-2	2P450-302 USA	9.8	1.0000 x 121.0000 x 242.0000	25.40 x 3073.40 x 6146.80	8,304	3,767

Shipment Summary of Order 231750-01: 4 pieces 33,216 lbs (15,067 kg)

## Chemical Analysis for Order 231750-01 (sorted by Heat)

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2P450	0.18	0.96	0.009	0.006	0.25	0.265	0.115	0.087	0.031	0.018
		Al	V	Nb/Cb	N	Alscl	Ti	B			
		0.028	0.01	0.00	0.009	0.028	0.002	0.0002			

## Tensile Tests for Order 231750-01 (sorted by Heat)

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation		RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%				
B11710-1	2P450-202	1.0000	25.40	73	503	52	361	46	2	50		Tran	1x		311325
B11710-2	2P450-202	1.0000	25.40	76	523	49	336	33	2	50		Tran			311326
B11711-1	2P450-302	1.0000	25.40	72	498	50	347	46	2	50		Tran	1x		311327
B11711-2	2P450-302	1.0000	25.40	85	587	53	362	39	2	50		Tran			311328

## Other Information for Order 231750-01

Material is 100% melted and manufactured in the USA. No weld repair has been performed. Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

Shipment Grand Totals of B/L 301794: 6 pieces 41,673 lbs (18,903 kg)

APPROVED

Q.C. DEPT

LESENA QUALITY CONTROL	
JOB:	12-32 B
ITEM:	(1) BTM Head
ACCEPTED DATE:	4/4/13
SIGNATURE:	<i>AW</i>

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Chief Metallurgist, David J. Cernava

*D. J. Cernava*

Revision:

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
 (Name and address of Manufacturer)  
 2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
 (Name and address of Purchaser)  
 3. Location of installation UNKNOWN  
 (Name and address)  
 4. Type ELLIP HEADS 3962.4mm x 25.4mm thk.  
 (Description of vessel part (shell, two-piece head, tube bundle)) 1016554 - 1,2  
 (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER BOTTOM HD. 2013  
 (National Board number) (Drawing number) (Drawing prepared by) (Year built)  
 5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
 (Edition and Addenda (date)) (Code Case number) [Special service per UG-120(d)]

6. Shell (a) No. of course(s): (b) Overall length

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, In.	Length (ft & In.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)    
 (Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
 (Internal) (External) (Internal) (External) Min. design metal temp.   at  

9. Impact test NO at test temperature of    
 [indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
 (Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 3-20-2013 Name Enerfab, Inc. Signed Richard J. Foster  
 (Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT

have inspected the pressure vessel part described in this Manufacturer's Data Report on 3-20-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 3-20-2013 Signed [Signature] Commissions NB10001A OH400e  
 (Authorized Inspector) (National Board (Incl. endorsements), State, Province, and number)





ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006986 000010 2013/01/18		Shipment No. & Date.: 1000026205 2013/01/19		TC No., Date & Time : ESA-43028 2013/01/21 - 16:32:27											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19149-8270 / 1 BOL NO.: 1000026205 Cust.Part No.: Carrier : NATIONAL TRANSPORTATION - 5836(1118)											
Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 25 min Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed															
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs				
0.7500 " x 96.000 " x 493.00 "		AC0482	3315P3-59	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "		AC0483	3315P3-59	10,067 LB	1				
0.7500 " x 96.000 " x 493.00 "		AC0695	3315P3-52	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "		AC0696	3315P3-52	10,067 LB	1				
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3315P3*	0.23	0.98	0.012	0.003	0.250	0.14	0.02	0.03	0.00	0.033	0.000	0.001	0.0000	0.002	0.4200
*****MECHANICAL PROPERTIES*****															
Tensile Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)			
3315P3	AC0695	✓	166"	ALG	0.7500	NORM	.2	T B	50.7	75.4	8"	28			
3315P3	AC0696		166"	ALG	0.7500	NORM	.2	T B	50.4	75.7	8"	26			
3315P3	AC0482		166"	ALG	0.7500	NORM	.2	T B	51.9	76.8	8"	27			
3315P3	AC0483		166"	ALG	0.7500	NORM	.2	T B	51.3	76.4	8"	26			

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

Date: 2013/01/21 Time: 16:32:27 Page no: 1

SIGNATURE: \_\_\_\_\_  
ACCEPTED DATE: \_\_\_\_\_  
ITEM: \_\_\_\_\_  
JOB: \_\_\_\_\_  
LESEA QUALITY CONTROL  
12-32  
ITEM: SHAL 'B'  
ACCEPTED DATE: 4/24/13  
SIGNATURE: \_\_\_\_\_

SHAL

# LESENA STEEL LTD

## PLATES AND HEAD INSPECTION REPORT

CUSTOMER ECODYNE LTD.

SERIAL No: 0413

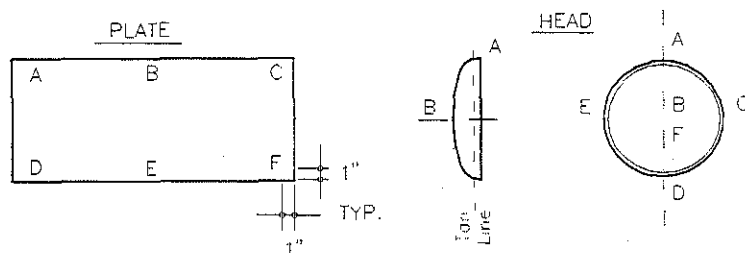
JOB No: 12-32 C

DATE: FEB/4/2013

CUST. P. O. No: 321253503

INSPECTED BY: Arie Willemssen

ITEM	HEAT No.	MATERIAL TYPE AND MFG.	THICKNESS (INS)					
			A	B	C	D	E	F
TOP HEAD S/N 1016555-1	350933-03 2J618-402	NUCOR/EVRAZ SA-516-70N	.907	.747	.905	.913	.907	.746
BTM HEAD S/N 1016556-1	3500933-01 2T446-505	NUCOR/EVRAZ SA-516-70N	.988	.891	1.001	1.003	1.005	.847
SHELL CSE LONG	3315P3- AC0483	SA-516-70N / ESSAR	.758	.766	.765	.751	.758	.761



(B & F at nozzle cutouts)

**NB.** THICKNESS WAS MEASURED WITH "T" MIKE PROGRAMABLE

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER TOP HEAD  
PRODUCTION # 1016555

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

2- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 18.20mm MIN. THK. W/ 50.8mm SF.

**HEAT NUMBER**

-----  
3500933-03  
2T618-402

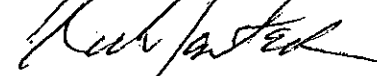
**CERTIFICATE OF COMPLIANCE**

ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,



BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB

LESENIA QUALITY CONTROL	
JOB:	12-32 D
ITEM:	(2) TOPS HEAD
ACCEPTED DATE:	04/25/13
SIGNATURE:	<i>MS</i>

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk.  
(Description of vessel part (shell, two-piece head, tube bundle)) 1016555 - 1,2  
(Manufacturer's serial number) 2013  
(CRN)  
PO# 321253501 TG# FILTER TOP HD.  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)    
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   Min. design metal temp.   at    
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of    
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Legs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 4-11-2013 Name Enerfab, Inc. Signed Richard J. [Signature]  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-11-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-11-2013 Signed [Signature] Commissions NB10964 06426  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 1



Issuing Date : 02/07/2013

B/L No. : 348434

Load No. : 350449

Our Order No. : 107909/1

Cust. Order No. : 4500054635

Vehicle No: Besl RW5497

Sold To: Enerfab Inc  
4955 Spring Grove Ave  
CINCINNATI, OH 45232Ship To: BRIGHTON TRU-EDGE HEADS  
11861 MOSTELLER RD.  
CINCINNATI, OH 45241

Specification : 0.8750" x 72.000" x 177.000"

ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized  
Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test									Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"		Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-03	✓ 2	3.16	T	46,000	75,300		25.8													
			T	58,200	71,600		27.4	N												

LESENA QUALITY CONTROL

JOB: 12-32 D

ITEM: (2) TORS H/CAP

ACCEPTED DATE: 07/25/17

SIGNATURE:

**APPROVED****Q.C. DEPT**

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-08). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

T.A. Depretis, Metallurgist

02/07/2013 3:41:30 PM

# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-01 Cust PO 4500056766

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 241093-01 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66495-1	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66495-2	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-1	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-2	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383

Shipment Summary of Order 241093-01: 4 pieces 21,016 lbs (9,533 kg)

## Chemical Analysis for Order 241093-01 (sorted by Heat)

Heat	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T449	0.121	1.363	0.008	0.006	0.293	0.295	0.113	0.099	0.036	0.013
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.024	0.005	0.002	0.0091	0.023	0.002	0.0004			

Heat	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T618	0.136	1.411	0.007	0.006	0.295	0.240	0.090	0.096	0.021	0.011
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.022	0.004	0.002	0.0094	0.021	0.002	0.0003			

## Tensile Tests for Order 241093-01 (sorted by Heat)

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation			RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%	Tail				
B66498-1	2T449-305	0.8750	22.23	75	514	53	362	46	2	50			Tran	1x		335866
B66498-1	2T449-305	0.8750	22.23	75	516	50	347	33	2	50			Tran			335867
B66495-1	2T618-402	0.8750	22.23	77	532	56	383	48	2	50			Tran	1x		335860
B66495-1	2T618-402	0.8750	22.23	80	548	55	381	37	2	50			Tran			335861

## Other Information for Order 241093-01

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049-3.1B / EN 10204-3.1 2004, In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

APPROVED

Q.C. DEPT

LESENA QUALITY CONTROL

JOB: 12-32 D

ITEM: C2) for HLRD

ACCEPTED DATE: 04/25/13

SIGNATURE: *[Signature]*

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

*[Signature]*

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016556

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

2- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 19.05mm MIN. THK. W/ 101.6mm SF.

**HEAT NUMBER**

-----  
3500933-01  
3500933-02  
2T643-901  
2T446-505

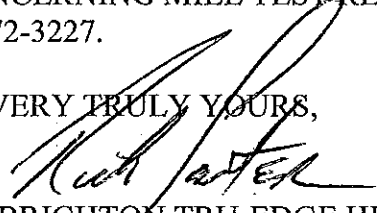
**CERTIFICATE OF COMPLIANCE**


ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F – ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB

LESCHER QUALITY CONTROL	
JOB:	12-32 D
ITEM:	(2) Bottom Head
ACCEPTED DATE:	04/25/13
SIGNATURE:	

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC., 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk. 1016556 -1,2  
[Description of vessel part (shell, two-piece head, tube bundle)] (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER BOTTOM HD. 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
[Edition and Addenda (date)] (Code Case number) (Special service per UG-120(d))

6. Shell (a) No. of course(s): (b) Overall length

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)    
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
(Internal) (External) (Internal) (External) Min. design metal temp.   at  

9. Impact test NO at test temperature of    
(indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
Date 4-09-2013 Name Enerfab, Inc. Signed Richard J. Fisher  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-9-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-9-2013 Signed [Signature] Commissions INDIANA 011436  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)



**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 4



Issuing Date : 02/07/2013

B/L No. : 348425

Load No. : 350434

Our Order No. : 107919/5

Cust. Order No. : 4500054637

Vehicle No: FOSTER 821

Sold To: Enerfab Inc

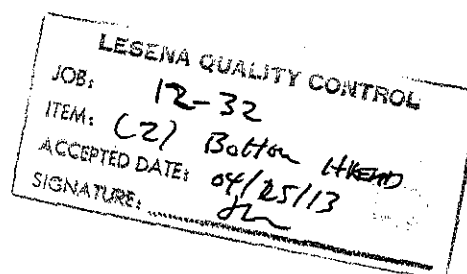
Ship To: BRIGHTON TRU-EDGE HEADS

Specification : 1.0000" x 72.000" x 179.000"

4955 Spring Grove Ave  
CINCINNATI, OH 4523211861 MOSTELLER RD.  
CINCINNATI, OH 45241ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized  
Test Coupons at 1650 F**Marking :**

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test									Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"		Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-02	3	5.48	T	42,600	74,800		23.1													
			T	45,600	70,600		27.4	N												

**APPROVED****Q.C. DEPT**

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant.  
DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

T. A. Depretis, Metallurgist

02/07/2013 2:43:33 PM

# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-02 Cust PO 4500056766

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 241093-02 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66499-1	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66499-2	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66501-2	2T643-901 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66502-1	2T463-201 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769

Shipment Summary of Order 241093-02: 4 pieces 24,420 lbs (11,077 kg)

## Chemical Analysis for Order 241093-02 (sorted by Heat)

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T446	0.127	1.392	0.007	0.002	0.325	0.256	0.107	0.079	0.027	0.012
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.024	0.004	0.001	0.0092	0.024	0.002	0.0004			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T463	0.129	1.380	0.009	0.004	0.292	0.263	0.101	0.075	0.027	0.013
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.024	0.006	0.003	0.0063	0.023	0.002	0.0004			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T643	0.172	1.039	0.010	0.010	0.237	0.286	0.124	0.121	0.028	0.015
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.023	0.004	0.002	0.0071	0.021	0.002	0.0003			

## Tensile Tests for Order 241093-02 (sorted by Heat)

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation			RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%	Tail				
B66499-1	2T446-505	1.0000	25.40	74	507	53	367	49	2	50			Tran	1x		335868
B66499-1	2T446-505	1.0000	25.40	77	532	55	376	38	2	50			Tran			335869
B66502-1	2T463-201	1.0000	25.40	73	501	53	362	48	2	50			Tran	1x		335874
B66502-1	2T463-201	1.0000	25.40	75	518	47	327	31	2	50			Tran			335875
B66501-1	2T643-901	1.0000	25.40	73	506	50	343	46	2	50			Tran	1x		335872
B66501-1	2T643-901	1.0000	25.40	76	525	47	327	34	2	50			Tran			335873

## Other Information for Order 241093-02

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049-3.1B / EN 10204-3.1 2004, in Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness.

Meets 2004 EN10204 3.1 AND DIN 50049 3.1B; In Compliance With ES-1094

Shipment Grand Totals of B/L 314582: 8 pieces 45,436 lbs (20,609 kg)

APPROVED

LEGNA QUALITY CONTROL

JOB: 12-32D

ITEM: (2) Bottom HEAD

ACCEPTED DATE: 07/25/13

SIGNATURE: *[Signature]*

Q.C. DEPT

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

*[Signature]*



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006986 000010 2013/01/18	Shipment No. & Date.: 1000026205 2013/01/19	TC No., Date & Time : ESA-43028 2013/01/21 - 16:32:27
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19149-8270 / 1 BOL NO.: 1000026205 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 5836(1118)

Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 25 min Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed

Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370

Insp T/R : Test Report As Per Spec

Cust Use : PVQ

ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES.  
THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.

MEETS EN 10204:2004 TYPE 3.1  
ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM

ALL HEATS FULLY KILLED.  
HEATS INDICATED WITH (\*) FINE GRAINED.  
HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS

Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs
0.7500" x 96.000" x 493.00"	AC0482	3315P3-59	10,067 LB	1	0.7500" x 96.000" x 493.00"	AC0483	3315P3-59	10,067 LB	1
0.7500" x 96.000" x 493.00"	AC0695	3315P3-52	10,067 LB	1	0.7500" x 96.000" x 493.00"	AC0696	3315P3-52	10,067 LB	1

*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3315P3*	0.23	0.98	0.012	0.003	0.250	0.14	0.02	0.03	0.00	0.033	0.000	0.001	0.0000	0.002	0.4200

*****MECHANICAL PROPERTIES*****												
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
3315P3	AC0695	166"	ALG	0.7500	NORM	.2	T	B	50.7	75.4	8"	28
3315P3	AC0696	166"	ALG	0.7500	NORM	.2	T	B	50.4	75.7	8"	26
3315P3	AC0482	166"	ALG	0.7500	NORM	.2	T	B	51.9	76.8	8"	27
3315P3	AC0483	166"	ALG	0.7500	NORM	.2	T	B	51.3	76.4	8"	26

LESSINA QUALITY CONTROL

JOB: 12-32

ITEM: SHELL 'D'

ACCEPTED DATE: 4/27/13

SIGNATURE: JK

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006986 000010 2013/01/18	Shipment No. & Date.: 1000026205 2013/01/19	TC No., Date & Time : ESA-43028 2013/01/21 - 16:32:27
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19149-8270 / 1 BOL NO.: 1000026205 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 5836(1118)
Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 25 min Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS		

Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs
0.7500 " x 96.000 " x 493.00 "	AC0482	3315P3-59	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "	AC0483	3315P3-59	10,067 LB	1
0.7500 " x 96.000 " x 493.00 "	AC0695	3315P3-52	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "	AC0696	3315P3-52	10,067 LB	1

Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3315P3*	0.23	0.98	0.012	0.003	0.250	0.14	0.02	0.03	0.00	0.033	0.000	0.001	0.0000	0.002	0.4200

MECHANICAL PROPERTIES												
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
3315P3	AC0695	166"	ALG	0.7500	NORM	.2	T	B	50.7	75.4	8"	28
3315P3	AC0696	166"	ALG	0.7500	NORM	.2	T	B	50.4	75.7	8"	26
3315P3	AC0482	166"	ALG	0.7500	NORM	.2	T	B	51.9	76.8	8"	27
3315P3	AC0483	166"	ALG	0.7500	NORM	.2	T	B	51.3	76.4	8"	26

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: Steel 'C'  
ACCEPTED DATE: 04/24/13  
SIGNATURE: JR

# LESENA STEEL LTD

## PLATES AND HEAD INSPECTION REPORT

CUSTOMER ECODYNE LTD.

SERIAL No: 0414

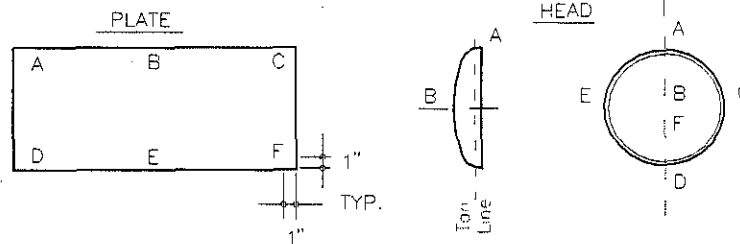
JOB No: 12-32 D

DATE: FEB/4/2013

CUST. P. O. No: 321253503

INSPECTED BY: Arie Willemsen

ITEM	HEAT No.	MATERIAL TYPE AND MFG.	THICKNESS (INS)					
			A	B	C	D	E	F
TOP HEAD S/N 1016555-2	3500933-03 2T618-402	NUCOR/EVRAZ SA-516-70N	.904	.755	.892	.880	.921	.735
BTM HEAD S/N 1016556-2	2T643-901 35000933-02	NUCOR/EVRAZ SA-516-70N	1.00	.867	1.009	1.005	1.002	.871
SHELL CSE LONG	3315P3- AC0696	SA-516-70N / ESSAR	.755	.754	.758	.763	.755	.759



(B & F at nozzle cutouts)

**NB.** THICKNESS WAS MEASURED WITH "T" MIKE PROGRAMABLE

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER TOP HEAD  
PRODUCTION # 1016555

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

2- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 18.20mm MIN. THK. W/ 50.8mm SF.

**HEAT NUMBER**

-----  
3500933-03  
2T618-402

**CERTIFICATE OF COMPLIANCE**

ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB

12-32 C  
C21 TOPS HEAD  
04/25/13  
JW

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk. 1016565 - 1,2  
(Description of vessel part (shell, two-piece head, tube bundle)) (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER TOP HD. 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) <u>SA516-70 (1650°F - 1/2 HOUR PER INCH)</u> (b) <u> </u>										(Material spec. number, grade or type) (H.T. - time & temp.)				
	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
(Internal) (External) (Internal) (External) Min. design metal temp.   at  

9. Impact test NO at test temperature of    
[Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-11-2013 Name Enerfab, Inc. Signed Richard J. [Signature]  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-11-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4/11/2013 Signed [Signature] Commissions NBIR0014 04/12/10  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

# Material Test Report

B/L: 314582

03/05/2013

4001 Philadelphia Pike, Claymont DE 19703

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-01 Cust PO 4500056766

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 241093-01 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66495-1	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66495-2	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-1	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-2	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383

Shipment Summary of Order 241093-01: 4 pieces 21,016 lbs (9,533 kg)

## Chemical Analysis for Order 241093-01 (sorted by Heat)

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T449	0.121	1.363	0.008	0.006	0.293	0.295	0.113	0.099	0.036	0.013
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.024	0.005	0.002	0.0091	0.023	0.002	0.0004			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T618	0.136	1.411	0.007	0.006	0.295	0.240	0.090	0.096	0.021	0.011
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.022	0.004	0.002	0.0094	0.021	0.002	0.0003			

## Tensile Tests for Order 241093-01 (sorted by Heat)

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation		RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%				
B66498-1	2T449-305	0.8750	22.23	75	514	53	362	46	2	50		Tran	1x		335866
B66498-1	2T449-305	0.8750	22.23	75	516	50	347	33	2	50		Tran			335867
B66495-1	2T618-402	0.8750	22.23	77	532	56	383	48	2	50		Tran	1x		335860
B66495-1	2T618-402	0.8750	22.23	80	548	55	381	37	2	50		Tran			335861

## Other Information for Order 241093-01

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049-3.1B / EN 10204-3.1 2004, In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness.

Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

APPROVED

LESENA QUALITY CONTROL  
JOB: 12-32 C  
ITEM: C21 TOR HEADS  
ACCEPTED DATE: 04/25/13  
SIGNATURE: [Signature]

Q.C. DEPT

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

[Signature]

Revision:



# Mill Test Report

Page 1

Issuing Date : 02/07/2013 B/L No. : 348434 Load No. : 350449 Our Order No. : 107909/1 Cust. Order No. : 4500054835  
Vehicle No: Besi RW5497 Sold To : Enerfab Inc 4955 Spring Grove Ave CINCINNATI, OH 45232 Ship To : BRIGHTON TRU-EDGE HEADS 11861 MOSTELLER RD. CINCINNATI, OH 45241  
Specification : 0.8750" x 72.000" x 177.000"  
ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized  
Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-03	2	3.16	T	46,000	75,300		25.8												
			T	58,200	71,600		27.4	N											

APPROVED

Q.C. DEPT

12-32 C  
C21 TOP HEAD  
DATE: 04/25/13  
[Signature]

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/5) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$

$Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-08). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only. Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

*T. A. Depreys*  
T. A. Depreys, Metallurgist

02/07/2013 3:41:30 PM

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016556

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

2- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 19.05mm MIN. THK. W/ 101.6mm SF.

**HEAT NUMBER**

-----  
3500933-01  
3500933-02  
2T643-901  
2T446-505

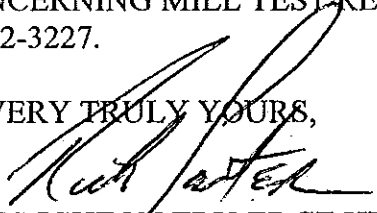
**CERTIFICATE OF COMPLIANCE**

ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB

12-32 C  
(2) BT HEAD  
04/25/13  
JH

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk. 1016556 -1,2 2013  
(Description of vessel part (shell, two-piece head, tube bundle)) (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER BOTTOM HD.  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
[Edition and Addenda (date)] (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)    
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
	Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)	19.05				2:1						1	FULL	Unk.
(b)													

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   Min. design metal temp.   at    
(Internal) (External) (Internal) (External) (Material spec. number, grade, size, number)

9. Impact test NO at test temperature of    
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 4-09-2013 Name Enerfab, Inc. Signed Richard J. Fisher  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-9-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-9-2013 Signed [Signature] Commissions NB10901A 011916  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-02 Cust PO 4500056766

**Specifications:**

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

**Products Shipped for Order 241093-02 (sorted by Serial)**

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66499-1	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66499-2	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66501-2	2T643-901 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66502-1	2T463-201 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769

Shipment Summary of Order 241093-02: 4 pieces 24,420 lbs (11,077 kg)

**Chemical Analysis for Order 241093-02 (sorted by Heat)**

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T446	0.127	1.392	0.007	0.002	0.325	0.256	0.107	0.079	0.027	0.012
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.024	0.004	0.001	0.0092	0.024	0.002	0.0004			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T463	0.129	1.380	0.009	0.004	0.292	0.263	0.101	0.075	0.027	0.013
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.024	0.006	0.003	0.0063	0.023	0.002	0.0004			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T643	0.172	1.039	0.010	0.010	0.237	0.286	0.124	0.121	0.028	0.015
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.023	0.004	0.002	0.0071	0.021	0.002	0.0003			

**Tensile Tests for Order 241093-02 (sorted by Heat)**

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation		RA %	Head Tail	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In. MM						
B66499-1	2T446-505	1.0000	25.40	74	507	53	367	49	2 50			Tran	1x		335868
B66499-1	2T446-505	1.0000	25.40	77	532	55	376	38	2 50			Tran			335869
B66502-1	2T463-201	1.0000	25.40	73	501	53	362	48	2 50			Tran	1x		335874
B66502-1	2T463-201	1.0000	25.40	75	518	47	327	31	2 50			Tran			335875
B66501-1	2T643-901	1.0000	25.40	73	506	50	343	46	2 50			Tran	1x		335872
B66501-1	2T643-901	1.0000	25.40	76	525	47	327	34	2 50			Tran			335873

**Other Information for Order 241093-02**

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049-3.1B / EN 10204-3.1 2004, In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

Shipment Grand Totals of B/L 314582: 8 pieces 45,436 lbs (20,609 kg)

LESENIA QUALITY CONTROL

ICB: 12-32 C

DEM: (2) BOTTOM H/LWD

ACCEPTED DATE: 04/25/13

Signature: [Signature]

APPROVED

Q.C. DEPT

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

Signature: [Signature]

**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 6



Issuing Date : 02/07/2013    B/L No. : 348434    Load No. : 350449    Our Order No. : 107919/1    Cust. Order No. : 4500054637  
 Vehicle No: Besi RW5497    Sold To: Enerfab Inc    Ship To: BRIGHTON TRU-EDGE HEADS  
 Specification : 1.0000" x 72.000" x 179.000"    4955 Spring Grove Ave    11861 MOSTELLER RD.  
 ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized    CINCINNATI, OH 45232    CINCINNATI, OH 45241  
 Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % In 2"	Elongation % In 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-01	2	3.65	T	43,700	74,700		23.8												
			T	45,500	71,500		27.4	N											

APPROVED

Q.C. DEPT

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material.  
 Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant.  
 DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

T. A. Depretis, Metallurgist

02/07/2013 3:41:30 PM

# LESENA STEEL LTD

## PLATES AND HEAD INSPECTION REPORT

CUSTOMER ECODYNE LTD.

SERIAL No: 0415

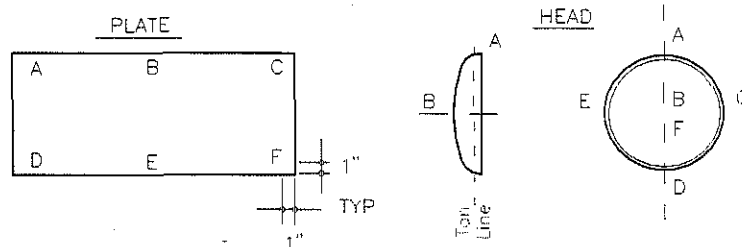
JOB No: 12-32 E

DATE: FEB/4/2013

CUST. P. O. No: 321253503

INSPECTED BY: Jai budhram

ITEM	HEAT No.	MATERIAL TYPE AND MFG.	THICKNESS (INS)					
			A	B	C	D	E	F
TOP HEAD S/N 1016557-2	2T449-305 3500933-03	SA-516-70N/EVRAZ/ NUCOR	.877	.792	.891	.900	.880	.788
BTM HEAD S/N 1016558-3	2T643-901 3500933-02	SA-516-70N/EVRAZ/ NUCOR	.990	.887	.974	.971	.989	.889
SHELL CSE LONG	3442P3- AC1659	SA-516-70N / ESSAR	.768	.757	.755	.762	.759	.756



(B & F at nozzle cutouts)

**NB.** THICKNESS WAS MEASURED WITH "T" MIKE PROGRAMABLE

BRIGHTON TRU-EDGE HEADS  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
MTR COVER LETTER

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016557

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

LABOR & MATERIAL

3- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 18.20mm MIN. THK. W/ 50.8mm SF.

HEAT NUMBER

-----  
3500933-03  
2T618-402  
2T449-305

CERTIFICATE OF COMPLIANCE

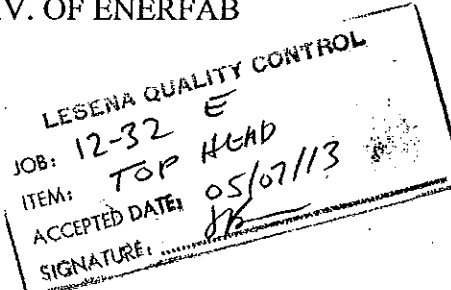
ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB



# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-01 Cust PO 4500056766

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 241093-01 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66495-1	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66495-2	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-1	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-2	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383

Shipment Summary of Order 241093-01: 4 pieces 21,016 lbs (9,533 kg)

## Chemical Analysis for Order 241093-01 (sorted by Heat)

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T449	0.121	1.363	0.008	0.006	0.293	0.295	0.113	0.099	0.036	0.013
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.024	0.005	0.002	0.0091	0.023	0.002	0.0004			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T618	0.136	1.411	0.007	0.006	0.295	0.240	0.090	0.096	0.021	0.011
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.022	0.004	0.002	0.0094	0.021	0.002	0.0003			

## Tensile Tests for Order 241093-01 (sorted by Heat)

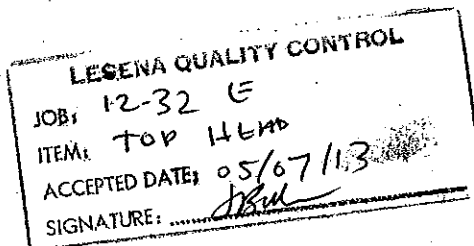
Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation		RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In. MM						
B66498-1	2T449-305	0.8750	22.23	75	514	53	362	46	2 50			Tran	1x		335866
B66498-1	2T449-305	0.8750	22.23	75	516	50	347	33	2 50			Tran			335867
B66495-1	2T618-402	0.8750	22.23	77	532	56	383	48	2 50			Tran	1x		335860
B66495-1	2T618-402	0.8750	22.23	80	548	55	381	37	2 50			Tran			335861

## Other Information for Order 241093-01

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049-3.1B / EN 10204-3.1 2004. In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

APPROVED



Q.C. DEPT

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

*[Handwritten Signature]*

Revision:



**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 1



Issuing Date : 02/07/2013

B/L No. : 348434

Load No. : 350449

Our Order No. : 107909/1

Cust. Order No. : 4500054635

Vehicle No: Besl RW5497

Sold To : Enerfab Inc  
4955 Spring Grove Ave  
CINCINNATI, OH 45232Ship To : BRIGHTON TRU-EDGE HEADS  
11861 MOSTELLER RD.  
CINCINNATI, OH 45241

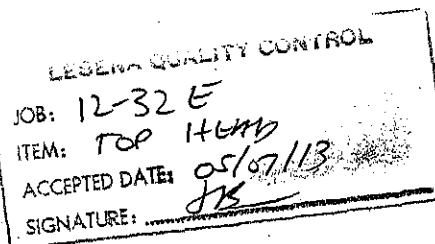
Specification : 0.8750" x 72.000" x 177.000"

ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized  
Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-03	2	3.16	T	46,000	75,300		25.8												
			T	58,200	71,600		27.4	N											

**APPROVED****Q.C. DEPT**

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

*T. A. Depretis*

T. A. Depretis, Metallurgist

02/07/2013 3:41:30 PM

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk.  
(Description of vessel part (shell, two-piece head, tube bundle)) 1016557 - 1,2,3  
(Manufacturer's serial number) 2013  
(CRN)

PO# 321253501 FILTER TOP HEAD  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) (Special service per UG-120(d))

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)                     

8. MAWP                      at max. temp.                      Min. design metal temp.                      at                       
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of                       
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed                       
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-29-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-29-2013 Signed                      Commissions NSB10901A 001426  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**BRIGHTON TRU-EDGE HEADS**  
**DIV OF ENERFAB**  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016558

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

3- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 19.05mm MIN. THK. W/ 101.6mm SF.

**HEAT NUMBER**

-----  
3500933-01  
3500933-02  
2T463-201  
2T643-901  
2T446-505

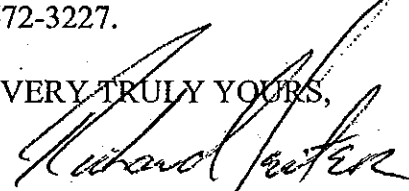
**CERTIFICATE OF COMPLIANCE**


ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS  
DIV. OF ENERFAB

LESENA QUALITY CONTROL	
JOB:	12-32 E
ITEM:	Bottom Heads
ACCEPTED DATE:	05/07/13
SIGNATURE:	

# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: **ENERFAB, INC.**

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-02 Cust PO 4500056766

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 241093-02 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66499-1	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66499-2	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66501-2	2T643-901 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66502-1	2T463-201 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769

Shipment Summary of Order 241093-02: 4 pieces 24,420 lbs (11,077 kg)

## Chemical Analysis for Order 241093-02 (sorted by Heat)

Heat	Anlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
2T446			0.127	1.392	0.007	0.002	0.325	0.256	0.107	0.079	0.027	0.012
		Al	V	Nb/Cb	N	Alsol	Ti	B				
			0.024	0.004	0.001	0.0092	0.024	0.002	0.0004			

Heat	Anlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
2T463			0.129	1.380	0.009	0.004	0.292	0.263	0.101	0.075	0.027	0.013
		Al	V	Nb/Cb	N	Alsol	Ti	B				
			0.024	0.006	0.003	0.0063	0.023	0.002	0.0004			

Heat	Anlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
2T643			0.172	1.039	0.010	0.010	0.237	0.286	0.124	0.121	0.028	0.015
		Al	V	Nb/Cb	N	Alsol	Ti	B				
			0.023	0.004	0.002	0.0071	0.021	0.002	0.0003			

## Tensile Tests for Order 241093-02 (sorted by Heat)

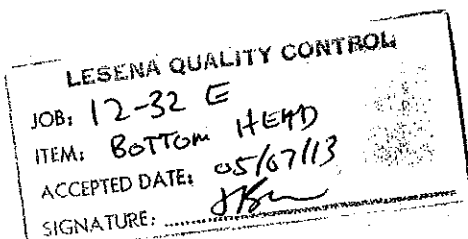
Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation			RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%	Tail				
B66499-1	2T446-505	1.0000	25.40	74	507	53	367	49	2	50			Tran	1x		335868
B66499-1	2T446-505	1.0000	25.40	77	532	55	376	38	2	50			Tran			335869
B66502-1	2T463-201	1.0000	25.40	73	501	53	362	48	2	50			Tran	1x		335874
B66502-1	2T463-201	1.0000	25.40	75	518	47	327	31	2	50			Tran			335875
B66501-1	2T643-901	1.0000	25.40	73	506	50	343	46	2	50			Tran	1x		335872
B66501-1	2T643-901	1.0000	25.40	76	525	47	327	34	2	50			Tran			335873

## Other Information for Order 241093-02

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049-3.1B / EN 10204-3.1 2004, In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

Shipment Grand Totals of B/L 314582: 8 pieces 45,436 lbs (20,609 kg)



**APPROVED**

**Q.C. DEPT**

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

[Signature]

# Mill Test Report

Page 4

Issuing Date : 02/07/2013 B/L No. : 348425 Load No. : 350434 Our Order No. : 107919/5 Cust. Order No. : 4500054637  
Vehicle No: FOSTER 821 Sold To: Enerfab Inc 4955 Spring Grove Ave CINCINNATI, OH 45232 Ship To: BRIGHTON TRU-EDGE HEADS 11851 MOSTELLER RD. CINCINNATI, OH 45241  
Specification : 1.0000" x 72.000" x 179.000"  
ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized  
Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % In 2"	Elongation % in 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-02	3	5.48	T	42,600	74,800		23.1												
			T	45,600	70,600		27.4	N											

LESENA QUALITY CONTROL  
JOB: 12-32 E  
ITEM: BOTTOM HEAD  
ACCEPTED DATE: 05/07/13  
SIGNATURE: JK

APPROVED

Q.C. DEPT

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/8) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$

$Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 58$

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMRQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

T. A. Depretis  
T. A. Depretis, Metallurgist

02/07/2013 2:43:33 PM

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk.  
(Description of vessel part (shell, two-piece head, tube bundle)) 1016558 - 1,2,3  
(Manufacturer's serial number) 2013  
(CRN)

PO# 321253501 TG# FILTER BOTTOM HD.  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) (Special service per UG-120(d))

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)                     

8. MAWP                      at max. temp.                      Min. design metal temp.                      at                       
(Internal) (External) (Internal) (External)

9. Impact test                      NO                      at test temperature of                       
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

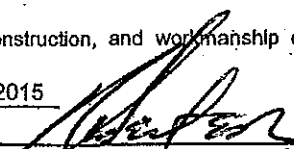
13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

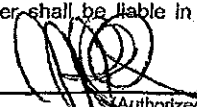
U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed   
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT

have inspected the pressure vessel part described in this Manufacturer's Data Report on 4.29.2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4.29.2013 Signed  Commissions NB10011A! OH424  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006986 000010 2013/02/10	Shipment No. & Date.: 1000029746 2013/02/11	TC No., Date & Time : ESA-47908 2013/02/11 - 16:20:41
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19149-8270 / 1 BOL NO.: 1000029746 Cust. Part No.: Carrier : GARDEWINE GROUP INC. - 1673 85129
Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 25 min Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.		

Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs
0.7500 " x 96.000 " x 493.00 "	AC1659	3442P3-02	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "	AC1660	3442P3-02	10,067 LB	1
0.7500 " x 96.000 " x 493.00 "	AC1661	3442P3-02	10,067 LB	1			-		

*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3442P3* <sup>+</sup>	0.22 ✓	1.01 ✓	0.008 ✓	0.003 ✓	0.250 ✓	0.15	0.02	0.04	0.00	0.023	0.000	0.001	0.0002	0.002	0.4200

*****MECHANICAL PROPERTIES*****												
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
3442P3	AC1659 ✓	166"	ALG	0.7500	N	.2	T	B	49.2	74.8	8"	26
3442P3	AC1660	166"	ALG	0.7500	N	.2	T	B	50.1	75.7	8"	27
3442P3	AC1661	166"	ALG	0.7500	N	.2	T	B	51.0	75.4	8"	30

LEGEND QUALITY CONTROL

JOB: 12-32

ITEM: Shell 'E'

ACCEPTED DATE: 04/24/13

SIGNATURE:

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

# LESENA STEEL LTD

## PLATES AND HEAD INSPECTION REPORT

CUSTOMER ECODYNE LTD.

SERIAL No: 0416

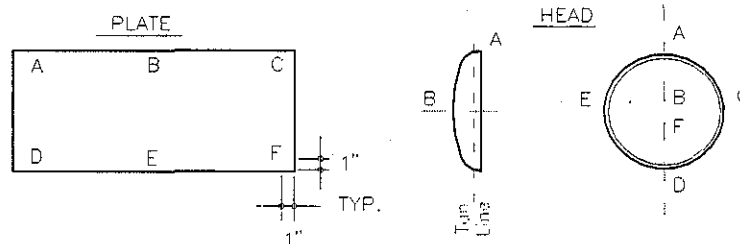
JOB No: 12-32 F

DATE: FEB/4/2013

CUST. P. O. No: 321253503

INSPECTED BY: Jai Budhram

ITEM	HEAT No.	MATERIAL TYPE AND MFG.	THICKNESS (INS)					
			A	B	C	D	E	F
TOP HEAD S/N 1016557-1	2T618-402 3500933-03	SA-516-70N/EVRAZ/ NUCOR	.880	.764	.880	.882	.880	.760
BTM HEAD S/N 1016558-2	2T463-201 3500933-02	SA-516-70N/EVRAZ/ NUCOR	.981	.901	1.000	.981	.997	.890
SHELL CSE LONG	3442P3- AC1660	SA-516-70N / ESSAR	.764	.763	.759	.759	.758	.764



(B & F at nozzle cutouts)

**NB.** THICKNESS WAS MEASURED WITH "T" MIKE PROGRAMABLE



BRIGHTON TRU-EDGE HEADS  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
MTR COVER LETTER

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016557

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

LABOR & MATERIAL

3- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 18.20mm MIN. THK. W/ 50.8mm SF.

HEAT NUMBER

-----  
3500933-03  
2T618-402  
2T449-305

CERTIFICATE OF COMPLIANCE

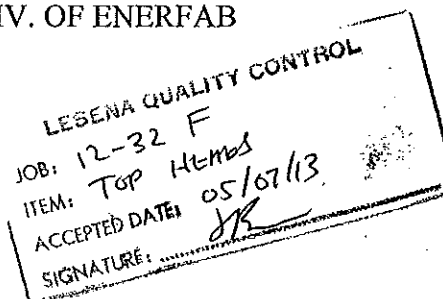
ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB



# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-01 Cust PO 4500056766

**Specifications:**

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

**Products Shipped for Order 241093-01 (sorted by Serial)**

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66495-1	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66495-2	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-1	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-2	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383

Shipment Summary of Order 241093-01: 4 pieces 21,016 lbs (9,533 kg)

**Chemical Analysis for Order 241093-01 (sorted by Heat)**

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T449	0.121	1.363	0.008	0.006	0.293	0.295	0.113	0.099	0.036	0.013
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.024	0.005	0.002	0.0091	0.023	0.002	0.0004			

HeatAnlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T618	0.136	1.411	0.007	0.006	0.295	0.240	0.090	0.096	0.021	0.011
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.022	0.004	0.002	0.0094	0.021	0.002	0.0003			

**Tensile Tests for Order 241093-01 (sorted by Heat)**

Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation		RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPa	KSI	MPa	%	In. MM						
B66498-1	2T449-305	0.8750	22.23	75	514	53	362	46	2 50			Tran	1x		335866
B66498-1	2T449-305	0.8750	22.23	75	516	50	347	33	2 50			Tran			335867
B66495-1	2T618-402	0.8750	22.23	77	532	56	383	48	2 50			Tran	1x		335860
B66495-1	2T618-402	0.8750	22.23	80	548	55	381	37	2 50			Tran			335861

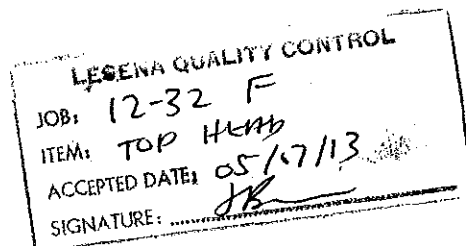
**Other Information for Order 241093-01**

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049-3.1B / EN 10204-3.1 2004, In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness.

Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; in Compliance With ES-1094

APPROVED



Q.C. DEPT

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

*[Signature]*

# Mill Test Report

Page 1

Issuing Date : 02/07/2013 B/L No. : 348434 Load No. : 350449 Our Order No. : 107909/1 Cust. Order No. : 4500054635  
Vehicle No: Besl RW5497 Sold To : Enerfab Inc 4955 Spring Grove Ave CINCINNATI, OH 45232 Ship To : BRIGHTON TRU-EDGE HEADS 11881 MOSTELLER RD. CINCINNATI, OH 45241  
Specification : 0.8750" x 72.000" x 177.000" ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-03	2	3.16	T	46,000	75,300		25.8												
			T	58,200	71,600		27.4	N											

LEGEND QUALITY CONTROL  
JOB: 12-32 F  
ITEM: TOP HEAD  
ACCEPTED DATE: 05/07/13  
SIGNATURE: *[Signature]*

APPROVED

Q.C. DEPT

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/8) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$

$PCM = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/80) + (Cr/20) + (Mo/15) + (V/10) + 5B$

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

*T. A. Depretis*  
T. A. Depretis, Metallurgist

02/07/2013 3:41:30 PM

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk. 1016557 - 1,2,3  
[Description of vessel part (shell, two-piece head, tube bundle)] (Manufacturer's serial number) (CRN)  
PO# 321253501 FILTER TOP HEAD 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
[Edition and Addenda (date)] (Code Case number) [Special service per UG-120(d)]

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)                       
(Material spec. number, grade, size, number)

8. MAWP                      at max. temp.                      Min. design metal temp.                      at                       
(Internal) (External) (Internal) (External)

9. Impact test                      NO at test temperature of                       
[Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed                       
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-29-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-29-2013 Signed                      Commissions NBIC901A 01426  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016558

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

3- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 19.05mm MIN. THK. W/ 101.6mm SF.

**HEAT NUMBER**

-----  
3500933-01  
3500933-02  
2T463-201  
2T643-901  
2T446-505

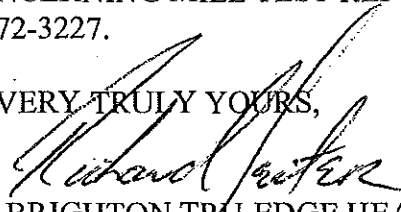
**CERTIFICATE OF COMPLIANCE**

ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F – ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS  
DIV. OF ENERFAB

LESENA QUALITY CONTROL	
JOB: 12-32 F	
ITEM: Bottom Heads	
ACCEPTED DATE: 05/07/13	
SIGNATURE: JR	

# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-02 Cust PO 4500056766

**Specifications:**

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

Products Shipped for Order 241093-02 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66499-1	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66499-2	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66501-2	2T643-901 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66502-1	2T463-201 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769

Shipment Summary of Order 241093-02: 4 pieces 24,420 lbs (11,077 kg)

**Chemical Analysis for Order 241093-02 (sorted by Heat)**

Heat	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T446	0.127	1.392	0.007	0.002	0.325	0.256	0.107	0.079	0.027	0.012
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.024	0.004	0.001	0.0092	0.024	0.002	0.0004			

Heat	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T463	0.129	1.380	0.009	0.004	0.292	0.263	0.101	0.075	0.027	0.013
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.024	0.006	0.003	0.0063	0.023	0.002	0.0004			

Heat	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T643	0.172	1.039	0.010	0.010	0.237	0.286	0.124	0.121	0.028	0.015
		Al	V	Nb/Cb	N	Alsol	Ti	B			
		0.023	0.004	0.002	0.0071	0.021	0.002	0.0003			

**Tensile Tests for Order 241093-02 (sorted by Heat)**

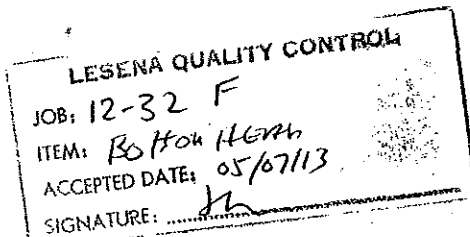
Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation			RA	Head Tail	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%					
B66499-1	2T446-505	1.0000	25.40	74	507	53	367	49	2	50			Tran	1x		335868
B66499-1	2T446-505	1.0000	25.40	77	532	55	376	38	2	50			Tran			335869
B66502-1	2T463-201	1.0000	25.40	73	501	53	362	48	2	50			Tran	1x		335874
B66502-1	2T463-201	1.0000	25.40	75	518	47	327	31	2	50			Tran			335875
B66501-1	2T643-901	1.0000	25.40	73	506	50	343	46	2	50			Tran	1x		335872
B66501-1	2T643-901	1.0000	25.40	76	525	47	327	34	2	50			Tran			335873

**Other Information for Order 241093-02**

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049 3.1B / EN 10204 3.1 2004. In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

Shipment Grand Totals of B/L 314582: 8 pieces 45,436 lbs (20,609 kg)



**APPROVED**

**Q.C. DEPT**

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

[Signature]

**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 4



Issuing Date : 02/07/2013 B/L No. : 348425

Load No. : 350434

Our Order No. : 107919/5

Cust. Order No. : 4500054637

Vehicle No: FOSTER 821

Sold To: Enerfab Inc  
4955 Spring Grove Ave  
CINCINNATI, OH 45232Ship To: BRIGHTON TRU-EDGE HEADS  
11861 MOSTELLER RD.  
CINCINNATI, OH 45241

Specification : 1.0000" x 72.000" x 179.000"

ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized

Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % In 2"	Elongation % In 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-02	3	5.48	T	42,600	74,800		23.1												
			T	45,600	70,600		27.4	N											

**LESENA QUALITY CONTROL**

JOB: 12-32 F

ITEM: Batta HEAD

ACCEPTED DATE: 05/17/13

SIGNATURE: *HL***APPROVED****Q.C. DEPT**

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/8) + ((Cr+Mo+V)/5) + ((Cu+Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA, ISO 9001:2008 certified (#008083) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant.  
DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

T. A. Depretis, Metallurgist

02/07/2013 2:43:33 PM

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk. 1016558 - 1,2,3  
[Description of vessel part (shell, two-piece head, tube bundle)] (Manufacturer's serial number) (CRN)

PO# 321253501 TG# FILTER BOTTOM HD. 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
[Edition and Addenda (date)] (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) <u>SA516-70 (1650°F - 1/2 HOUR PER INCH)</u> (b) <u> </u>										(Material spec. number, grade or type) (H.T. - time & temp.)				
	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   Min. design metal temp.   at    
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of    
[Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, Inspection, and safety valve openings:  

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)							
Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 4-29-2013 Name Enerfab, Inc. Signed    
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT  
 have inspected the pressure vessel part described in this Manufacturer's Data Report on 4.29.2013

and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4.29.2013 Signed   Commissions NB100014! OH404  
(Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]





ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006986 000010 2013/02/10	Shipment No. & Date.: 1000029746 2013/02/11	TC No., Date & Time : ESA-47908 2013/02/11 - 16:20:41													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19149-8270 / 1 BOL NO.: 1000029746 Cust. Part No.: Carrier : GARDEWINE GROUP INC. - 1673 85129													
Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 25 min Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs						
0.7500 " x 96.000 " x 493.00 "	AC1659	3442P3-02	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "	AC1660	3442P3-02	10,067 LB	1						
0.7500 " x 96.000 " x 493.00 "	AC1661	3442P3-02	10,067 LB	1											
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3442P3*	0.22	1.01	0.008	0.003	0.250	0.15	0.02	0.04	0.00	0.023	0.000	0.001	0.0002	0.002	0.4200
*****MECHANICAL PROPERTIES*****															
Tensile Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)			
3442P3	AC1659	166"	ALG	0.7500	N	.2	T	B	49.2	74.8	8"	26			
3442P3	AC1660	166"	ALG	0.7500	N	.2	T	B	50.1	75.7	8"	27			
3442P3	AC1661	166"	ALG	0.7500	N	.2	T	B	51.0	75.4	8"	30			

LEGENA QUALITY CONTROL

JOB: 12-32  
ITEM: Shell 'F'  
ACCEPTED DATE: 04/24/13  
SIGNATURE:

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

# LESENA STEEL LTD

## PLATES AND HEAD INSPECTION REPORT

CUSTOMER ECODYNE LTD.

SERIAL No: 0417

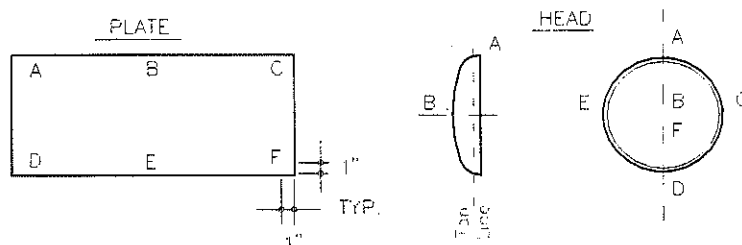
JOB No: 12-32 G

DATE: FEB/4/2013

CUST. P. O. No: 321253503

INSPECTED BY: Jai Budhram

ITEM	HEAT No.	MATERIAL TYPE AND MFG.	THICKNESS (INS)					
			A	B	C	D	E	F
TOP HEAD S/N 1016557-3	<b>2T449-305</b> <b>3500933-03</b>	SA-516-70N/EVRAZ/ NUCOR	.909	.780	.911	.911	.918	.780
BTM HEAD S/N 1016558-01	<b>2T446-505</b> <b>3500933-01</b>	SA-516-70N/EVRAZ/ NUCOR	.956	.885	.972	.968	.966	.870
SHELL CSE LONG	<b>3315P3-</b> <b>AC0482</b>	SA-516-70N / ESSAR	.760	.758	.755	.768	.760	.762



(B & F at nozzle cutouts)

**NB.** THICKNESS WAS MEASURED WITH "T" MIKE PROGRAMABLE

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016557

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

3- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 18.20mm MIN. THK. W/ 50.8mm SF.

**HEAT NUMBER**

-----  
3500933-03  
2T618-402  
2T449-305

**CERTIFICATE OF COMPLIANCE**

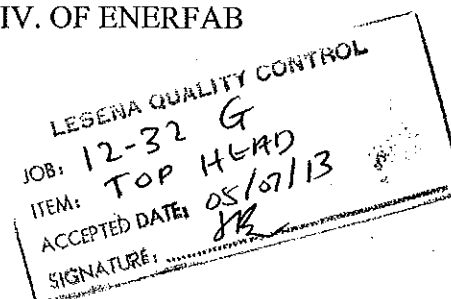
ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS.  
DIV. OF ENERFAB



# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-01 Cust PO 4500056766

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 241093-01 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66495-1	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66495-2	2T618-402 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-1	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383
B66498-2	2T449-305 USA	11.0	0.8750 x 116.5000 x 181.7500	22.23 x 2959.10 x 4616.45	5,254	2,383

Shipment Summary of Order 241093-01: 4 pieces 21,016 lbs (9,533 kg)

## Chemical Analysis for Order 241093-01 (sorted by Heat)

Heat/Anlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T449	0.121	1.363	0.008	0.006	0.293	0.295	0.113	0.099	0.036	0.013
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.024	0.005	0.002	0.0091	0.023	0.002	0.0004			

Heat/Anlys	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
	2T618	0.136	1.411	0.007	0.006	0.295	0.240	0.090	0.096	0.021	0.011
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.022	0.004	0.002	0.0094	0.021	0.002	0.0003			

## Tensile Tests for Order 241093-01 (sorted by Heat)

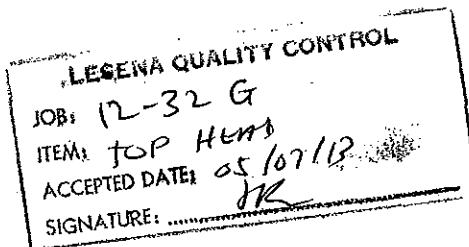
Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation		RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%	Tail			
B66498-1	2T449-305	0.8750	22.23	75	514	53	362	46	2	50			Tran	1x	335866
B66498-1	2T449-305	0.8750	22.23	75	516	50	347	33	2	50			Tran		335867
B66495-1	2T618-402	0.8750	22.23	77	532	56	383	48	2	50			Tran	1x	335860
B66495-1	2T618-402	0.8750	22.23	80	548	55	381	37	2	50			Tran		335861

## Other Information for Order 241093-01

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049-3.1B / EN 10204-3.1 2004, In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr. per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

APPROVED



Q.C. DEPT

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

*[Signature]*

# Mill Test Report

Page 1

Issuing Date : 02/07/2013 B/L No. : 348434

Load No. : 350449

Our Order No. : 107909/1

Cust. Order No. : 4500054635

Vehicle No: Besi RW5497

Sold To : Enerfab Inc  
4955 Spring Grove Ave  
CINCINNATI, OH 45232

Ship To : BRIGHTON TRU-EDGE HEADS  
11861 MOSTELLER RD.  
CINCINNATI, OH 45241

Specification : 0.8750" x 72.000" x 177.000"

ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized

Test Coupons at 1650 F

## Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test										Charpy Impacts									
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-03	2	3.16	T	46,000	75,300		25.8												
			T	58,200	71,600		27.4	N											

LESERA QUALITY CONTROL  
JOB: 12-32 G  
ITEM: TOP HEAD  
ACCEPTED DATE: 05/01/13  
SIGNATURE: *[Signature]*

APPROVED

Q.C. DEPT

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$

$PCM = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant.

DIN 50049 3.1.B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only. Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

*T. A. Depretis*  
T. A. Depretis, Metallurgist

02/07/2013 3:41:30 PM

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk. 1016557 - 1,2,3  
[Description of vessel part (shell, two-piece head, tube bundle)] (Manufacturer's serial number) (CRN)  
PO# 321253501 FILTER TOP HEAD 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
[Edition and Addenda (date)] (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) <u>SA516-70 (1650°F - 1/2 HOUR PER INCH)</u> (b) <u> </u>										(Material spec. number, grade or type) (H.T. - time & temp.)				
	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
(Internal) (External) (Internal) (External) Min. design metal temp.   at  

9. Impact test NO at test temperature of    
[Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)							
Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 4-29-2013 Name Enerfab, Inc. Signed    
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-29-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-29-2013 Signed   Commissions NB1090-1A 0446  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**BRIGHTON TRU-EDGE HEADS**  
DIV OF ENERFAB  
11861 MOSTELLER RD \* CINCINNATI OH 45241 \* (513)-771-2300  
**MTR COVER LETTER**

ECODYNE LIMITED  
4475 CORPORATE DRIVE  
BURLINGTON ON L7L 5T9

ATTN: QC MANAGER  
CUSTOMER P/O# 321253501  
BRIGHTON S/O# 12766

TAG# FILTER BOTTOM HEAD  
PRODUCTION # 1016558

TO WHOM IT MAY CONCERN:

ATTACHED ARE COPIES OF MILL TEST REPORTS FOR THE FOLLOWING MATERIAL PROVIDED ON YOUR REFERENCED PURCHASE ORDER. TRACEABILITY OF MATERIAL WAS MAINTAINED WHILE UNDER CONTROL OF BRIGHTON TRU-EDGE HEADS.

**LABOR & MATERIAL**

3- SA516-70 2:1 ELLIP HEADS 3962.4mm OD x 19.05mm MIN. THK. W/ 101.6mm SF.

**HEAT NUMBER**

-----  
3500933-01  
3500933-02  
2T463-201  
2T643-901  
2T446-505

**CERTIFICATE OF COMPLIANCE**


ALL HEADS ARE IN COMPLIANCE WITH REGULATION UG 79, UG 80, UG 81 AND UCS-79 AS STATED IN SECTION VIII DIVISION I OF THE ASME BOILER AND PRESSURE VESSEL CODE. HEADS WERE FORMED WITHOUT COMING IN CONTACT WITH MERCURY OR ANY OF ITS COMPOUNDS.

ALL PLATES WERE NORMALIZED 1650°F - ½ HOUR PER INCH AND AIR COOLED.

IF YOU HAVE ANY FURTHER QUESTIONS CONCERNING MILL TEST REPORTS ONLY, PLEASE CONTACT ME IN CINCINNATI, OHIO AT 513-672-3227.

VERY TRULY YOURS,

  
BRIGHTON TRU-EDGE HEADS  
DIV. OF ENERFAB

LESENA QUALITY CONTROL	
JOB:	12-32 G
ITEM:	Bottom Head
ACCEPTED DATE:	05/07/13
SIGNATURE:	

# Material Test Report

B/L: 314582

4001 Philadelphia Pike, Claymont DE 19703

03/05/2013

Sold To: ENERFAB, INC.

4955 SPRING GROVE AVENUE, CINCINNATI, OH 45232

Order 241093-02 Cust PO 4500056766

## Specifications:

ASTM A516/A516M-10 Grade 70(485) / ASME SA516/SA516M 2010 Edition Grade 70(485) Fully Killed

## Products Shipped for Order 241093-02 (sorted by Serial)

Serial	Heat-Slab Orig	R/R	Plate Size in Inches	Plate Size in MM	Lbs	Kg
B66499-1	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66499-2	2T446-505 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66501-2	2T643-901 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769
B66502-1	2T463-201 USA	9.6	1.0000 x 117.0000 x 184.0000	25.40 x 2971.80 x 4673.60	6,105	2,769

Shipment Summary of Order 241093-02: 4 pieces 24,420 lbs (11,077 kg)

## Chemical Analysis for Order 241093-02 (sorted by Heat)

Heat	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
2T446	✓	0.127	1.392	0.007	0.002	0.325	0.256	0.107	0.079	0.027	0.012
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.024	0.004	0.001	0.0092	0.024	0.002	0.0004			

Heat	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
2T463		0.129	1.380	0.009	0.004	0.292	0.263	0.101	0.075	0.027	0.013
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.024	0.006	0.003	0.0063	0.023	0.002	0.0004			

Heat	Heat	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn
2T643		0.172	1.039	0.010	0.010	0.237	0.286	0.124	0.121	0.028	0.015
	Al	V	Nb/Cb	N	Alsol	Ti	B				
		0.023	0.004	0.002	0.0071	0.021	0.002	0.0003			

## Tensile Tests for Order 241093-02 (sorted by Heat)

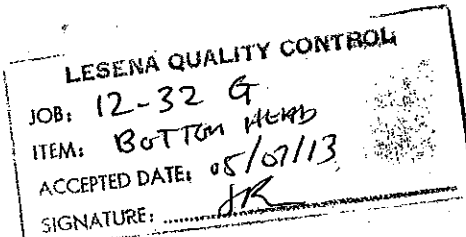
Serial	Heat-Slab	Gauge		Tensile		Yield		Elongation			RA	Head	Dir	Norm	S/R	Test ID
		Inches	MM	KSI	MPA	KSI	MPA	%	In.	MM	%	Tail				
B66499-1	2T446-505	1.0000	25.40	74	507	53	367	49	2	50			Tran	1x		335868
B66499-1	2T446-505	1.0000	25.40	77	532	55	376	38	2	50			Tran			335869
B66502-1	2T463-201	1.0000	25.40	73	501	53	362	48	2	50			Tran	1x		335874
B66502-1	2T463-201	1.0000	25.40	75	518	47	327	31	2	50			Tran			335875
B66501-1	2T643-901	1.0000	25.40	73	506	50	343	46	2	50			Tran	1x		335872
B66501-1	2T643-901	1.0000	25.40	76	525	47	327	34	2	50			Tran			335873

## Other Information for Order 241093-02

Material is 100% melted and manufactured in the USA. No weld repair has been performed. In Compliance With DIN 50049 3.1B / EN 10204 3.1 2004, In Compliance With ES-1094

Plates supplied as-rolled. One test coupon normalized and one test coupon as rolled. Normalized 1650F (+/-25 F) 1 hr, per inch of thickness. Meets 2004 EN10204 3.1 AND DIN 50049 3.1.B; In Compliance With ES-1094

Shipment Grand Totals of B/L 314582: 8 pieces 45,436 lbs (20,609 kg)



APPROVED

Q.C. DEPT

Unless otherwise specified, Mercury, radium or alpha source materials have not been used.

I certify the above results to be correct as contained in the records of the corporation.

Metallurgist, Ryan Carmichael

[Signature]



**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 1



Issuing Date : 02/07/2013

B/L No. : 348425

Load No. : 350434

Our Order No. : 107919/2

Cust. Order No. : 4500054637

Vehicle No: FOSTER 821

Sold To: Enerfab Inc  
4955 Spring Grove Ave  
CINCINNATI, OH 45232Ship To: BRIGHTON TRU-EDGE HEADS  
11861 MOSTELLER RD.  
CINCINNATI, OH 45241

Specification : 1.0000" x 72.000" x 184.000"

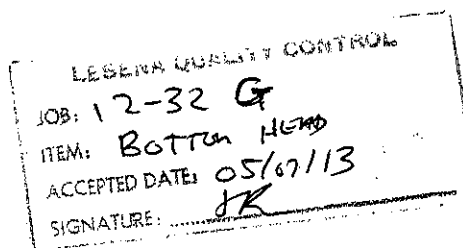
ASTM A516 70-10/ASME SA516 70 PVQ 2011 Addenda Normalized

Test Coupons at 1650 F

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
3500933	0.20	1.03	0.017	0.001	0.20	0.13	0.06	0.09	0.01	0.031	0.003	0.001	0.002		0.0018	0.0003	0.007	0.40	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
3500933-01	2	3.75	T	43,700	74,700		23.8												
			T	45,500	71,500		27.4	N											

**APPROVED****Q.C. DEPT**

Test coupons only, normalized 60 minutes per inch of thickness at 1650 F ± 25 F. Hold 30 minutes minimum. ;

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $Ceq = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para. 4.3 Compliant. DIN 50049 3.1.B/EN 10204 3.1B(2004). DIN EN 10204 3.1(2005) compliant. For ABS grades only, Quality Assurance certificate 09-MMPQA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

T. A. Depretis, Metallurgist

02/07/2013 2:43:33 PM

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk. 1016558 - 1,2,3 2013  
(Description of vessel part (shell, two-piece head, tube bundle)) (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER BOTTOM HD.  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) (Special service per UG-120(d))

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)    
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)   (Material spec. number, grade, size, number)

8. MAWP   at max. temp.   Min. design metal temp.   at    
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of    
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed    
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4.29.2013

and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4.29.2013 Signed   Commissions NB10001A! OH404  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006986 000010 2013/01/18		Shipment No. & Date.: 1000026205 2013/01/19		TC No., Date & Time : ESA-43028 2013/01/21 - 16:32:27											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19149-8270 / 1 BOL NO.: 1000026205 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 5836(1118)											
Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 25 min Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs				
0.7500 " x 96.000 " x 493.00 "		AC0482	3315P3-59	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "		AC0483	3315P3-59	10,067 LB	1				
0.7500 " x 96.000 " x 493.00 "		AC0695	3315P3-52	10,067 LB	1	0.7500 " x 96.000 " x 493.00 "		AC0696	3315P3-52	10,067 LB	1				
***** CHEMICAL PROPERTIES *****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3315P3*	0.23	0.98	0.012	0.003	0.250	0.14	0.02	0.03	0.00	0.033	0.000	0.001	0.0000	0.002	0.4200
***** MECHANICAL PROPERTIES *****															
Tensile Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)			
3315P3	AC0695	166"	ALG	0.7500	NORM	.2	T	B	50.7	75.4	8"	28			
3315P3	AC0696	166"	ALG	0.7500	NORM	.2	T	B	50.4	75.7	8"	26			
3315P3	AC0482	166"	ALG	0.7500	NORM	.2	T	B	51.9	76.8	8"	27			
3315P3	AC0483	166"	ALG	0.7500	NORM	.2	T	B	51.3	76.4	8"	26			

LESENA QUALITY CONTROL

JOB: 12-32

ITEM: Shell 'G'

ACCEPTED DATE: 04/24/13

SIGNATURE: *[Signature]*

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

# LESENA STEEL LTD

DATE: FEB/4/2013

CUSTOMER: ECODYNE LTD.

JOB No: 12-32 A to G

## PRESSURE PARTS LIST

SERIAL No: 0411 to 0417

	ITEM	SIZE	MAT'L	NAME	SPEC.	HEAT / C.C.	No. pcs
1	N1	12" RF WN	SA-105	FLANGE	150#	B7706	7
2		12"Ø x 31.4375" lg.	SA-106-B	PIPE	SCH.60	A23157	7
3		17.75"Ø x 0.875" thk.	SA-516-70N	REPAD	0.875"	8952M3-AA3939	7
4		18" OD x 12.8125" ID	SA-516-70N	INTERNAL Flg.	1"	2508502-01	7
5		4" x 5.5"	SA-516-70N	SUPP. BRKT. REPAD	0.5"	3781P3-AC2882 2259P3-AB6376	47 7
6		3" x 3" ANGLE	G40.21 44W/50W	SUPP. BRKT.	0.375"	W908374	42
7	N2	12" RF WN	SA-105	FLANGE	150#	B7706	7
8		12" LR	SA-234 WPB	ELBOW	XS	JN302	7
9		12 "x 8.5" lg.	SA-106-B	PIPE	SCH.60	A23157	7
10		18.25"Ø x 0.875" thk.	SA-516-70N	REPAD	0.875"	8952M3-AA3939 9339M3-AA3881	7
11		1.5" x 0.5" x 11"	SA516-70N	BAFFLE SUPP.	0.5"		28
12		18" Ø	G40.21 300W	BAFFLE	0.5"	0695P3-05	7
13	N3A, N3B	4" LWN	SA-105N	NOZZLE	150#	TL10004211 TL10005391	12 2
14		4" BLIND FLG.	SA-105N	COVER	150#	A6019 H3507	10 4
15	N4	3" RF WN	SA-105	FLANGE	150#	1426/11 112035	5 2
16		3 "x 21.5" lg.	SA-106-B	PIPE	SCH.160	12-P192 13-P209	7
17		7. 5"Ø x 0. 5" thk.	SA-516-70N	REPAD	0. 5"	2259P3-AB6376	7
18	SG1A, SG1B	10" OD x 5.75" ID	SA-516-70N	SIGHTGLASS	2.5"	58352-031-031	7
19		10" OD x 5.75" ID	SA-516-70	SG. COVER	1"	2507651-01	7
20	M1	24" RF WN	SA-105	FLANGE	150#	B4505	7
21		24" RF BLIND	SA-105	FLANGE	150#	B4505	7
22		24"Ø x 25.125" lg.	SA-106-B	PIPE	XS	13-P207	7
23		38"OD x 0.875" thk.	SA-516-70N	REPAD	0.875"	8952M3-AA3939 9339M3-AA3881	7
24		2"Ø x 40" lg.	SA-106-B	DAVIT ARM	SCH.80	13-P208	7
25		2.5"Ø x 10" lg.	SA-106-B	DAVIT SOCKET	SCH 40	13-P200	7
26		4" x 4.5" 4" x 8.5"	SA-36	SOCKET BRKT.	0.5" 0.5"	3781P3-AC2882 2259P3-AB6374	7 7
27		6" x 3"	SA-516-70N	REPAD	0.375"	74641-0033L 04622-1954L	7
28		0.625"Ø x 10.75" lg.	G40.21 300W	HANDLE	0.625"Ø	N123352	7
29		0.75"Ø x 6.5" lg.	G40.21 300W	U brkt.	0.75"Ø	N123114	7

# LESENA STEEL LTD

## INSPECTION REPORT FOR PLATE & STRUCTURAL ITEMS WELDED TO PRESSURE PARTS

JOB No: 12-32 A to G

SERIAL No: 0411 to 0417

CUSTOMER: ECODYNE LTD.

CUSTOMER P. O. No: 321253503

DATE: 3/4/2013

INSPECTED BY: Arie Willemsen

	ITEM	SIZE	MAT'L	NAME	SPEC.	HEAT / C.C.	No. pcs
30	M2	24" RF WN	SA-105	FLANGE	150#	B4505	7
31		24" RF BLIND	SA-105	FLANGE	150#	B4505	7
32		24"Ø x 18.5" lg.	SA-106-B	PIPE	XS	13-P207	7
33		38"OD x 0.875" thk.	SA-516-70N	REPAD	0.875"	8952M3-AA3939 9339M3-AA3881	7
34		2"Ø x 15" lg.	SA-106-B	DAVIT	XXS	24168	7
35		2.5"Ø x 6" lg.	SA-106-B	DAVIT SOCKET	SCH 40	13-P200	7
36		5.125" x 4.25"	SA-516-70N	GUSSET	0.75"	58640-012-012	7
37		8" x 4"	SA-516-70N	GUSSET	0.5" 0.75"	2259P3-AB6376 58640-012-012	7 7
38		0.625"Ø x 10.75" lg.	G40.21 300W	HANDLE	0.625"Ø	N123352	7
39	LL1, LL2	10" x 32.5"	SA-516-70N	LIFTING LUGS	1.25" IMPACT TEST CER.	5939P3-AD5130 5939P3-AD5132	14
40	TL1, TL2, TL3, TL4	8.4375" x 7.0625"	SA-516-70N	TAILING LUGS	2"	2138P3-AB6701	28
41	NP	4.5" x 9"	SA-516-70N	NAME PL. brkt.	0.25"	3315P3-CO3520	7
42		9" x 10"	SA-240 TP304/304L	NAME PL. brkt.	.1875"	A1M5	7
43	GND	2" x 3"	SA-240 TP304/304L	GROUNDING LUG	0.25"		14
44	LEG	W10 x 49#	CSA-G40.21 350W	WIDE flg. BEAMS	49#	6010270904/908	28
45		8" x 14"	SA-516-70N	REPADS	0.5"	3605P3-AC2064 2259P3AB6376	13 15
46		18.125" x 14"	SA-516-70N	REPADS	0.5"	2259P3-AB6374 2259P3-AB6375 3605P3-AC2084	24 1 3
47		13" x 13"	SA-516-70N	PADS	1"	2508502-01	28
48	STRAINER PL.	119.5" x 154"	SA-516-70N	PLATE	1.5"	3442P3-AC1687 3442P3-AC1688 3442P3-AC1689	3 1 3
49	STRAINER PL.	34.5"x123 7/16"	SA-516-70N	PLATE	1.5"	3442P3-AC1688	7
50	STAY RODS	2.5"Ø	SA-G40.21 300W	ROUND BAR	2.5"	M675927	224
51							
52							
53							
54							

## INSPECTION REPORT FOR PLATE & STRUCTURAL ITEMS WELDED TO PRESSURE PARTS

INSPECTED BY: Arie Willemsen

# CERTIFICATE OF INSPECTION & TEST

ORIGINAL



CE  
K.S. KIM



**ST&H CORPORATION**  
411-3 Shinwol-ri, Jinryemyun, Gimhae-si Gyungnam, Korea  
Tel: 82.51.744-4680(5 line) Fax: 82.51.744-4670  
E-mail: stcorp@kornet.net

(EN 10204 3.1)

Certified to ISO9001:2008, ISO14001:2004, PED97/23/EC by LRQA

Certified API Spec Q1 and API Spec 6A (Licence No : 6A-1284)

Customer : GARTH INDUSTRIAL						Contract No. : 81280						Report No : MHJ 7499			Date: SEP.20.2012		
Spec For Material : ASTM/ASME A/SA105N-11(NACE MR-0175)															Heat Treatment		
Chemical Composition (%)		C	Si	Mn	P	S	Ni	Cr	Mo	Cu	V	Nb	910° NORMALIZED				
Heat No.	MAX	0.350	0.350	1.050	0.035	0.040	0.400	0.300	0.120	0.400	0.080						
	MIN		0.100	0.600													
E7706		0.180	0.180	0.930	0.015	0.012	0.017	0.014	0.032	0.020	0.001		Dimensional Inspection				
Tension Test												Charpy Impact Test (10x10 mm Specimen Size)					
Size of Specimen(mm)		Yield Strength MPa	Tensile Strength MPa	Elongation %	Red of Area %	Individual		Average		Notch Type	Hardness Test (HB)	Bending Test 90:120(180°)	ANSI B16.5 - 2009  GOOD				
Dia	Gage Length					min	min										
12.5	50	MAX				Test Result			Temp	187		Ultrasonic Examination					
		MIN	250.000	485.000	22.000	30.000	①	②		③					Average	137	
12.5	50		290.000	520.000	33.500	67.000					150		Magnetic Particle Examination				
ITEM / SIZE		Q'TY	ITEM / SIZE		Q'TY	ITEM / SIZE		Q'TY	Remarks :								
150LBS WNRF STD 75"		20	BLANK			BLANK			N/A								
150LBS WNRF STD 10" FLAWN RF180R		20							Magnetic Particle Examination								
150LBS WNRF STD 8" FLAWN RF180P		20							N/A								
150LBS WNRF STD 8" FLAWN FF140P		10							Remarks : **CE = 0.35 (LONG FORMULAR)								
600LBS WNRF STD 6" FLAWN RF6400		10															

NOTE :  
1MPa = 145.037 psi  
1MPa = 0.145037 ksi  
1psi = 0.006895 MPa  
1ksi = 6.89476 MPa  
W.C:Water Cool O.C:Oil Cool  
A.C:Air Cool N.A:Non Action  
N:Normalized A:Annealed  
Q.T:Quenched and Tempered  
N.T:Normalized and Tempered

1.We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.  
2. Produced in Korea

*[Signature]*

Witnessed by/ K. S. KIM

Manager of Q.A Dept/ H. J. LEE



ST&H CORPORATION

ST-801-14-00

<b>LESENA QUALITY CONTROL</b>	
JOB:	12-32
ITEM:	N1, N2
ACCEPTED DATE:	4/3/13
SIGNATURE:	<i>[Signature]</i> ①⑦



UNITED STATES STEEL

**TUBULAR PRODUCTS  
CERTIFIED TEST REPORT**  
(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 3.1.b)

DATE: 03/06/07  
TIME: 14:32:34  
SERIAL NO: L0016234

789/69

MILL ORDER/ITEM NO DR37463 04		SHIPPER'S NO.		P.O. NUMBER 74443-00		VEHICLE ID												
						MAIL TO ADDRESS						VENDOR USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055						
SPECIFICATION AND GRADE PIPE CARBON SMLS STD PIPE API 5L-43RD EDITION DATED 3/04 PSL-1 GRADE B AND GRADE X42 ASTM A53-05 ASTM A106-04B GRADE B QUAD STENCIL ASME SA53-2004 EDITION ASME SA106-2004 EDITION GRADE B BLK REG MILL COAT PE SC MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 2002																		
MATERIAL COND: AS ROLLED				O.D.: 12.750 (323.850)				In (mm)		WALL: 0.562 (14.274)				In (mm)				
PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD		EXT %	TENSILE		Y/T	ELONG % (IN 2")	HARDNESS		MIN HYDRO	DWELL (SEC)				
				MIN: PSI	MAX: PSI		MIN: PSI	MAX: PSI			SCALE: HRB	PSI						
A23157	STRIP/L/B	AR	1.500	42000	49400	.50	60000	76500	0.64	30.0	46.0	B 79.7	3000	5				
				** END OF DATA THIS SHEET **														
LEGEND: L-LONGITUDINAL U-UPSET T-TRANSVERSE NM-NORMALIZED QT-QUENCH & TEMPERED SR-STRESS RELIEVED AR-AS ROLLED B-BODY W-WELD																		
PRODUCT IDENTIFICATION	TYPE																C.E.*	
		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO	MAX
A23157	HEAT	19	108	010	003	21	03	02	08	03	030	00	0001	002	001			.40
A23157	PROD	21	108	010	004	20	03	02	08	03	031	00	0000	001	001			.42
A23157	PROD	21	108	010	005	20	03	02	09	03	031	00	0000	001	001			.42
				** END OF DATA THIS SHEET **														
*C.E. IS BASED ON THE FOLLOWING EQUATION(S): $CE = C + (MN/6) + (CR+MO+V)/5 + (NI+CU)/15$																		

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.

JOB: 11-22  
ITEM: 12"-SCH 60 PIPE  
ACCEPTED DATE: DEC 21, 2011

PAGE

1 OF 2

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: N1, N2

Order# 148634 Sec 1 POW: 22-2 Heat# A23157 Mill: U.S. Steel  
Part#: P 12 60 S6 S B Part Desc: Pipe 12 (323.8mm O.D.) SCH 60 SMLS ASA106-B SRL BEVELED END (.562W)

(2) (9)





UNITED STATES STEEL

TUBULAR PRODUCTS  
CERTIFIED TEST REPORT  
(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 3.1.b)DATE: 03/06/07  
TIME: 14:32:34  
SERIAL NO: L0016234

MILL ORDER/ITEM NO <b>DR37463 04</b>		SHOPPERS NO.		P.O. NUMBER <b>74443-00</b>													
MATERIAL COND: <b>AS ROLLED</b>		O.D.: <b>12.750 (323.850)</b>		WALL: <b>0.562 (14.274)</b>													
PRODUCT IDENTIFICATION <b>A23157</b>	FLAT <b>OK</b>	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING								% SHEAR				
					F14LS				F14LS				F14LS				
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	1	2	3	AVG	1	2	3	AVG
					DEG												
** END OF DATA THIS SHEET **																	
LEGEND L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE																	
TESTING / INSPECTION INFORMATION																	
TEST / INSPECTION		YES		RESULTS / COMMENTS													
FULL LENGTH VISUAL		X															
FULL LENGTH EMI		X		OD <u>X</u> OD/D <u>      </u> L <u>      </u> LT <u>X</u> 10.0% NOTCH													
FULL LENGTH MPI																	
FULL LENGTH UT				ID <u>      </u> OD/D <u>      </u> L <u>      </u> LT <u>      </u>													
END AREA INSPECTION (PLAIN END)		X		MPI <u>X</u> UT <u>      </u>													
SPECIAL END AREA (SEA) INSP				MPI <u>      </u> UT <u>      </u>													
FULL LENGTH DRIFT				DRIFT MANDREL SIZE: <u>      </u>													
ADDITIONAL NOTES/COMMENTS																	
MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT. PIPE ALSO MEET THE REQUIREMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C																	

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: J. MAJURZAK - MANAGER, Q.A.

DATE: 03/06/07

11-22  
12" SCH 60 PIPE  
RECEIVED DATE: DEC 21, 2011  
SIGNATURE: *KZ*

## LESENA QUALITY CONTROL

JOB: 12-32

ITEM: N1, N2

ACCEPTED DATE: 3/5/13

SIGNATURE: *AW*

PAGE 2 OF 2

\*\*



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8003186 000020 2012/09/12		Shipment No. & Date.: 1000008928 2012/10/04		TC No., Date & Time : ESA-15738 2012/10/04 - 20:45:16											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 18264-STK / 2 BOL NO.: 1000008928 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 205097											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Temp 1670 °F CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface No Weld Repair Flatness 1/2 A20 No Weld Repair															
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs				
0.8750 " x 120.000 " x 480.00 "		AA3939	8952M3-04	14,293 LB	1	0.8750 " x 120.000 " x 480.00 "		AA3938	9339M3-54	14,293 LB	1				
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
8952M3**	0.19	1.07	0.014	0.005	0.330	0.03	0.15	0.04	0.00	0.029	0.000	0.014	0.0002	0.003	0.3900
9339M3**	0.19	1.12	0.016	0.005	0.350	0.02	0.15	0.04	0.00	0.027	0.000	0.015	0.0002	0.003	0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
8952M3	AA3939	166"	ALG	0.8750	NORM	B	HBW	153							
9339M3	AA3938	166"	ALG	0.8750	NORM	B	HBW	155							

(2 pages)  
**ACCEPTABLE TO  
ASME  
REQUIREMENTS**  
PER mm Jan 30/13

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Date: 2012/10/04 Time: 20:45:16 Page no: 1 of 2

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	N1, N2, M1, M2 Repairs
ACCEPTED DATE:	4/4/13
SIGNATURE:	<i>AW</i>

③ ⑩ ②③ ③③



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8003186 000020 2012/09/12		Shipment No. & Date.: 1000008928 2012/10/04		TC No., Date & Time : ESA-15738 2012/10/04 - 20:45:16								
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 18264-STK / 2 BOL NO.: 1000008928 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 205097								
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Temp 1670 °F CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface No Weld Repair Flatness 1/2 A20 No Weld Repair												
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R : Test Report As Per Spec				Cust Use : PVQ								
ESSAR STEEL ALGOMA INC HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Impact Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)
8952M3	AA3939	166"	ALG	0.8750	NORM	CVN	L	B	FULL	-50	91 78 111	93
9339M3	AA3938	166"	ALG	0.8750	NORM	CVN	L	B	FULL	-50	91 74 78	81
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
8952M3	AA3939	166"	ALG	0.8750	NORM	.2	T	B	50	78	2"	34
9339M3	AA3938	166"	ALG	0.8750	NORM	.2	T	B	51	77	2"	34

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Date: 2012/10/04 Time: 20:45:16 Page no: 2 of 2

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: N1, N2, M1, M2 Reps  
ACCEPTED DATE: 4/9/13  
SIGNATURE:

③ ⑩ ②③ ③③

**NUCOR****PLATE MILL**P.O.Box 279  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 1



Issuing Date : 12/23/2012      B/L No. : 344326      Load No. : 346550      Our Order No. : 105847/12      Cust. Order No. : N 80011  
 Vehicle No: NOKL 725363      Sold To: SAMUEL PLATE SALES      Ship To: SAMUEL PLATE SALES C/O STEEL  
 Specification: 1.0000" x 120.000" x 288.000"      12 TEAL AVENUE      CARE  
 ASTM A36-08 ASTM A709 36-11/ASME SA 36 2011 Addenda/CSA      STONEY CREEK      (HAMILTON Tfr, ON) STATION 3477  
 G40.21-44W/300W/38W/260W-04      HAMILTON, ON L8P4Z3      HAMILTON TFR, ON L8W3N1

Marking :

Heat No	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Al(tot)	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCM
2508502	0.19	1.03	0.011	0.001	0.21	0.32	0.09	0.09	0.02	0.032	0.005	0.003	0.002		0.0025	0.0002	0.010	0.41	0.27

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Tons	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"	Dir.	1	(%) shear	2	(%) shear	3	(%) shear	Ave.	(%) shear	Size	Temp	Min Ave.
2508502-01	9	44 10	T	44,500	73,000		23.2												
			T	45,100	71,900		25.1												

**LESENA QUALITY CONTROL**

JOB: 12-32

ITEM: NI internal Flg. &amp; Base Fl's

ACCEPTED DATE: 4/3/12

SIGNATURE: *[Signature]*

Manufactured to fully killed fine grain practice by Electric Arc Furnace. Welding or weld repair was not performed on this material. Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.5EUL method unless otherwise specified.  $CEQ = C + (Mn/6) + ((Cr + Mo + V)/5) + ((Cu + Ni)/15)$  $Pcm = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$ 

Melted and manufactured in the USA. ISO 9001:2008 certified (#008063) by SRI Quality System Registrar (#0985-09). PED 97/23/EC 7/2 Annex 1, Para 4.3 Compliant. DIN 50049 3.1 B/EN 10204 3.1B(2004), DIN EN 10204 3.1(2005) compliant. For ABS grades only. Quality Assurance certificate 09-MMPQA-545

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications

*T. A. Depretis*  
T. A. Depretis, Metallurgist

12/26/2012 9:14:54 AM

(4) (47)



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2012/12/15	Shipment No. & Date.: 1000022861 2013/01/02	TC No., Date & Time : ESA-37980 2013/01/02 - 18:11:54													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000022861 Cust. Part No.: Carrier: TRIPLE K TRANSPORT LTD - 14008 (265)													
Customer Specification: HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions: Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4096 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs						
0.5000 " x 120.000 " x 480.00 "	AB6375	2259P3-03	16,336 LB	2	0.5000 " x 120.000 " x 480.00 "	AB6376	2259P3-53	16,336 LB	2						
***** CHEMICAL PROPERTIES *****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
2259P3*	0.19	1.10	0.009	0.005	0.330	0.04	0.15	0.04	0.01	0.034	0.000	0.015	0.0002	0.003	0.4000
***** MECHANICAL PROPERTIES *****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
2259P3	AB6375	166"	ALG	0.5000	NORM	B	HBW	155							
2259P3	AB6376	166"	ALG	0.5000	NORM	B	HBW	153							

LESENA QUALITY CONTROL

JOB: 12-32

N2 Gusset ITEM: N1 support BRKT Repad  
ACCEPTED DATE: 4/3/13  
SIGNATURE: [Signature]

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

(5) (37)

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2012/12/15	Shipment No. & Date.: 1000022861 2013/01/02	TC No., Date & Time : ESA-37980 2013/01/02 - 18:11:54
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000022861 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 14008 (265)
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
***** MECHANICAL PROPERTIES *****		
Impact Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC SIZE TEMP(°F) ENERGY(ft-lbf) ENERGY AVG(ft-lbf)
2259P3	AB6376	166" ALG 0.5000 NORM CVN L B FULL -50 110 196 101 136
2259P3	AB6375	166" ALG 0.5000 NORM CVN L B FULL -50 115 106 118 113
Tensile Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC YIELD(KSI) TENSILE(KSI) EL SCALE ELONG(%)
2259P3	AB6376	166" ALG 0.5000 NORM .2 T B 52.5 74.5 8" 26
2259P3	AB6375	166" ALG 0.5000 NORM .2 T B 53.5 74.5 8" 27

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	N1 support Brkt. Repad
ACCEPTED DATE:	4/3/13
SIGNATURE:	<i>[Signature]</i>
(5) (37)	

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8007126 000030 2013/01/31		Shipment No. & Date.: 1000028791 2013/02/05		TC No., Date & Time : ESA-46616 2013/02/05 - 15:05:34											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19303-STK / 3 BOL NO.: 1000028791 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 6201(1137)											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs					
0.5000 " x 120.000 " x 480.00 "		AC2064	3605P3-53	16,336 LB	2	0.5000 " x 120.000 " x 480.00 "	AC2882	3781P3-04	16,336 LB	2					
0.5000 " x 120.000 " x 480.00 "		AC2883	3781P3-53	16,336 LB	2										
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3605P3*	0.19	1.10	0.009	0.004	0.330	0.03	0.19	0.05	0.01	0.031	0.000	0.016	0.0002	0.003	0.4000
3781P3*	0.20	1.08	0.011	0.003	0.340	0.02	0.14	0.02	0.00	0.029	0.000	0.015	0.0002	0.003	0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
3605P3	AC2064	166"	ALG	0.5000	N	B	HBW	158							
3781P3	AC2882	166"	ALG	0.5000	N	B	HBW	156							
3781P3	AC2883	166"	ALG	0.5000	N	B	HBW	156							

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL

JOB: 12-32

ITEM: M1 Parit socket Supp

ACCEPTED DATE: 4/3/13

SIGNATURE: [Signature]

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Date: 2013/02/05 Time: 17:05:14 Page no: 1 of 2

(26) (5)



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8007126 000030 2013/01/31		Shipment No. & Date.: 1000028791 2013/02/05		TC No., Date & Time : ESA-46616 2013/02/05 - 15:05:34								
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19303-STK / 3 BOL NO.: 1000028791 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 6201(1137)								
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Fine Grain Fully Killed No Weld Repair												
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R : Test Report As Per Spec				Cust Use : PVQ								
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Impact Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)
3605P3	AC2064	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	74 111 113	99
3781P3	AC2882	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	108 125 122	118
3781P3	AC2883	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	98 88 104	97
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
3605P3	AC2064	166"	ALG	0.5000	N	.2	T	B	53.7	77.5	8"	27
3781P3	AC2882	166"	ALG	0.5000	N	.2	T	B	51.2	74.6	8"	29
3781P3	AC2883	166"	ALG	0.5000	N	.2	T	B	52.5	75.8	8"	29

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Date: 2013/02/05 Time: 17:05:14 Page no: 2 of 2

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: M1 Davit Socket Support  
ACCEPTED DATE: 4/3/13  
SIGNATURE:



3418306

TEST CERT. #



C45701

W-115001



**GERDAU AMERISTEEL**

WHITBY STEEL MILL  
HOPKINS STREET SOUTH  
WHITBY ON L1N 5T1 CAN  
(905) 668-8811

Chemical and Physical Test Report  
MADE IN CANADA ✓

SHIP TO RUSSEL M/LEROUX DIV OF RUSSEL 15 CHERRY BLOSSOM RD  CAMBRIDGE, ON N3H 4R7	INVOICE TO RUSSEL METALS INC ACTS PAYABLE 1900 MINNESOTA CRT S-210 MISSISSAUGA, ON L5N 3C9	SHIP DATE 04/11/11  CUST. ACCOUNT NO 80122892
---	--	---

**PRODUCED IN: WHITBY**

SHAPE + SIZE		GRADE		SPECIFICATION ✓																SALES ORDER		CUST P.O. NUMBER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
A3 X 3 X 3/8		44W		C.S.A. G40.21-04 (R2009) 44W																5099198-74		34020626-34																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	Zr	Ca	C Eqv																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										

Mechanical Test: Yield 54552 PSI, 376.12 MPA Tensile: 74551 PSI, 514.01 MPA %El: 31.2/8in, 31.2/200MM Def HT: 0, OMM %l/h 0  
 Mechanical Test: Yield 54637 PSI, 376.71 MPA Tensile: 74615 PSI, 514.45 MPA %El: 31.9/8in, 31.9/200MM Def HT: 0, OMM %l/h 0  
 CUST ITEM NUMBER: 12414

**PRODUCED IN: WHITBY**

SHAPE + SIZE		GRADE		SPECIFICATION																SALES ORDER		CUST P.O. NUMBER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
A3 1/2 X 2 1/2 X 3/8		44W		C.S.A. G40.21-04 (R2009) 44W																1005066-21		34020022-21																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	N	Sn	Al	Ti	Zr	Ca	C Eqv																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					</

Mechanical Test: Yield 51298 PSI, 353.69 MPA Tensile: 75053 PSI, 517.47 MPA %El: 23.6/8in, 23.6/200MM Def HT: 0, OMM %l/h 0  
 Mechanical Test: Yield 50826 PSI, 350.43 MPA Tensile: 74271 PSI, 512.06 MPA %El: 25.0/8in, 25.0/200MM Def HT: 0, OMM %l/h 0  
 CUST ITEM NUMBER: 12426

LESINA QUALITY CONTROL  
 JOB: 11-04; 11-05 & Stock  
 ITEM: 3' x 3' x 3/8' ANGLE  
 ACCEPTED DATE: JUNE 10 2011  
 SIGNATURE: *[Signature]*

**Customer Notes**

NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

This material, including the billets, was melted and manufactured in Canada

*[Signature: Bhaskar]*  
 Bhaskar Yalamanchili  
 Quality Director  
 Gerdau Ameristeel

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

*[Signature: Raul]*  
 Metallurgical Services Manager  
 WHITBY STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER, AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller. Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.

LESENA QUALITY CONTROL  
 JOB: 12-32  
 ITEM: N1 Supp. Bkt.  
 ACCEPTED DATE: *[Signature]* 4/9/13  
 SIGNATURE: *[Signature]*



# INSPECTION CERTIFICATE

PANTECH STEEL INDUSTRIES SDN. BHD. (009731-A)

LOT 13258 & 13259, Jalan Haji Abd. Manan,

Off Jalan Meru, 42200 Klang, Selangor, Malaysia.

Tel: 603-3393 1633 Fax: 603-3393 1733 E-mail: pantech2@streamyx.com

## WROUGHT CARBON STEEL BUTTWELDING FITTINGS

INSPECTION DOCUMENT: EN10204:2004 Type 3.1



Cert. No.: KLR 0003926

PED 97/23/EC Annex 1, Clause 4.3

Cert. No.: 0038/PED/MUM/0510070/1

Purchaser: ALLIED FITTING CORP

Certificate No: PSI 71894

Date: 10-May-11

Order No.	Invoice No.	Specification for Pipe	Specification for Fittings: Made from Seamless Pipe	Specification for Inspection												
30911GPS-2	E 7446	ASTM A106 - 08 / API 5L - 07 PSL1 Gr. B & NACE MR0175/ ISO 15156-03	ASTM A234 - 10 / ASME SA 234 - 10 WPB	ASME B16.9 - 07												
Heat No.	Product & Size		Quantity (pcs)	Pipe Mill	Pipe Heat No.											
JN 202	18" 45 DEG LR STD ELBOW		5	HENGYANG VALIN STEEL TUBE	0833204											
JN 302	12" 90 DEG LR XS ELBOW		18	PANGANG GROUP CHENGDU IRON & STEEL	0881438											
JK 503	12" 90 DEG LR XS ELBOW		7	HENGYANG VALIN STEEL TUBE	0834201											
KA 205	12" 90 DEG SR XS ELBOW		2	YANTAI LUBAO STEEL PIPE	370503											
JN 302	14" 90 DEG LR XS ELBOW		9	PANGANG GROUP CHENGDU IRON & STEEL	0881438											
Visual Examination		Dimensional Inspection		Heat Treatment	Magnetic Particle Testing											
GOOD		GOOD		H	N.A											
GOOD		GOOD		H	N.A											
GOOD		GOOD		H	N.A											
GOOD		GOOD		H	N.A											
GOOD		GOOD		H	N.A											
Specification	Chemical Composition (%)												Tensile Test <sup>1</sup>			Hardness (HB)
	C	Si	Mn	P	S	Ni	Cr	Mo	Cu	V		CE	YS	TS	E	
	x100	x100	x100	x1000	x1000	x100	x100	x100	x100	x100	x1000		x100	(KSI / MPa)	(%)	
Min	-	10	29	-	-	-	-	-	-	-	-	-	240	415	22	-
Max	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat No.	30	-	106	50	58	40	40	15	40	80		50	-	665	-	197
JN 202	14	20	71	11	10	5	4	1	11	10		30	320	490	36.0	137
JN 302	16	48	98	28	13	2	5	1	4	8		36	337	523	36.0	101
JK 503	13	23	57	26	13	6	6	2	11	7		28	322	470	31.9	130
KA 205	19	24	56	8	4	2	3	1	7	0		30	301	482	35.0	132
JN 302	16	48	98	28	13	2	5	1	4	8		36	337	523	36.0	101

WE HEREBY CERTIFY THAT THE PRODUCT DESCRIBED HEREIN HAS BEEN MANUFACTURED, SAMPLED, TESTED AND INSPECTED IN ACCORDANCE WITH THE REQUIREMENTS OF THE ABOVE SPECIFICATION AND PURCHASE ORDER; AND WAS FOUND SATISFIED THE REQUIREMENTS. MATERIAL IS FREE FROM MERCURY AND RADIOACTIVE CONTAMINATION.  
TENSILE REQUIREMENT: CONFORMS TO ASTM A370 STANDARD, LONGITUDINAL DIRECTION, GAUGE LENGTH 2" (50mm)

### NOTE:

C: Cold formed at temperature below 620°C

S: Stress relieved in temperature between 595°C - 890°C and cooled in still air.

H: Hot formed in temperature between 620°C - 890°C and cooled in still air.

N: Normalised at 910°C

Q: Heated to 910°C and quench in water.

T: Temper between 590°C - 690°C.

\*1: YS = Yield strength TS = Tensile strength E = Elongation

### LESENA QUALITY CONTROL

JOB: 12-32

ITEM: N2 Elbow

ACCEPTED DATE: 4/3/13

SIGNATURE:

Quality Assurance Manager





ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8003186 000010 2012/10/22	Shipment No. & Date.: 1000012066 2012/10/23	TC No., Date & Time : ESA-20551 2012/10/24 - 20:41:44													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 18264-STK / 1 BOL NO.: 1000012066 Cust. Part No.: Carrier : NATIONWIDE FREIGHT SYSTEMS LTD - 57													
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Temp 1670 °F CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS															
Dimensions (T x W x L) 0.8750 " x 96.000 " x 480.00 "	Batch No. AA3881	Heat No-MS 9339M3-03													
Quantity 22,870 LB	Pcs 2														
CHEMICAL PROPERTIES															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
9339M3*	0.19	1.12	0.016	0.005	0.350	0.02	0.15	0.04	0.00	0.027	0.000	0.015	0.0002	0.003	0.4000
MECHANICAL PROPERTIES															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
9339M3	AA3881	166"	ALG	0.8750	NORM	B	HBW	154							
Impact Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)			
9339M3	AA3881	166"	ALG	0.8750	NORM	CVN	L	B	FULL	-50	78 79 82	80			

(2 pages)  
**ACCEPTABLE TO  
ASME  
REQUIREMENTS**  
PER mm Jan 30/13

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	N1, N2, M1, M2 Repair
ACCEPTED DATE:	4/9/13
SIGNATURE:	<i>[Signature]</i>

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

⑩ ②③ ③③



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8003186 000010 2012/10/22	Shipment No. & Date.: 1000012066 2012/10/23	TC No., Date & Time : ESA-20551 2012/10/24 - 20:41:44
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 18264-STK / 1 BOL NO.: 1000012066 Cust. Part No.: Carrier : NATIONWIDE FREIGHT SYSTEMS LTD - 57
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface No Weld Repair Flatness 1/2 A20 No Weld Repair		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (706)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
***** MECHANICAL PROPERTIES *****		
Tensile Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC YIELD(KSI) TENSILE(KSI) EL SCALE ELONG(%)
9339M3	AA3881	166" ALG 0.8750 NORM .2 T B 51 79 2" 33

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

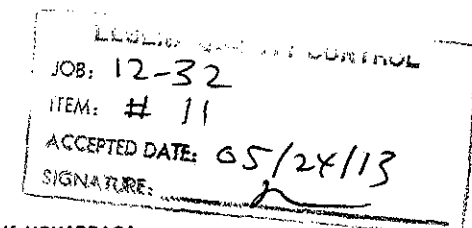
Date: 2012/10/24 Time: 20:41:44 Page no: 2 of 2

LESANA QUALITY CONTROL	
JOB:	12-32
ITEM:	N1, N2, M1, M2 Repairs
ACCEPTED DATE:	4/9/13
SIGNATURE:	<i>AV</i>
10 23 33	



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8008924 000040 2013/03/15		Shipment No. & Date.: 1000038482 2013/03/29		TC No., Date & Time : ESA-60868 2013/03/30 - 08:47:26											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19609-STK / 4 BOL NO.: 1000038482 Cust. Part No.: Carrier : GBS & SONS TRUCKING LTD. - 413(1034)											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs					
0.5000 " x 120.000 " x 480.00 "		AD0156	4927P3-52	16,336 LB	2	0.5000 " x 120.000 " x 480.00 "	AD0157	4927P3-53	16,336 LB	2					
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
4927P3*	0.20	1.07	0.009	0.003	0.330	0.01	0.15	0.02	0.00	0.025	0.000	0.015	0.0002	0.003	0.39
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
4927P3	AD0157	166"	ALG	0.5000	N	B	HBW	152							
4927P3	AD0156	166"	ALG	0.5000	N	B	HBW	153							



K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

11



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8008924 000040 2013/03/15		Shipment No. & Date.: 1000038482 2013/03/29		TC No., Date & Time : ESA-60868 2013/03/30 - 08:47:26								
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19609-STK/4 BOL NO.: 1000038482 Cust. Part No.: Carrier : GBS & SONS TRUCKING LTD. - 413(1034)								
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed												
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R : Test Report As Per Spec					Cust Use : PVQ							
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Impact Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	FULL ENERGY(ft-lbf)	FULL AVG(ft-lbf)
4927P3	AD0157	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	73 105 88	89
4927P3	AD0156	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	84 108 108	100
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
4927P3	AD0157	166"	ALG	0.5000	N	.2	T	B	51.0	75.0	8"	24
4927P3	AD0156	166"	ALG	0.5000	N	.2	T	B	52.0	75.0	8"	27

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: # 11  
ACCEPTED DATE: 05/24/13  
SIGNATURE: *[Signature]*

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

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SOLD 2013528  
TO CANADIAN PLATE & PROFILES INC.  
920 KAMATO ROAD  
MISSISSAUGA ON L4W 2R6

SHIPPED  
TO CANADIAN PLATE AND STRUCTURAL ENG. I  
920 KAMATO ROAD  
MISSISSAUGA ON L4W 2R6

SALES DESCRIPTION..... GRADE ITEM ORDER# DATE SHIPPED 0/00/00  
.500 (1/2) HR PLT 44W/50W ✓ 70860 40185775 QTY SHIPPED 53869  
60 288 TAG NO. 1887911

CUST. ORDER# 19737-2177 RELEASE CONTRACT  
VENDOR ESSAR STEEL ALGOMA INC MILL NO. HAC7348 COUNTRY OF ORIGIN CANADA

HEAT NO. 0695P3-05 ✓  
CARBON .0600 MANGANESE .8100 PHOSPHORUS .0070 CHEMICAL ANALYSIS  
SULPHUR .0030 SILICON .2200 COPPER .0200 NICKEL .0100 CHROMIUM .0200  
MOLYBDENUM .0000 VANADIUM .0000 COLUMBIUM .0460 ALUMINUM .0290 ASA .0000 ZINC .0000 TITANIUM .0020 BORON .0000

MECHANICAL / PHYSICAL PROPERTIES

ROCKWELL TENSILE PSI YIELD PSI ELONGATION GRAIN SIZE ONE TWO  
000 76500.000 62100.000 38.00 .000 .0000 .0000  
THREE FOUR LDH TEST N VALUE R VALUE IMPACTS BENDTEST TEST  
.0000 .0000 .000 .000 .000 00000000 00000000 13-0321C

WE CERTIFY THE HEAT ANALYSIS AND OR TEST RESULTS SHOWN ABOVE ARE TRUE AND EXACT AS CONTAINED  
IN THE PERMANENT RECORDS OF RUSSEL METALS INC. THESE RECORDS MAY BE EXAMINED  
BY YOUR PERSONNEL OR ANY AGENT AUTHORIZED BY YOU.

AUTHORIZED AGENT

QUALITY CONTROL  
JOB: 12-32  
ITEM: 12.18" Q  
ACCEPTED DATE: 05/09/13  
SIGNATURE: JK

12



**B&T Steel**

A Division of Russel Metals Inc.

1052 South Service Road, Stoney Creek, ON L8E 6G3

Mailing Address: P.O. Box 2105, LCD1, Hamilton, ON L8N 3R5

Toll Free: 1-800-263-6597 Tel: (905) 643-3008 Fax: (905) 643-5976

Form# 071 Rev 4 09-07-2011

**ISO 9001**  
REGISTERED QMS



ISO 9001:2008

**TRILAD Flanges and Fittings, Inc.**

30 WOODSLEE AVE.  
PARIS, ON, CANADA N3L 3V1  
(PHONE) 519-442-6520  
(FAX) 519-442-7658  
[www.tri-lad.com](http://www.tri-lad.com)

**CERTIFIED MATERIAL TEST REPORT**

Certificate No.

13162664

EN 10204 3.1

Date of Report

2/12/2013

Customer

LESENA STEEL LTD.  
1060 BIRCHMOUNT ROAD

SCARBOROUGH

ON M1K 1S4

Customer Order No.

32-6

Quantity

2

Tri-Lad Order No.

557472

Line No.

1

Specification

SA105N SECT II 2010 EDITION 2011A ADDENDA

Heat Treatment

NORMALISED

Item Description

4 150 LWN RF A105N 12 LG

(800946)

Temperature

Init 1652 F 900 C

Shop Order/Trace No.

Time

AIR COOL

Lot Definition

Lot No.

Heat Code

TL10005391

C.E.

.38

Melt Practice

## Chemical Composition

Heat  
Product

C

.18

Mn

1.12

P

.009

S

.008

Si

.20

Cu

.02

Ni

.02

Cr

.03

Mo

.01

V

.005

Heat  
ProductHeat  
Product

## Mechanical Properties

Yield		Tensile		Elongation	Reduction of Area	Hardness BHN 150 BHN 149	Impact Test Temperature	Impact Values	Shear Fracture
Ksi	46	Ksi	74						
Mpa	320	Mpa	513	33 %	67 %				
Tensile Specimen				STD RD					
Lateral Expansion				Impact Type	Impact Orientation	Starting Material	Impact Specimen		
				VNOTCH			FULL SIZE		

Notes

LESENA QUALITY CONTROL

JOB:

12-32

ITEM:

N3A N3B

ACCEPTED DATE:

3/28/13

SIGNATURE:

NACE MR0103 LATEST ED.

NACE MR0175 LATEST ED.

(13)

Material is in accordance with the applicable Standard to which it is ordered including:  
ASME Sect II, ASME B16.5, B16.9, B16.36, B16.47, CSA, MSS, AWWA C-207.

NO WELD REPAIR

Material conforms to both ASTM (A) and ASME (SA) applicable specifications.

We hereby certify that all information presented on this CMTR conforms to the above specification.

We hereby certify the results to be a true copy of the records of the company.

Les Mansfield, CET

Quality Assurance Manager





ISO 9001:2008

**TRILAD Flanges and Fittings, Inc.**

30 WOODSLEE AVE.  
PARIS, ON, CANADA N3L 3V1  
(PHONE) 519-442-6520  
(FAX) 519-442-7658  
[www.tri-lad.com](http://www.tri-lad.com)

**CERTIFIED MATERIAL TEST REPORT**

Certificate No.

13162663

EN 10204 3.1

Date of Report

2/12/2013

Customer

LESENA STEEL LTD.  
1060 BIRCHMOUNT ROAD

SCARBOROUGH

ON M1K 1S4

Customer Order No.

32-6

Quantity

12

Tri-Lad Order No.

557472

Line No.

1

Specification

SA105N SECT II 2010 EDITION 2011A ADDENDA

Heat Treatment

NORMALISED

Item Description

4 150 LWN RF A105N 12 LG

(800946)

Temperature

Init 1670 F 910 C

Shop Order/Trace No.

Time

N=3HRS

Lot Definition

Lot No.

Heat Code

TL10004211

C.E.

.39

Melt Practice

## Chemical Composition

Heat Product	C .21	Mn 1.03	P .014	S .015	Si .21	Cu .01	Ni .01	Cr .01	Mo .00	V .002
Heat Product										
Heat Product										

## Mechanical Properties

Yield Ksi 46 Mpa 317	Tensile Ksi 74 Mpa 513	Elongation 34 %	Reduction of Area 77 %	Hardness BHN 153 BHN 156	Impact Test Temperature	Impact Values	Shear Fracture
Tensile Specimen STD RD							
Lateral Expansion		Impact Type VNOTCH	Impact Orientation		Starting Material		Impact Specimen FULL SIZE

Notes

## LESENA QUALITY CONTROL

JOB: 12-32

ITEM: N3A, N3B

ACCEPTED DATE:

SIGNATURE:

NACE MR0103 LATEST ED.  
NACE MR0175/ISO15156-09

(13)

Material is in accordance with the applicable Standard to which it is ordered including:  
ASME Sect II, ASME B16.5, B16.9, B16.36, B16.47, CSA, MSS, AWWA C-207.

NO WELD REPAIR

Material conforms to both ASTM (A) and ASME (SA) applicable specifications.

We hereby certify that all information presented on this CMTR conforms to the above specification.

We hereby certify the results to be a true copy of the records of the company.

Les Mansfield, CET

Quality Assurance Manager

# CERTIFICATE OF INSPECTION & TEST

ORIGINAL



ST&H CORPORATION  
411-3 Shinwol-ri, Jinryemyun, Gimhae-si Gyungnam, Korea  
Tel: 82.51.744-4680(5 line) Fax: 82.51.744-4670  
E-mail: stcorp@kornet.net

(EN 10204 3.1)

Certified to ISO9001:2008, PED97/23/EC by LRQA  
Report No: MYM 7115 Date: MAR.20.2012

Customer : COMCO PIPE & SUPPLY CO										Contract No. : G1-3034				Heat Treatment	
Spec. For Material: ASTM/ASME A/SA105N-05(NACE MR-0175)															
Chemical Composition (%)		C	Si	Mn	P	S	Ni	Cr	Mo	Cu	V	Nb	910°C NORMALIZED		
Heat No.	MAX	0.350	0.350	1.050	0.035	0.040	0.400	0.300	0.120	0.400	0.080				
	MIN		0.100	0.600											
A6019		0.190	0.230	0.870	0.024	0.011	0.006	0.014	0.001	0.008	0.002		Dimensional Inspection		
Tension Test												Charpy Impact Test (10x10 mm Specimen Size)			
Size of Specimen(mm)		Yield Strength MPa	Tensile Strength MPa	Elongation %	Red of Area %	Individual		Average		Notch Type					
Dia	Gage Length					min	min								
12.5	50	MAX				Test Result				Temp	187		GOOD		
		MIN	250.000	485.000	22.000	30.000	①	②	③		Average			137	
12.5	50		296.000	526.000	31.000	61.000						143-145		Ultrasonic Examination	
ITEM / SIZE		Q'TY	ITEM / SIZE		Q'TY	ITEM / SIZE		Q'TY	ITEM / SIZE		Q'TY	N/A Magnetic Particle Examination N/A Remarks : **CE = 0.34 (LONG FORMULAR)			
150LBS BLRF 2"		100	150LBS SORF 3"		450	150LBS WNRF STD 3"		300							
150LBS BLRF 3"		100	150LBS SORF 4"		600	150LBS WNRF STD 4"		500							
150LBS BLRF 4"		150	300LBS SORF 3"		20	300LBS WNRF STD 3"		20							
150LBS SORF 2"		400	300LBS BLRF 4"		25	BLANK									
150LBS SORF 2 1/2"		25	150LBS WNRF STD 2 1/2"		25										

NOTE :  
1MPa = 145.037 psi  
1MPa = 0.145037 ksi  
1psi = 0.006895 MPa  
1ksi = 6.89476 MPa  
W.C:Water Cool O.C:Oil Cool  
A.C:Air Cool N.A:Non Action  
N:Normalized A:Annealed  
Q.T:Quenched and Tempered  
N.T:Normalized and Tempered

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

*[Signature]*



Witnessed by: K. S. KIM Manage of Q.A Dept/ Y. M. CHOI

ST-801-14-00

LEGENA QUALITY CONTROL

JOB: 12-32  
ITEM: N3A, N3B  
ACCEPTED DATE: 4/2/13

①④

ST&H CORPORATION



R.N. GUPTA & COMPANY LTD., C-55, FOCAL POINT, LUDHIANA -141 010 ( INDIA )

MATERIAL / MILL TEST CERTIFICATE EN 10204 : 2004 - 3.1



CERTIFICATE NO. 3093 DATE 12/08/2011

NAME OF BUYER

RAW MATERIAL SPECIFICATION : ASTM A105-09/ASME SA105-09

SPECIFICATION FOR INSPECTION : ANSI/ASME B16.5-2009

P.O NO. 61590 DT. 08/03/2011

INVOICE NO. RNG/EXP/2252 DT. 09/08/2011

### MECHANICAL REQUIREMENTS

Sr. No.	Description	Qty ( PCS )	Heat No.	Supp. Code	Y.S(Psi) Min 36,000	T.S(Psi) Min 70,000	E% Min 22%	R.A% Min 30%	Heat Treatment	Soaking Time ( Min. )	Hardness BHN 137-187
9	4 150# WNRF STD FLGS	150	H 3546	2	46994	77374	30.80	61.41	ASFORGED		152 - 154
10	4 150# BLRF FLGS	150	H 3507	20	47666	79224	28.80	61.79	ASFORGED		160 - 162
11	4 150# BLRF FLGS	150	H 3507	20	47666	79224	28.80	61.79	ASFORGED		160 - 162
12	6 150# SORF FLGS	150	H 3536	31	45745	75842	31.20	58.37	ASFORGED		148 - 150
13	6 150# SORF FLGS	150	H 3536	31	45745	75842	31.20	58.37	ASFORGED		148 - 150
14	6 150# SORF FLGS	15	H 3509	20	45910	77633	29.60	61.41	AS FORGED		154 - 156
15	6 150# SORF FLGS	135	H 3536	31	45745	75842	31.20	58.37	ASFORGED		148 - 150
16	6 150# SORF FLGS	13	H 3477	31	45810	74673	30.60	59.76	AS FORSED		144 - 146

### CHEMICAL REQUIREMENTS

Sr. No.	Heat No.	SPECIFIED ELEMENTS						UNSPECIFIED ELEMENTS				
		C.E.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V
		0.47% Max	0.35 Max	0.60-1.05	0.035 Max.	0.04 Max.	0.10 -0.35 Max.	0.40 Max.	0.40 Max	0.30 Max.	0.12 Max.	0.05 Max.
9	H 3546	0.39	0.23	0.93	0.023	0.009	0.28	0.013	0.013	0.027	0.005	0.002
10	H 3507	0.38	0.20	0.96	0.030	0.011	0.24	0.066	0.026	0.079	0.007	0.002
11	H 3507	0.38	0.20	0.96	0.030	0.011	0.24	0.066	0.026	0.079	0.007	0.002
12	H 3536	0.37	0.21	0.95	0.023	0.010	0.24	0.007	0.012	0.013	0.003	0.002
13	H 3536	0.37	0.21	0.95	0.023	0.010	0.24	0.007	0.012	0.013	0.003	0.002
14	H 3509	0.39	0.19	0.96	0.025	0.011	0.25	0.075	0.055	0.130	0.021	0.002
15	H 3536	0.37	0.21	0.95	0.023	0.010	0.24	0.007	0.012	0.013	0.003	0.002
16	H 3477	0.39	0.21	1.05	0.021	0.008	0.27	0.005	0.009	0.022	0.003	0.002

Material in accordance with NACE MRO 175-2003 and NACE MRO 103

All Products were manufactured, Sampled, Tested and Inspected Solely by the manufacturer shown on this Test Report in accordance with indicated specification and were found to meet the requirements.

No Weld Repair was performed and all products are free of Weld Repair. All Products are free of Mercury Contamination and Radioactivity.

Note:- We hereby confirm that our QA system comply with the requirements of Annex I, Clause 4.3 of PED 97/23/EC and it is certified by M/s Det Norske Veritas vide Certificate No. 95036-2011-CE-IND-DNV Dated 31-03-2014 ISO 9001-2008 Certificate No. is 39752-2008-QA-INDIA-RvA.01 Dated 23/07/2011.

ALL NORMALISED MATERIALS ARE HEAT TREATED AT TEMP. 920 DEGREE CENTIGRADE.

For R.N. GUPTA & COMPANY LTD. Page No: 2


METALLURGIST

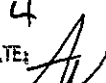
LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: N3A, N3B

14

Order#: 256732 Seq: 3 PO#: 32-8 Heat#: H3507 Mill: R.N. Gupta  
Part#: F 4 1 R B 5C Part Desc: Flanges 4 (114.3mm O.D.) 150# RAISED FACE BLIND ASA105 COMMERCIAL

		<b>MUNISH FORGE PVT. LTD</b> <b>VILL. GOBINDGARH ADJOINING PHASE -VII FOCAL POINT</b> <b>LUDHIANA- 141 010 INDIA. TEL:- + 91-161-2673307, 2673407 Fax: + 91-161-2676046</b> <b>AN ISO 9001 : 2008 CERTIFIED COMPANY</b> <b>(CERTIFICATE No. 125446-2008-AQ-IND-RvA Rev.02)</b> <b>CERTIFICATE AS PER DIN EN 10204 3.1 - 2004</b>										<b>FM.NO. 960A</b> <b>REV: 00</b> <b>EFF. DT: 22.07.08</b>			
INVOICE NO. & DATE												CERTIFICATE NO.		7207/11	
CUSTOMER'S NAME												DATE		21.05.2011	
PART NO. / NAME		3" - 150 WNRF SCH 160										P.O. NO. & DATE			
MATERIAL SPECIFICATION		ASTM A105N/ SA105N 2009, NACE MR 0175-2003													
STANDARD		ASME B16.5:2009 (REVISION OF ASME B16.5:2003)										BATCH NO.		112035	
QUANTITY		250 Pcs													
DESCRIPTION	QTY (PCs)	BATCH NO.	CHEMICAL COMPOSITION												
			C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	CE%	
SPECIFIED			0.35 MAX	0.60 1.05	0.035 MAX	0.040 MAX	0.10 0.35	0.40 MAX	0.40 MAX	0.30 MAX	0.12 MAX	0.08 MAX	0.02 MAX	0.47 MAX	
MILL TEST REPORT	250	5/13/4	0.21	0.89	0.032	0.018	0.25	0.07	0.03	0.06	0.005	0.002			
OBSERVED BY US	250	112035	0.21	0.98	0.030	0.009	0.27	0.07	0.04	0.06	0.006	0.001	0.003	0.39	
MECHANICAL TESTING AS PER ASTM A 370 - 09															
MECHANICAL PROPERTIES															
BATCH NO.	DESCRIPTION	YIELD STRENGTH PSI		TENSILE STRENGTH PSI		% ELONGATION		% REDUCTION		HARDNESS BHN					
-	SPECIFIED	36000 MIN		70000 MIN		22 MIN		30 MIN		137-187					
112035	OBSERVED	50633.14		79401.97		29.66		56.63		149 - 153					
<b>SPECIAL REMARKS: - WE CERTIFY THAT THE MATERIAL MEETS THE REQUIREMENT OF ASTM A105N/SA105N-09 &amp; DIMENSIONAL STD. ASME B16.5:2009 (REVISION OF ASME B16.5:2003) CARBON STEEL FLANGES ARE FORGED, NORMALIZED &amp; FULLY MACHINED WITH SERRATED FINISH AS PER STD. MSS SP-6-2007</b> <b>FLANGES ARE PAINTED WITH BLACK PAINT &amp; MARKED AS : MUNISH 3 WNRF SCH 160 150 A/SA105N B16.5 112035 INDIA</b>															
MADE BY		CHECKED BY (Q.C.M)				D.G.M. (Q.C) WORK INSPECTOR FOR MUNISH FORGE PVT. LTD.									

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	N4
ACCEPTED DATE:	4/2/13
SIGNATURE:	

15



STAMPAGGIO A CALDO DI ACCIAI COMUNI - LEGATI E INOSSIDABILI

SALA PROVE E ANALISI MATERIALI / MATERIAL TEST DEPARTMENT

SEDE AMMINISTRATIVA E STABILIMENTO:  
23861 CESANA BRIANZA (LC) - Italy  
Via G. Parini, 28  
Tel +39 031.655441  
Fax +39 031.655149  
quality.mtf@metalfar.com

COMPANY WITH QUALITY MANAGEMENT  
SYSTEM CERTIFIED BY DNV  
= ISO 9001:2008 =

# CERTIFICATO DI COLLAUDO SECONDO EN 10204 - 3.1 INSPECTION CERTIFICATE

Certif. N. 4327	Del/Dated 17.09.2012	Fattura / Invoice N. 2528	Del/Dated 14.09.2012
DDT / Del Note N. 3470	Del/Dated 14.09.2012	Ns.Ord. / Our ref. N.	Del/Dated
Dest: "BG" COMCO			
GUELPH			CA

Pag. 5 - 15

COD. COL.	COLATA	POS.	VS. ORDINE	Q.TA'	DESCRIZIONE	DIM. IN ACC. A	VISIVO E DIMENS.
HEAT CODE	HEAT	ITEM	YOUR REFERENCE	Q.TY	DESCRIPTION	DIM. ACCORDANCE TO	VIS. & DIMENS.
1426/11	076	62616/BG	2915	25,00	W/N 150 RF 3" 160 A105N	ASME/ANSI B16.5 - 2009	SATISFACTORY
MATERIALE / MATERIAL							
ASTM A105 (LADLE)							
C%	Si%	Mn%	S%	P%	Cr%	Ni%	Mo%
0,183	0,220	1,060	0,005	0,004	0,060	0,090	0,021
TP%	Cu%	V%	Nb%	N%	Al%	C.E.%	
0,019	0,100	0,002	0,002	0,000	0,025	0,389	
PROVETTA / TEST SPECIMEN							
SEZ. mm2	LUNG. mm	FORMA	SNERVAMENTO	ROTTURA	ALLUNGAMENTO	CONTRAZIONE	DUREZZA
SECT. mm2	LENGTH mm	SHAPE	YIELD POINT	TENSILE STRENGTH	ELONGATION	REDUCTION OF AREA	HARDNESS
126,60	50,80	1-O 2=□	N/mm2 >=0,2%	N/mm2 >=	%>=	%>=	HBW
			325,0	548,0	30,0	58,0	166,0 - 174,0
RESILLENZA / IMPACT TEST - JOULE/cm2							
TIPO / TYPE	10x10mm	°C	1	2	3		
			20	89	85	89	
SNERVAMENTO							
YIELD POINT			N/mm2 >=1,0%				
			0,0				
MATERIALE IN ACCORDO A / MATERIAL IN ACC. TO							
ASTM/ASME A 105/SA 105 M - 11 ASME CODE SECT. II, PART A, ED. 2010	TRATTAMENTO TERMICO / HEAT TREATMENT			FORNO / FURNACE			ORIGINE / ORIGIN OF STEEL
	NORMALIZED AT 920 C - COOLED IN STILL AIR			ELECTRIC FURNACE			EUROPEAN UNION

COD. COL.	COLATA	POS.	VS. ORDINE	Q.TA'	DESCRIZIONE	DIM. IN ACC. A	VISIVO E DIMENS.
HEAT CODE	HEAT	ITEM	YOUR REFERENCE	Q.TY	DESCRIPTION	DIM. ACCORDANCE TO	VIS. & DIMENS.
4062/12	078	62616/BG	2915	30,00	W/N 300 RF 3" XS A105N	ASME/ANSI B16.5 - 2009	SATISFACTORY
MATERIALE / MATERIAL							
ASTM A105 (LADLE)							
C%	Si%	Mn%	S%	P%	Cr%	Ni%	Mo%
0,191	0,220	0,950	0,004	0,007	0,160	0,100	0,033
TP%	Cu%	V%	Nb%	N%	Al%	C.E.%	
0,018	0,110	0,003	0,002	0,009	0,025	0,403	
PROVETTA / TEST SPECIMEN							
SEZ. mm2	LUNG. mm	FORMA	SNERVAMENTO	ROTTURA	ALLUNGAMENTO	CONTRAZIONE	DUREZZA
SECT. mm2	LENGTH mm	SHAPE	YIELD POINT	TENSILE STRENGTH	ELONGATION	REDUCTION OF AREA	HARDNESS
126,60	50,80	1-O 2=□	N/mm2 >=0,2%	N/mm2 >=	%>=	%>=	HBW
			325,0	528,0	31,0	60,0	163,0 - 165,0
RESILLENZA / IMPACT TEST - JOULE/cm2							
TIPO / TYPE	10x10mm	°C	1	2	3		
			20	86	80	88	
SNERVAMENTO							
YIELD POINT			N/mm2 >=1,0%				
			0,0				
MATERIALE IN ACCORDO A / MATERIAL IN ACC. TO							
ASTM/ASME A 105/SA 105 M - 11 ASME CODE SECT. II, PART A, ED. 2010	TRATTAMENTO TERMICO / HEAT TREATMENT			FORNO / FURNACE			ORIGINE / ORIGIN OF STEEL
	NORMALIZED AT 920 C - COOLED IN STILL AIR			ELECTRIC FURNACE			EUROPEAN UNION

COD. COL.	COLATA	POS.	VS. ORDINE	Q.TA'	DESCRIZIONE	DIM. IN ACC. A	VISIVO E DIMENS.
HEAT CODE	HEAT	ITEM	YOUR REFERENCE	Q.TY	DESCRIPTION	DIM. ACCORDANCE TO	VIS. & DIMENS.
1232803	006	62763/BG	2974	36,00	S/O 150 RF 10" A105N	ASME/ANSI B16.5 - 2009	SATISFACTORY
MATERIALE / MATERIAL							
ASTM A105 (LADLE)							
C%	Si%	Mn%	S%	P%	Cr%	Ni%	Mo%
0,200	0,220	0,950	0,008	0,011	0,090	0,060	0,010
TP%	Cu%	V%	Nb%	N%	Al%	C.E.%	
0,018	0,140	0,001	0,001	0,000	0,026	0,392	
PROVETTA / TEST SPECIMEN							
SEZ. mm2	LUNG. mm	FORMA	SNERVAMENTO	ROTTURA	ALLUNGAMENTO	CONTRAZIONE	DUREZZA
SECT. mm2	LENGTH mm	SHAPE	YIELD POINT	TENSILE STRENGTH	ELONGATION	REDUCTION OF AREA	HARDNESS
126,60	50,80	1-O 2=□	N/mm2 >=0,2%	N/mm2 >=	%>=	%>=	HBW
			340,0	520,0	31,0	59,0	156,0 - 159,0
RESILLENZA / IMPACT TEST - JOULE/cm2							
TIPO / TYPE	10x10mm	°C	1	2	3		
			20	83	85	89	
SNERVAMENTO							
YIELD POINT			N/mm2 >=1,0%				
			0,0				
MATERIALE IN ACCORDO A / MATERIAL IN ACC. TO							
ASTM/ASME A 105/SA 105 M - 11 ASME CODE SECT. II, PART A, ED. 2010	TRATTAMENTO TERMICO / HEAT TREATMENT			FORNO / FURNACE			ORIGINE / ORIGIN OF STEEL
	NORMALIZED AT 920 C - COOLED IN STILL AIR			ELECTRIC FURNACE			EUROPEAN UNION

NOTE 100% MANUFACTURED IN ITALY  
NOTES MANUFACTURING IN ACCORDANCE WITH ORDER AND SPECIFICATION  
MATERIAL IN ACCORDANCE WITH NACE MR-0175/2009 ISO 15156-2009  
MATERIAL IN ACCORDANCE WITH NACE MR-0103/2010

UFFICIO CONTROLLO QUALITA'  
QUALITY CONTROL DEPARTEMENT

ENTE UFFICIALE DI COLLAUDO  
INSPECTION AUTHORITY

MARCHIO PRODUZIONE  
MANUFACTURER'S SYMBOL

S. Corti  
L. Sergio

LESENA QUALITY CONTROL

JOB: 12-32

ITEM: N 4

ACCEPTED DATE: 4/2/13

MFF

(15)

Order#: 274255 Seq. 1 PO#: 32-29 Heat#: 26264 Mill: Ykpanha  
 Part#: P 3 160 S6 S B Part Desc: Pipe 3 (88.9mm O.D.) SCH 160 SMLS A/SA106-B SRL BEVELLED END (438W)

Тип образца Type of specimen			Размеры образца Dimensions of specimen		Ориентация образца Orientation of specimen		
Strip			Ширину, width: ¼" (19.1mm) 1" (25.4 mm) Длина, length: 2" (50.8 mm)		Longitudinal		
№ п.п. No	Номер партии Number of heat	Число партий Number of lot	Прочность PSI (MPa) Tensile strength, PSI (MPa)	Прочность PSI (MPa) Yield strength, PSI (MPa)	Удлинение, % Elongation, %	Твердость по Роквеллу, HRC Hardness, HRC	Спаивание Flattening
1.	26264	3782	82018 (565.5)	57899 (399.2)	36.52	< 22	O.K.
2.	1122819	3817	70731 (487.7)	45935 (316.7)	30.64	< 22	O.K.
3.	1122750	3738	85286 (588.0)	58371 (402.5)	25.20	< 22	O.K.
4.	1122750	3739	72205 (497.9)	48065 (331.4)	30.70	< 22	O.K.
5.	1122393	3393	70062 (483.1)	43266 (298.3)	30.60	< 22	O.K.

№ п.п. No	Номер партии Number of heat	Число партий Number of lot	Размеры образца Dimensions of specimen mm	Мин. работа разрывом, футо-фунт (ФФ) Min. Charpy Energy, Ft.-Lbs. (J)				Температура °F/ °C Temperature °F/°C
				попереч. Transverse		продольн. Longitudinal		
				полноразм. full size	неполноразм. Non-stand.	полноразм. full size	неполноразм. Non-stand.	
Гидростатическое давление, PSI (MPa) Hydrostatic test pressure, PSI (MPa)				Время выдержки, сек Duration, sec				
88.9 x 1.13 - 2500 PSI (17.2 MPa);				min 5 sec				
141.3 x 9.53 - 2800 PSI (19.3 MPa);								
168.3 x 7.11 - 1780 PSI (12.3 MPa).								

Номера труб (пакеты):  
Number of pipes (packages):

88.9 x 1.13 26264 - 1/3 1-23, 2/3 24-46, 3/3 47-52, 1/1 53-55.  
 141.3 x 9.53 1122819 - 1/6 1-14, 2/6 15-28, 3/6 29-42, 4/6 43-56, 5/6 57-65.  
 168.3 x 7.11 1122750 - 5/35 41-50, 12/35 111-120, 16/35 151-156, 20/35 187-196, 21/35 197-206,  
 22/35 207-216, 23/35 217-226, 24/35 227-237, 25/35 238-248.  
 1122393 - 26/35 249-258, 27/35 259-268, 28/35 269-278, 29/35 279-288, 30/35 289-298,  
 31/35 299-308, 32/35 309-311.

Total: 25 packages.

Примечания:

- Note: 1. We hereby certify that above mentioned material has been manufactured, sampled, tested and inspected in accordance with ASTM A106/A106M-2011/ASME SA106-2007/ASTM A53/A53M-2012/ASME SA53-2007/NACE MR 0175-2009/NACE MR 0103-2010 and has been found to meet the requirements and terms of contract.  
 2. Nondestructive ultrasonic test - without remarks.  
 3. Pipes with plastic caps.  
 4. Metal supplier: Oskol Electric Steel Works (26264).  
 Metal supplier: «METALLURGICAL PLANT DNEPRSTAL» Ltd (1122819; 1122750; 1122393).  
 4. Weight of 1 meter is - 88.9 x 11.13 - 21.35 kg.; 14.34 lb/ft.  
 141.3 x 9.53 - 30.97 kg.; 20.80 lb/ft.  
 168.3 x 7.11 - 28.26 kg.; 18.99 lb/ft.

On behalf of Head of Quality Department

N.A. Ryabchuk

17.12.2012.  
Дата/Date

Печать/Stamp

Подпись/Signature

13-P209

LESINA QUALITY CONTROL

JOB: 12-32

ITEM: NY 3" Pipe

ACCEPTED DATE: 05/09/13

SIGNATURE: [Signature]

16

Order#: 274255 Seq: 1 PO#: 32-29 Heat#: 26264 Mill: Ykpanha  
Part#: P 3 160 S6 S B Part Desc: Pipe 3 (88.9mm O.D.) SCH 160 SMLS A/SA106-B SRL BEVELLED END (.438W)

**ИНТЕРПАЙП**  
НТЗ

ОАО "ИНТЕРПАЙП НИЖНЕДНЕПРОВСКИЙ ТРУБОПРОКАТНЫЙ ЗАВОД"  
Украина, г. Днепропетровск, ул. Столетова, 21  
Тел./факс +38 (0562) 34-90-99

Заказчик  
Customer  
Worldmarket Ltd.  
412 Simcha Str., Ramat Gan, Israel

Сертификат № 1058/5  
Certificate №  
MIL'S TEST CERTIFICATE ACC. TO EN 10204-2004/3.1

Контракт № 653090051  
Contract №

Заказ № 721287/101  
Customer order № 12-1287

№ транспортного средства 55174544 /101/  
№ vehicle

Лист 1 Листов 1  
Sheet Sheets

Наименование и код товара Description and code of goods	НД Standard	Термообработка Heat treatment
Seamless steel hot-rolled pipes	ASTM A106/A 106M-2011/ ASME SA106-2007/ ASTM A53/A 53M-2012/ ASME SA53-2007/ NACE MR 0175-2009/ NACE MR 0103-2010	Without heat treatment

Маркировка/ Marking	ИНТЕРПАЙП NTRP	ASTM A106/ASME SA106/ASTM A53/ASME SA53/NACE MR 0175/NACE MR 0103 dimensions pipe B S Tril Pressure NDE length pipe weight pipe heat
------------------------	-------------------	---

PIPE WEIGHTS										
N o. No.	Почер появки Number of heat	Почер партии Number of lot	Марка стали Grade steel	Размеры, дюйм (мм) Dimensions, in. (mm)		Длина фут (м) Length ft. (m)	Метраж, фут (м) Metrage ft. (m)	Кое трюб. шт Q-ty of pipes, etc.	Вет. фута (м) Weight, lb. (t)	
				Диаметр D.D.	Тол. ст. Thk. st.				Gross	Net
B										
Theoretical calculation of the weight										
1.	26264 ✓	3782	"	3.500 (88.9)	0.438 (11.13)	19.69-20.01 (6.0-6.1)	1088.42 (331.78)	55	15674.9 (7.110)	15615.4 (7.083)
2.	1122819	3817	"	3.563 (91.3)	0.375 (9.53)	19.69-20.01 (6.0-6.1)	1287.04 (392.39)	65	26852.3 (12.180)	26784.0 (12.149)
3.	1122750	3738	"	6.625	0.280	19.69-20.01	710.66	36		
4.	1122750	3739	"	"	"	"	1028.74	52		
5.	1122393	3393	"	"	"	"	1246.36	63		
				(168.3)	(7.14)	(6.0-6.1)	2985.76 (910.86)	151	56901.4 (25.810)	56698.5 (25.718)
						Total:	5361.22 (1634.10)	271	99428.6 (45.100)	99097.9 (44.950)

Показатели качества товара Quality characteristics of goods											
Химический состав, массовая доля % Chemical composition, mass fraction %											
№ п.п. No	Почер появки Number of heat	C	Si	Mn	S	P	Cr	Ni	Cu	Mo	V
		x 100	x 100	x 100	x 1000	x 1000	x 100	x 100	x 100	x 1000	x 1000
1.	26264 II	20	24	46	9	6	3	3	5	0	0
	26264 P	20	23	52	4	17	7	10	17	10	5
		20	23	50	4	17	7	9	17	10	5
2.	1122819 II	19	25	54	6	8	8	9	15	10	5
	1122819 P	19	26	55	4	6	7	9	14	10	5
		19	26	55	4	6	8	9	14	10	5
3.	1122750 II	18	26	52	3	10	9	11	16	13	5
	1122750 P	18	23	59	4	10	6	10	19	0	0
		19	23	59	4	10	6	10	19	0	0
4.	1122750 P	18	23	58	4	9	6	10	19	0	0
		18	23	58	3	9	6	10	19	0	0
5.	1122393 II	19	28	57	2	8	7	10	17	10	5
	1122393 P	20	23	51	4	12	3	9	18	0	0
		20	23	52	4	12	3	9	18	0	0

Cr+Cu+Ni+Mo+V ≤ 1 %  
Продолжение на обороте The continuation on the back

**ИНТЕРПАЙП**  
NTRP

ОАО "ИНТЕРПАЙП НИЖНЕДНЕПРОВСКИЙ ТРУБОПРОКАТНЫЙ ЗАВОД"  
UKRAINE, Dnepropetrovsk, 21, Stoleiova str.  
Tel./fax +38 (0562) 34-90-99

11.11.17

13-P-209

LEADING QUALITY CONTROL

JOB: 12-32

ITEM: NY 3" PIPE

RECEIVED DATE: 05/09/13

SIGNATURE: *[Signature]*

16



# INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1B: 1991)

Number / Número: 604314  
Page / Página: 1 / 6  
Date / Día: July 01, 2011

Siderca S.A.I.C.  
Dr Jorge A. Simini 250  
(B2804MHA) Campana  
Buenos Aires, Argentina  
(54) 3489 433100 tel

Customer / Cliente: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Orden Cliente - Item: E1-2118 Rev 1 y 2-00120		Customer's Reference / Ref. del Cliente: N/A		Manufacturer's Works Order N° / Confirmación de venta: 50724/06	
Manufacturing Process / Proceso de Manufactura: SEAMLESS HOT ROLLED		Product Type / Tipo de Producto: CARBON STEEL PIPE-HIGH TEMPERATURE SERV.				Surface / Superficie: INT BARE / EXT VARNISHED	
Standard or Specification / Normas o Especificaciones: ASTM/ASME A/SA106+CSA Z245, 1-07 CAT.1 SSPSP00373/1+NACE MR0175/0103+IPRO LP-006				Steel Grade / Grado de acero: B/290 CAT 1 SS		Ends / Extremos: BEVELLED AT 30 DEG. ASTM	
Dimensions / Dimensiones: 3 1/2 X 0.438 INCH 88.90 X 11.13 MM		Schedule / Cédula: 160 ✓		Length / Longitud: MF 11800 mm		Quantity / Cantidad: 132 Pcs/pz 5078.48 FT 72424 LB 1547.92 MTS 32851 KG	
						Nominal Weight / Peso Nominal: 14.32 LB/FT 21.35 KG/M	

## TENSILE TEST / ENSAYO DE TENSION

Heat N° Colada N°	Sample N° Muestra N°	Zone Zona	Specimen condition Condición de la probeta				Specimen dimensions Dimensiones de la probeta		Test temp Temp. ensayo	Y.S.	U.T.S.	Elongation / Alargamiento		
			Ls	Sc	Type Tipo	Ori	Size Tamaño mm	Area Sección mm2		Eul 0.50 %	Req.	Lo 2"	Min.	Obt.
									Min: 290	Min: 415				
									Max: -	Max: 625				
									°C	mpa	mpa	mm	%	%
✓ 46647	1626285	M	B	AM	Ss	L	18.97 x 11.23	215.26	RT	353	521	50.8	25.0	30.2
46648	1626356	M	B	AM	Ss	L	18.92 x 11.24	214.87	RT	336	518	50.8	25.0	30.9

AM: As manufactured / Según proceso de fabricación	Ls: Location of sample / Ubicación de la muestra	Obt: Obtained / Obtenido	Sc: Specimen condition / Condición de la probeta
B: Body / Cuerpo	M: Middle / Medio	Ori: Orientation / Orientación	Ss: Strip specimen / Muestra rectangular
L: Longitudinal / Longitudinal	Max: Maximum / Máximo	Req: Required / Requerido	U.T.S: Ultimate tensile strength / Resistencia
Lo: Initial length / Longitud inicial	Min: Minimum / Mínimo	RT: Room temperature / Temperatura ambiente	Y.S: Yield strength / Fluencia

## CHEMICAL COMPOSITION / COMPOSICION QUIMICA

		Composition % / Composición %																			
		X 100					X 1000										X 10000				
		C	Mn	Si	Cr	Mo	Al	S	P	Ni	V	Cu	Al	Sn	As	Nb	Ti	Pb	Sb	Co	Zr
Heat N° Colada N°	Sample N° Muestra N°	25	135	50	40	15	--	35	30	400	80	400	--	--	--	110	110	--	--	--	--
		--	29	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lot N° Lote N°	Pipe N° Tubo N°	25	135	50	40	15	--	35	30	400	80	400	--	--	--	110	110	--	--	--	--
		--	29	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
46647		16	112	25	7	2	2	1	15	35	32	94	20	7	4	2	4	1	1	7	20

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

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LESEN QUALITY CONTROL

FOR03171

JOB: STOCK  
ITEM: 3" SCH 160 PIPE  
ACCEPTED DATE: MAR. 26, 2012  
SIGNATURE: [Signature]

12-32 N4



**Tenaris****INSPECTION CERTIFICATE**

(BS EN 10204 3.1: 2004 - ISO 10474 3.1B: 1991)

Number / Número:  
**604314**Page / Página:  
**2 / 6**

Date / Día: July 01, 2011

Siderca S.A.I.C.  
Dr. Jorge A. Slimini 250  
(B2804MHA) Campana  
Buenos Aires, Argentina  
(54) 3489 433100 tel

Customer / Cliente: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Orden Cliente - Item: E1-2118 Rev 1 y 2-00120	Customer's Reference / Ref. del Cliente: N/A	Manufacturer's Works Order N° / Confirmación de venta: 50724/06
Manufacturing Process / Proceso de Manufactura: SEAMLESS HOT ROLLED		Product Type / Tipo de Producto: CARBON STEEL PIPE-HIGH TEMPERATURE SERV.		Surface / Superficie: INT BARE / EXT VARNISHED
Standard or Specification / Normas o Especificaciones: ASTM/ASME A/SA106+CSA Z245.1-07 CAT.J SSPSP00373/1+NACE MR0175/0103+IPRO LP-006			Steel Grade / Grado de acero: B/290 CAT I SS	Ends / Extremos: BEVELLED AT 30 DEG. ASTM
Dimensions / Dimensiones: 3 1/2 X 0.438 INCH 88.90 X 11.13 MM	Schedule / Cédula: 160	Length / Longitud: MF 11800 mm	Quantity / Cantidad: 132 Pcs/pz 5078.48 FT 72424 LB 1547.92 MTS 32851 KG	Nominal Weight / Peso Nominal: 14.32 LB/FT 21.35 KG/M

**CHEMICAL COMPOSITION / COMPOSICIÓN QUÍMICA**

					Composition % / Composición %																												
					x 100						x 1000										x 10000								x 100	x 10000			
					C	Mn	Si	Cr	Mo	Al sol	S	P	Ni	V	Cu	Al	Sn	As	Nb	Ti	Pb	Sb	Co	Zr	Bi	Ca	B	N	Mg	W	Ce.1	F.1	
Heat N° Coleda N°	Sample N° Muestra N°	Lot N° Lote N°	Pipe N° Tubo N°	H	Max	25	135	50	40	15	--	35	30	400	80	400	--	--	--	110	110	--	--	--	--	--	--	10	--	--	--	40	99
				Min	--	29	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Heat N° Coleda N°	Sample N° Muestra N°	Lot N° Lote N°	Pipe N° Tubo N°	P	Max	25	135	50	40	15	--	35	30	400	80	400	--	--	--	110	110	--	--	--	--	--	--	10	--	--	--	40	99
				Min	--	29	10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
46647	1626285	0	2	P	17	111	25	7	2	--	1	11	37	31	85	22	9	4	2	4	2	2	7	20	22	13	2	97	5	100	39	24.3	
46647	1626284	0	1	P	17	110	25	7	2	--	1	12	37	29	83	22	9	3	2	4	1	2	7	20	22	12	2	92	4	100	38	23.9	
46648				H	16	110	25	9	2	3	1	14	29	28	101	28	9	4	1	4	1	1	7	20	22	12	2	87	4	20	37	26.8	
46648	1626356	0	1	P	15	110	25	9	2	--	2	12	32	27	99	30	10	3	2	3	1	2	7	20	22	13	2	84	3	10	37	26.8	
46648	1626357	0	2	P	17	110	26	9	2	--	1	12	30	27	99	32	12	4	2	3	3	2	7	30	22	13	2	84	3	10	39	26.6	

Co.1:	(5'B))	H: Heat / Coleda.	Min: Minimum / Mínimo
C+P((MN/6)+(SI/24)+(CU/15)+(NI/20)+(CR+MO+V+NB)/5+)	F.1: CR+CU+MO+NI+V	Max: Maximum / Máximo	P: Product / Producto

**THROUGH WALL HARDNESS / DUREZA EN EL ESPESOR**

Required values		Individuals / Individuales			Average / Promedio			Hardness type HV10													
Valores requeridos		Min: --	Max: --	Var: --	Min: --	Max: 248.0	Var: --	Tipo de dureza													
Heat N° Colada N°	Sample N° Muestra N°	Zone Zona	Specimen condition		Qued.	OD					MW					ID					Var
			Ls			1	2	3	4	Avg.	1	2	3	4	Avg.	1	2	3	4	Avg.	
46647	1626285	M	B		1	148.0	153.0	146.0	149.0	149.0	145.0	153.0	148.0	151.0	149.3	154.0	150.0	149.0	148.0	150.3	1.3
46648	1626356	M	B		1	147.0	148.0	144.0	138.0	144.3	148.0	143.0	145.0	142.0	144.5	144.0	145.0	143.0	145.0	144.5	0.3

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FOR03171

LESENA QUALITY CONTROL

JOB: **STOCK**  
 ITEM: **3" SCH 160 PIPE**  
 ACCEPTED DATE: **MAR. 26, 2012**  
 SIGNATURE: **JK**

12-32 N4

10-0190

Order#: 187327 Seq: 4 PO#: 03-12 Heat#: 46647 Mill: Siderca  
 Part#: P 3 160 S6 S B Part Desc: Pipe 3 (88.9mm O.D.) SCH 160 SMLS A/SA106-B SRL BEVELLED END (.438W)



# INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1B: 1991)

Number / Número:

604314

Page / Página:

3 / 6

Date / Día: July 01, 2011

Siderca S.A.I.C.  
Dr Jorge A. Simini 250  
(B2804MHA) Campana  
Buenos Aires, Argentina  
(54) 3489 435100 tel

Customer / Cliente: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Orden Cliente - Item: E1-2118 Rev 1 y 2-00120	Customer's Reference / Ref. del Cliente: N/A	Manufacturer's Works Order N° / Continuation de Venta: 50724/06
Manufacturing Process / Proceso de Manufactura: SEAMLESS HOT ROLLED		Product Type / Tipo de Producto: CARBON STEEL PIPE-HIGH TEMPERATURE SERV.		Surface / Superficie: INT BARE /EXT VARNISHED
Standard or Specification / Normas o Especificaciones: ASTM/ASME A/SA106+CSA Z245.1-07 CAT.I SSPSP00373/1+NACE MR0175/0103+HPRO LP-006		Steel Grade / Grado de acero: B/290 CAT I SS		Ends / Extremos: BEVELLED AT 30 DEG. ASTM
Dimensions / Dimensiones: 3 1/2 X 0.438 INCH 88.90 X 11.13 MM	Schedule / Cédula: 160	Length / Longitud: MF 11800 mm	Quantity / Cantidad: 132 Pcs/pz 5078.48 FT 72424 LB 1547.92 MTS 32851 KG	Nominal Weight / Peso Nominal: 14.32 LB/FT 21.35 KG/M

## THROUGH WALL HARDNESS / DUREZA EN EL ESPESOR

Avg. Average / Promedio	Ls: Location of sample / Ubicación de la muestra	Min: Minimum / Mínimo	Quad: Quadrant / Cuadrante
B: Body / Cuerpo	M: Middle / Medio	MW: Middle wall / Centro	Var: Variation / Variación
ID: Internal diameter / Diámetro interno	Max: Maximum / Máximo	OD: Outside diameter / Diámetro externo	

## FLATTENING TEST / ENSAYO DE APLASTAMIENTO

Standard / Norma:			
Heat N° Colada N°	Sample N° Muestra N°	Ls	Result Resultado
46647	1626285	B	Good / Bueno

Standard / Norma:			
Heat N° Colada N°	Sample N° Muestra N°	Ls	Result Resultado
46648	1626356	B	Good / Bueno

B: Body / Cuerpo Ls: Location of sample / Ubicación de la muestra

## HYDROSTATIC TEST / PRUEBA HIDRAULICA

Pressure / Presión		Time / Tiempo	Results / Resultado
Unit / Unidad.	Value / Valor	Seconds / Segundos	
PSI	3,000	5	Satisfactory / Satisfactorio

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Este certificado se emite mediante sistema computarizado y es válido con firma electrónica. El certificado original posee impreso el logo Tenaris color verde. En caso de que el poseedor del certificado entregue una copia, deberá garantizar la conformidad con el original haciéndose responsable por cualquier uso ilegal o indebido. Cualquier alteración y/o falsificación estará sujeta a la ley.

### LESENA QUALITY CONTROL

JOB: STOCK  
ITEM: 3" SCH 160 PIPE  
ACCEPTED DATE: MAR-26-2012  
SIGNATURE:

FOR03171

Order#: 187327 Seq: 4 PO#: 03-12 Heat#: 46647 Mill: Siderca  
Part#: P 3 160 S6 S B Part Desc: Pipe 3 (88.9mm O.D.) SCH 160 SMLS ASA106-B SRL BEVELLED END (438W)



# INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1B: 1991)

Number / Número:

604314

Page / Página:

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Date / Día: July 01, 2011

Siderca S.A.I.C.  
Dr Jorge A. Simón 250  
(B2604MHA) Campana  
Buenos Aires, Argentina  
(54) 3489 433100 tel

Customer / Cliente: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Orden Cliente - Item: E1-2118 Rev 1 y 2-00120	Customer's Reference / Ref. del Cliente: N/A	Manufacturer's Works Order N° / Confirmación de Venta: 50724/06
Manufacturing Process / Proceso de Manufactura: SEAMLESS HOT ROLLED		Product Type / Tipo de Producto: CARBON STEEL PIPE-HIGH TEMPERATURE SERV.		Surface / Superficie: INT BARE /EXT VARNISHED
Standard or Specification / Normas o Especificaciones: ASTM/ASME A/SA106+CSA Z245.1-07 CAT.I SSPSP00373/1+NACE MR0175/0103+IPRO LP-006		Steel Grade / Grado de acero: B/290 CAT I SS		Ends / Extremos: BEVELLED AT 30 DEG. ASTM
Dimensions / Dimensiones: 3 1/2 X 0.438 INCH 88.90 X 11.13 MM	Schedule / Cédula: 160	Length / Longitud: MF 11800 mm	Quantity / Cantidad: 132 Pcs/pz 5078.48 FT 72424 LB 1547.92 MTS 32851 KG	Nominal Weight / Peso Nominal: 14.32 LB/FT 21.35 KG/M

## SPECIAL REQUIREMENTS / REQUERIMIENTOS ESPECIALES

Condition / Condición	Description / Descripción
Pipe residual magnetism / Magnetismo remanente de tubo	30 GAUSS
End protectors / Protector de extremo	NON LIFTABLE CLOSED PLASTIC PROTECTOR FOR FLAT / BEVELED PIPE. SUPPLIER METALCENTRO.

## SUPPLEMENTARY INFORMATION / INFORMACION SUPLEMENTARIA

Supplementary Information Información Suplementaria	Supplementary Information Información Suplementaria
<p>*MANUFACTURED BY TENARIS SIDERCA*</p> <p>*ACIERAGE PROCESS*</p> <p>STEEL MAKING PROCESS: E.A.F./L.F. AND CONTINUOUS CASTING - FULL ALUMINIUM KILLED AND FINE GRAIN PRACTICE.</p> <p>-THE LF PRACTICE INCLUDES ARGON RINSE AND A FINAL INJECTION OF CALCIUM SILICIDE WIRE FOR MICROINCLUSION SHAPE CONTROL.</p> <p>-MATERIAL FREE FROM MERCURY CONTAMINATION.</p> <p>*ROLLING PROCESS*</p> <p>-MANUFACTURING PROCESS: SEAMLESS HOT ROLLED.</p> <p>*CONTROLS*</p> <p>-VISUAL AND DIMENSIONAL INSPECTION: SATISFACTORY.</p> <p>*MATERIAL CONDITIONS*</p> <p>-NOT REPAIRED BY WELDING.</p> <p>*MATERIAL PROPERTIES*</p> <p>-MATERIAL COMPLIES WITH NACE MR 0103.</p> <p>-HARDNESS ACCORDING TO NACE MR-01-75/ ISO-15156-2.</p> <p>-MATERIAL COMPLIES WITH CSA Z245.1.07 GR 290 CAT II SS.</p>	<p>*FABRICADO POR TENARIS SIDERCA*</p> <p>*PROCESO DE ACERACIÓN*</p> <p>FABRICACIÓN DE ACERO: FUNDICIÓN POR ARCO ELECTRICO Y COLADO CONTINUO - ACERO CALMADO AL ALUMINIO.</p> <p>-LA PRÁCTICA DE AFINO EN EL HORNO - CUCHARA INCLUYE AGITACION POR ARGON Y UNA INYECCIÓN FINAL DE UNA VARILLA DE SILICIO DE CALCIO PARA OBTENER UNA FORMA GLOBULAR DE EVENTUALES MICROINCLUSIONES.</p> <p>-MATERIAL LIBRE DE CONTAMINACIÓN DE MERCURIO.</p> <p>*PROCESO DE LAMINACIÓN*</p> <p>-FABRICACIÓN DE TUBO: LAMINADO EN CALIENTE Y SIN COSTURA.</p> <p>*CONTROLES*</p> <p>-CONTROL VISUAL Y DIMENSIONAL: SATISFACTARIO.</p> <p>*CONDICIONES DEL MATERIAL*</p> <p>-NO REPARADO POR SOLDADURA.</p> <p>*PROPIEDADES DEL MATERIAL*</p> <p>-EL MATERIAL CUMPLE CON LOS REQUERIMIENTOS NACE MR 0103.</p> <p>-LA DUREZA CUMPLE CON LA NACE MR-01-75/ISO-15156-2.</p> <p>-EL MATERIAL CUMPLE CON LOS REQUERIMIENTOS CSA Z245.1.07 GR 290 CAT II SS.</p>

This certificate is issued by a computerized system and it is valid with electronic signature. The original certificate has a green colored "Tenaris" stamp. In case the owner of the original certificate would release a copy, he must attest its conformity to the original by taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Este certificado se emite mediante sistema computarizado y es válido con firma electrónica. El certificado original posee impreso el logo Tenaris color verde. En caso de que el poseedor del certificado entregue una copia, deberá garantizarla conformidad con el original haciéndose responsable por cualquier uso ilegal o indebido. Cualquier alteración y/o falsificación estará sujeta a la ley.

ACCEPTABLE TO  
ASME  
REQUIREMENTS

12-32 N4

12-P192

### LESENA QUALITY CONTROL

JOB: STOCK  
ITEM: 3" SCH 160 PIPE  
ACCEPTED DATE: MAR. 26, 2012  
SIGNATURE: [Signature]

FOR03171

Order#: 187327 Seq: 4 PO#: 03-12 Heat#: 46647 Mill: Siderca  
Part#: P 3 160 S6 S B Part Desc: Pipe 3 (88.9mm O.D.) SCH 160 SMLS A/SA106-B SRL BEVELLED END (.438W)



# INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1B: 1991)

Number / Número:

604314

Page / Página:

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Date / Día: July 01, 2011

Siderca S.A.I.C.  
Dr Jorge A. Simini 250  
(B2804MHA) Campana  
Buenos Aires, Argentina  
(54) 3488 433100 (a)

Customer / Cliente: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Orden Cliente - Item: E1-2118 Rev 1 y 2-00120		Customer's Reference / Ref. del Cliente: N/A		Manufacturer's Works Order N° / Confirmación de Venta: 50724/06					
Manufacturing Process / Proceso de Manufactura: SEAMLESS HOT ROLLED		Product Type / Tipo de Producto: CARBON STEEL PIPE-HIGH TEMPERATURE SERV.				Surface / Superficie: INT BARE /EXT VARNISHED					
Standard or Specification / Normas o Especificaciones: ASTM/ASME A/SA106+CSA Z245.1-07 CAT.I SSPSP00373/1+NACE MR0175/0103+IPRO LP-006				Steel Grade / Grado de acero: B/290 CAT I SS		Ends / Extremos: BEVELLED AT 30 DEG. ASTM					
Dimensions / Dimensiones: 3 1/2 X 0.438 INCH 88.90 X 11.13 MM		Schedule / Cédula: 160		Length / Longitud: MF 11800 mm		Quantity / Cantidad: 132 Pcs/pz 5078.48 FT 1547.92 MTS		Nominal Weight / Peso Nominal: 72424 LB 32851 KG		Ends / Extremos: BEVELLED AT 30 DEG. ASTM	

## SUPPLEMENTARY INFORMATION / INFORMACION SUPLEMENTARIA

Supplementary Information Información Suplementaria			
*STANDARDS* - EDITION OF REGULATION: ASTM A 106/A 106M-2010 - EDITION REGULATION: ASME SA 106/ 2007 - EDITION OF REGULATION: NACE MR-01.75 LATEST EDITION - EDITION OF REGULATION: NACE MR-01.03 EDITION 2007 - EDITION OF REGULATION : CSA Z245 : 2007		*NORMAS* - EDICIÓN DE LA NORMA: ASTM A 106/A 106M-2010 - EDICIÓN DE LA NORMA: ASME SA 106/ 2007 - EDICIÓN DE LA NORMA: NACE MR-01-75 ULTIMA EDICIÓN - EDICIÓN DE LA NORMA: NACE MR-01-03 EDICION 2007 - EDICIÓN DE LA NORMA : CSAZ245: 2007	
Additional Information Información Adicional		Additional Information Información Adicional	
HEAT TREATMENT: AS ROLLED. NON DESTRUCTIVE TEST: SATISFACTORY. INSPECTION METHODS: E.M.I. LONG. (EXT.) NOTCH 5% + E.M.I. LONG. (INT.) NOTCH 10% + E.M.I. TRANS.		(EXT./INT.) NOTCH 10% + M.P.I. LONG/TRANS. (EXT./INT.) ON ENDS + W.M.P.I. ON BISELES. ONE BLUE BAND. (RAL 5003) ON EACH END.	

## MARKING / MARCACION

Marking Marcación		Marking Marcación	
- & = Monograma / Monogram SIDERCA - NNNNN = Número de tubo / Nbr of pipe - LLL = Longitud / length - PPP = Peso / Weight		- @ = Monograma / Monogram API - MM.YY = Mes / Año - Month / Year - Y/T = Año / Trimestre - Year / Quarter - HNNXXXX = Colada / Heat	

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration under falsification is subject to the law.

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ACCEPTABLE TO  
PIPE  
TENSILE STRENGTHS  
12-32 N4

LESENA  
JOB: STOCK  
ITEM: 3" SCH 160 PIPE  
ACCEPTED DATE: MAR. 26, 2012  
SIGNATURE: [Signature]  
00102-12 5/6

FOR03171

Order#: 187327 Seq: 4 PO#: 03-12 Heat#: 46647 Mill: Siderca  
Part#: P 3 160 S6 S B Part Desc: Pipe 3 (88.9mm O.D.) SCH 160 SMLS ASA106-B SRL BEVELLED END (.438W)



# INSPECTION CERTIFICATE

(BS EN 10204 3.1: 2004 - ISO 10474 3.1B: 1991)

Number / Número:

604314

Page / Página:

6 / 6

Date / Día: July 01, 2011

Siderca S.A.I.C.  
Dr Jorge A. Simini 250  
(B2804MHA) Campana  
Buenos Aires, Argentina  
(54) 3489 433100 tel

Customer / Cliente: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Orden Cliente - Item: E1-2118 Rev 1 y 2-00120		Customer's Reference / Ref. del Cliente: N/A		Manufacturer's Works Order N° / Confirmación de venta: 50724/06	
Manufacturing Process / Proceso de Manufactura: SEAMLESS HOT ROLLED		Product Type / Tipo de Producto: CARBON STEEL PIPE-HIGH TEMPERATURE SERV.		Surface / Superficie: INT BARE /EXT VARNISHED			
Standard or Specification / Normas o Especificaciones: ASTM/ASME A/SA106+CSA Z245.1-07 CAT.I SSP00373/1+NACE MR0175/0103+IPRO LP-006		Steel Grade / Grado de acero: B/290 CAT I SS		Ends / Extremos: BEVELLED AT 30 DEG. ASTM			
Dimensions / Dimensiones: 3 1/2 X 0.438 INCH 88.90 X 11.13 MM		Schedule / Cédula: 160		Length / Longitud: MF 11800 mm		Quantity / Cantidad: 132 Pcs/pz 5078.48 FT 72424 LB 1547.92 MTS 32851 KG	
				Nominal Weight / Peso Nominal: 14.32 LB/FT 21.35 KG/M			

## MARKING / MARCACION

Stencilling (Pipe) Estercido (Tubo)	Stencilling (Pipe) Estercido (Tubo)
TENARIS SD MM.YY ASTM/ASME A/SA106 88,9 11,13 21,34 3 SCH160 B/290 CATI SS SEAMLESS 207KPAX100 NDE	CSA Z245.1-07 CUSTOMER PO E1-2118 REV 1 Y 2 MADE IN ARGENTINA HNXXXX NNNNN LLLL PPPPP

This is to certify that the product described here has been manufactured, sampled, tested, and inspected in accordance with purchaser order requirements. This certificate is not a declaration of origin nor may it be used as a declaration of origin.

Por el presente certificamos que el material aquí descrito ha sido fabricado, muestreado, ensayado e inspeccionado de acuerdo a los requisitos de su orden de compra. Este certificado no es, ni puede ser usado, como una declaración de origen.

CUSTOMER, THIRD PARTY		TENARIS QUALITY DEPARTMENT SIGNATURE	
INSPECTION COMPANY COMPAÑIA DE INSPECCION  Company Name: N/A Employee Name: N/A		 QUALITY CERTIFICATION DEPT. DEPTO. DE CERTIFICACIÓN DE CALIDAD PAOLINA Soledad	 CHIEF OF QUALITY CERTIFICATION DEPT. RESPONSABLE DEL DEPTO. DE CERTIFICACIÓN DE CALIDAD AYERBE Eduardo

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subject to the law.

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LESENA QUALITY CONTROL

FOR03171

JOB: STOCK  
ITEM: 3" SCH160 PIPE  
ACCEPTED DATE: MAR. 26, 2012  
SIGNATURE:

12-32 N4



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2012/12/15	Shipment No. & Date.: 1000022861 2013/01/02	TC No., Date & Time : ESA-37980 2013/01/02 - 18:11:54													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000022861 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 14008 (265)													
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs						
0.5000 " x 120.000 " x 480.00 "	AB6375	2259P3-03	16,336 LB	2	0.5000 " x 120.000 " x 480.00 "	AB6376	2259P3-53	16,336 LB	2						
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
2259P3*	0.19	1.10	0.009	0.005	0.330	0.04	0.15	0.04	0.01	0.034	0.000	0.015	0.0002	0.003	0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
2259P3	AB6375	166"	ALG	0.5000	NORM	B	HBW	155							
2259P3	AB6376	166"	ALG	0.5000	NORM	B	HBW	153							

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES LESENA QUALITY CONTROL

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Date: 2013/01/02 Time: 18:11:54 Page no: 1 of 2

JOB: 12-32  
ITEM: N4 Repad  
ACCEPTED DATE: 4/2/13  
SIGNATURE: [Signature]



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2012/12/15	Shipment No. & Date.: 1000022861 2013/01/02	TC No., Date & Time : ESA-37980 2013/01/02 - 18:11:54
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000022861 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 14008 (265)
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
***** MECHANICAL PROPERTIES *****		
Impact Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC SIZE TEMP(°F) ENERGY(ft-lbf) ENERGY AVG(ft-lbf)
2259P3	AB6376	166" ALG 0.5000 NORM CVN L B FULL -50 110 196 101 136
2259P3	AB6375	166" ALG 0.5000 NORM CVN L B FULL -50 115 106 118 113
Tensile Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC YIELD(KSI) TENSILE(KSI) EL SCALE ELONG(%)
2259P3	AB6376	166" ALG 0.5000 NORM .2 T B 52.5 74.5 8" 26
2259P3	AB6375	166" ALG 0.5000 NORM .2 T B 53.5 74.5 8" 27

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL	
SOB: 12-32	ITEM: N4
ACCEPTED DATE: 4/2/13	SIGNATURE: [Signature]

# RUUKKI

## VASTAANOTTOTODISTUS INSPECTION CERTIFICATE

EN 10 204-3.1 (2004)

4/10

A 27492 -001 -  
30.10.2012

Tilaaaja Purchaser OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Tilaus nro Order No. TO-9392		Vastaanottaja Consignee OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Asiakkaan merkki Shipping mark		Päivämäärä Date 28.11.2012 Valmistajan merkki Mark of the Manufacturer	
Tilausvahvistus Order Confirmation 27492					

Todistus Certificate 31		Laatuvaraus Shipping EDENBORG		Laatuvaraus Quality Stamping SA516GR70MTLV		Tarkastajan leima Stamp of Inspector Vastaanottajan leima Stamp of Surveyor Muut leimaukset Other Stamps	
Toimitustyyppi Delivery type TOTAL DELIVERY		Sulatus nro levy nro Cast No. Plate No. XXXXX XXX XX XXX		Toleranssit Tolerances ASME SA-20, 2011A		Tekniset vaatimukset ja/tai viralliset määräykset Technical terms of Delivery and/or Official Regulations	

Tuote Product HEAVY PLATES Laji Grade SA516 GR 70 MTLV ASME SA516-11A/ASTM A516-10 Laatuselvitys Quality Specifications PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20							
--	--	--	--	--	--	--	--

Positio Item	Mitat mm Dimensions mm	Merkki Mark	Kpl Pcs	Paino kg Weight kg	Sulatus levy nro Cast plate No	SP nro SP No	UT	MT
-----------------	---------------------------	----------------	------------	-----------------------	-----------------------------------	-----------------	----	----

### NORMALIZED STEEL PLATES

#### SURFACE CONDITION EN 10 163-2:2005 CLASS B3

011	44.45 X 3048	X	7315	1	3/4X120X288 OMS PO 9392	1	7780	57746	031	031
011	44.45 X 3048	X	7315	1		1	7780	57746	032	032

#### SURFACE CONDITION EN 10 163-2:2005 CLASS B3

012	50.80 X 3048	X	7315	2X120X288 OMS PO 9392	1	8891	56889	041	041
012	50.80 X 3048	X	7315		1	8891	56889	049	049

#### VACUUM DEGASSED

#### SURFACE CONDITION EN 10 163-2:2005 CLASS B3

013	63.50 X 3048	X	7315	2	1/2X120X288 OMS PO 9392	1	11114	58352	031	031
013	63.50 X 3048	X	7315			1	11114	58352	032	032

#### VACUUM DEGASSED

#### SURFACE CONDITION EN 10 163-2:2005 CLASS B3

014	76.20 X 2590	X	6147	3X102X242 OMS PO 9392	1	9526	58529	021	021
014	76.20 X 2590	X	6147		1	9526	58529	022	022


#### VACUUM DEGASSED

#### SURFACE CONDITION EN 10 163-2:2005 CLASS B3

015	88.90 X 2590	X	6147	3	1/2X102X242 OMS PO 9392	1	11114	58141	021	021
015	88.90 X 2590	X	6147			1	11114	58141	022	022

*	10	96850
**	62	318416
***	62	318416

### LESENA QUALITY CONTROL

JOB: 12-32  
 ITEM: SG1A, SG1B  
 ACCEPTED DATE: 4/3/13  
 SIGNATURE: 

18

### Raabe Steel Works

Testaus ja tarkastus Testing and Inspection



JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
 Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O Box 93  
 FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
 +358 20 5911

Telekopio Telefax: 020 592 2736  
 +358 20 592 2736

Y-tunnus Business ID: 2389445-7

Tämä on sähköinen kopio alkuperäisestä asiakirjasta.  
 This is an electronic copy of the original document.



# RUUKKI

## AINESTODISTUS TEST REPORT

EN 10 204-3.1 (2004)

8/10  
A 27492 -001  
30.10.2012

Tilaaaja Purchaser  
OLBERT METAL SALES LIMITED  
SUITE 305

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
SUITE 305  
Asiakkaan merkki Shipping mark

Päivämäärä Date  
28.11.2012 LV  
Valmistajan merkki  
Mark of the Manufacturer

Tilaus nro Order No.

TO-9392

Laji Grade  
SA516 GR 70 MTLTV

Lisävaatimukset Additional requirements

Jatkuvavalettua happiterästä  
Oxygen steel, continuous casting

Laatuselvitys Quality Specifications

PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

Fully killed, Fine grain practiced

N 920C, T=1.1(MIN)XTHICKN(MM)

Pos. Item	Sulatus, kera nro Cast. test No	T-tila Cond	Tensile test																Taivutuskoee Bend test		Huom Nb	Päästö Tempering				
			K2	F	RP02 KSI	RT05 KSI	REL KSI	REH KSI	RM KSI			A %			REH / RM	RM * A5	RAZ %			Keskiarvo Average			K5	D = X t		
011	57746	031	N	J1	46					74																
011	57746	032	N	J1	47					74																
012	56889	041	N	J1	45					73																
012	56889	049	N	J1	45					73																
013	58352	031	N	J1	47					74																
013	58352	032	N	J1	46					75																
014	58529	021	N	J1	44					73																
014	58529	022	N	J1	45					74																
015	58141	021	N	J1	44					73																
015	58141	022	N	J1	42					74																

K2: J1=BOTTOM,TRANSV.

N=NORMALIZED

Pos. Item	Sulatus k. erä nro Cast. test No	Iskukoe Impact test							Sitkeämurtuma Ductile fracture				Erikoiskokeet Special tests					Huom Nb	Päästö Tempering F
		K3	F	1	2	3	Keskiarvo Average	1	2	3	Keskiarvo Average	K4	F	1	2	Keskiarvo Average			
011	57746	031	1B1	-040	50	44	64	52											
011	57746	032	1B1	-040	62	44	60	55											
012	56889	041	1B1	-040	38	55	24	39											
012	56889	049	1B1	-040	46	49	42	46											
013	58352	031	1B1	-031	43	63	63	56											
013	58352	032	1B1	-031	45	61	39	49											
014	58529	021	1B1	-031	47	16	42	35											
014	58529	022	1B1	-031	60	61	48	56											
015	58141	021	1B1	-020	38	40	14	31											
015	58141	022	1B1	-020	46	36	38	40											

K3: 1B1=CH-V/ISO-V(J),10X10,BOTTOM T/4, LONGIT.

### LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: SG1A, SG1B  
ACCEPTED DATE: 4/3/13  
SIGNATURE: *[Signature]*

18

### Raabe Steel Works

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and Inspection

*[Signature]*

JAAKKO JUUSO

Vaiuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O Box 93  
FIN-92101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

RTX/7

# RUUKKI

## ANALYYSITODISTUS ANALYSIS CERTIFICATE ANALYSEBESCHEINIGUNG COMPOSITIO CHIMIQUE CERTIFICAT СЕРТИФИКАТ АНАЛИЗА

10/10  
A 27492 -001  
30.10.2012 -

Sulatus nro Cast No Schmelzen Nr. No de couléen № Плавки	Koe nro Test No Prüf Nr. Essai No № Проба	Positiio Item Pos. Poste Поз.	Cekv Ceq Câq Cég Cekv	Analys % Chemical composition % Chemisch Zusammensetzung % Composition Chimique % Анализ плавки % (*=ppm)																Päivämäärä Date Datum Date Data 28.11.2012	LV
					C	SI	MN	P	S	AL	NB	V	TI	CU	CR	NI	MO	B	ZR		
57746		011	.41	.204	.38	1.14	.013	.003	.047	.016	.008	.004	.011	0.05	0.04	.004	.0003	.001			
56889		012	.41	.209	.37	1.14	.012	.001	.040	.016	.012	.005	.010	0.04	0.04	.003	.0003	.001			
58352		013	.43	.218	.36	1.14	.012	.001	.037	.015	.014	.004	.011	0.05	0.04	.004	.0003	.001			
58529		014	.41	.208	.35	1.12	.011	.002	.038	.016	.009	.005	.012	0.05	0.04	.008	.0003	.000			
58141		015	.40	.208	.36	1.10	.008	.001	.039	.015	.011	.005	.014	0.04	0.04	.003	.0003	.000			

CEQ=C+MN/6+(CR+MO+V)/5+(NI+CU)/15

Raahe Steel Works

Testaus ja tarkastus  
Prüfung und Kontrolle  
Testing and Inspection  
Essais et Contrôle  
Испытание и контроль качества

*Jaakko Juuso*

JAAKKO JUUSO

Valtuutettu tarkastaja  
Sachverständiger  
Authorized inspection representative  
Inspektor autorisé  
Уполномоченный инспектор

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI  
Osasto Address: PL 93, P.O. Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Tefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: SG1A, SG1B  
ACCEPTED DATE: 4/3/13  
SIGNATURE: *AV*

Steel manufactured and supplied by Rautaruukki is free from radiation.  
Производимая на металлургическом комбинате «Рантаурукки» и поставляемая заказчику сталь не излучает радиации.

18

**NUCOR**P.O. Box 278  
Winton, NC 27986  
(252) 356-3700**Mill Test Report**

Page 5

**NUCOR**  
It's our Nature.

Issuing Date: 11/19/2012

B/L No.: 341438

Load No.: 343583

Our Order No.: 105931/7

Cust. Order No.: N 80313

Vehicle No: NOKL 725339

Sold To: SAMUEL PLATE SALES  
12 TEAL AVENUE  
STONEY CREEK  
HAMILTON, ON L8P4Z3Ship To: SAMUEL PLATE SALES C/O STEEL  
CASE  
(HAMILTON TR, ON) STATION 3477  
HAMILTON TFR, ON L8W3N1

Specification: 1.0000" x 120.000" x 488.000"

ASTM A516 70-10/ASME SA516 70 SA516-485 PVQ 2011 Addenda

Marking:

Heat No	C	Mn	P	S	Si	Cu	NI	Cr	Mo	Al	V	Nb	Ti	N	Ca	B	Sn	CEQ	PCN
2507851	0.20	1.02	0.008	0.004	0.21	0.27	0.08	0.08	0.03	0.029	0.008	0.002	0.002		0.0015	0.0002	0.010	0.42	0.28

Tensile Test								Charpy Impacts											
Plate Serial No	Pieces	Yours	Dir.	(psi) Yield	(psi) Tensile	Elongation % in 2"	Elongation % in 8"	Dir.	1	(ft) shear	2	(ft) shear	3	(ft) shear	Ave.	(ft) shear	Shear	Temp	2ft Ave.
2507851-01	1	8.16	T	53,700	79,600		23.8												

NADE BR0175 ANNEX 2.12, MRS103 212 COMPLIANT

**LESENA QUALITY CONTROL**

JOB: 12-32

ITEM: 561A, 561B

ACCEPTED DATE: 4/3/13

SIGNATURE: *AW*

Manufactured to fully filled fine grain practice by Electric Arc Furnace. Working or weld repair was not performed on this material.  
Mercury has not been used in the direct manufacturing of this material. Produced as continuous cast discrete plate as-rolled, unless otherwise noted in Specification.

Yield by 0.2% EL method unless otherwise specified. Ceq = C+(Mn/16)+(Cr+Mo+V/5)+(Cu+Ni/10)

Pcm = C/(B+C)+0.0025\*(C+Mn/10)+0.0025\*(Cr+Mo+V/5)+0.0025\*(Cu+Ni/10)+0.0025

Produced and manufactured in the USA, ISO 9001:2008 certified (N000063) by SRI Quality System Registrar (R0185-05). PED 97/23/EC 722 Annex 1, Para. 4.3 Compliant.  
DIN 50049 3.1.8/EN 10204 3.1/2004, DIN EN 10204 3.1(2008) compliant. For ABS grades only, Quality Assurance certificate 08-MWPCA-546

We hereby certify that the contents of this report are accurate and correct. All test results and operations performed by the material manufacturer are in compliance with the applicable specifications, including customer specifications.

*T. A. Degreffe*  
T. A. Degreffe, Metallurgist

11/20/2012 8:08:17 AM

Feb 21, 2013 11:39 AM

No. 6/10 P. 4



**ST&H CORPORATION**  
411-3 Shinwol-ri, Jinryemyun, Gimhae-si Gyeongnam, Korea  
Tel: 82.51.744-4680(5 line) Fax: 82.51.744-4670  
E-mail: stcorp@kornet.net

# CERTIFICATE OF INSPECTION & TEST

(EN 10204 3.1)

Certified to ISO9001:2008, ISO14001:2004, PED97/23/EC by LRQA

Certified API Spec Q1 and API Spec 6A (Licence No : 6A-1284)

ORIGINAL



CE  
SPE 020201/01

Customer : COMCO PIPE & SUPPLY CO						Contract No. : G1-3758						Report No : MHJ7706		Date: DEC.26.2012	
Spec. For Material : ASTM/ASME A/SA105N-11(NACE MR-0175)														Heat Treatment	
Chemical Composition (%)		C	Si	Mn	P	S	Ni	Cr	Mo	Cu	V	Nb	910°C NORMALIZED & A.C		
Heat No.	MAX	0.350	0.350	1.050	0.035	0.040	0.400	0.300	0.120	0.400	0.080				
	MIN		0.100	0.600											
B4505		0.230	0.210	0.930	0.009	0.006	0.012	0.158	0.018	0.010	0.003		Dimensional Inspection		
Tension Test						Charpy Impact Test (10x10 mm Specimen Size)				Hardness Test (HB)		Bending Test 90:120(180°)		ANSI B16.5 - 2009  GOOD	
Size of Specimen(mm)		Yield Strength MPa	Tensile Strength MPa	Elongation %	Red of Area %	Individual		Average		Notch Type	Temp	187	90:120(180°)		
Dia	Gage Length					min	min								
12.5	50	MAX				Test Result									
		MIN	250.000	485.000	22.000	30.000	①	②	③	Average					
12.5	50		375.000	575.000	37.500	62.000						146, 150			
ITEM / SIZE		Q'TY		ITEM / SIZE		Q'TY		ITEM / SIZE		Q'TY		Ultrasonic Examination			
150LBS WNFF XH 24"		12		BLANK				BLANK				N/A			
150LBS BLFF 24"		12										Magnetic Particle Examination			
150LBS BLRF 24"		30										N/A			
150LBS WNRF XH 24"		14										Remarks : **CE = 0.42 (LONG FORMULAR)			
150LBS WNRF STD 24"		20													

NOTE :  
1MPa = 145.037 psi  
1MPa = 0.145037 ksi  
1psi = 0.006895 MPa  
1ksi = 6.89476 MPa  
W.C:Water Cool O.C:Oil Cool  
A.C:Air Cool N.A:Non Action  
N:Normalized A:Annealed  
Q.T:Quenched and Tempered  
N.T:Normalized and Tempered

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

*[Signature]*



Witnessed by/ K. S. KIM

Manager of Q.A Dept/ H. J. LEE

ST-801-14-00

LESENA QUALITY CONTROL

JOB: 12-32

ITEM: M2

ACCEPTED DATE: 4/2/13

30 20

ST&H CORPORATION



UNITED STATES STEEL

TUBULAR PRODUCTS  
CERTIFIED TEST REPORT

(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 11/17/11  
TIME: 04:46:59  
SERIAL NO: L0038461

MILL ORDER/ITEM NO DA00223 02	SHIPPER'S NO. T11580	P.O. NUMBER G1-2590	VEHICLE ID 8018PC ON
SOLD TO ADDRESS U S STEEL TUBULAR PRODUCTS CANADA C/O COMCO PIPE & SUPPLY CO 333 7TH AVE SW STE 2150 PO BOX 457 CALGARY AB T2C 2Z1		MAIL TO ADDRESS U S STEEL TUBULAR PRODUCTS CANADA C/O COMCO PIPE & SUPPLY CO 333 7TH AVE SW STE 2150 PO BOX 457 CALGARY AB T2C 2Z1	
VENDOR USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055			

## SPECIFICATION AND GRADE

PIPE CARBON SMLS STD PIPE ASTM A106-\*08 GRADE B ASME SA106-\*2010 EDITION GRADE B ASTM A53-\*07 GRADE B  
ASME SA53-\*2010 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS  
OF NACE STANDARD MR-01-75 \*-2003/COR.1:2005 AND MR0103-2007

MATERIAL COND: AS ROLLED				O.D.: 24.000 (609.600)				In (mm)		WALL: 0.500 (12.700)		In (mm)			
PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD		EXT % .50	TENSILE		Y/T	ELONG % (IN 2" )		HARDNESS SCALE: HRB		MIN HYDRO PSI	DWELL (SEC)
				MIN: 40000			MIN: 70000	MAX:		MIN:	MAX:				
MA3234	STRIP/L/B	AR	1.500	49900	.50		77000	0.65		29.5	MIN: 66.0	MAX: 99.5	1000	5	
		**	END OF DATA THIS SHEET **												

LEGEND:		L- LONGITUDINAL U-UPSET				T- TRANSVERSE NM -NORMALIZED				QT- QUENCH & TEMPERED SR- STRESS RELIEVED				AR- AS ROLLED TR- THERMOMECHANICAL ROLLED				B- BODY				W- WELD			
PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO						CE*		
																							MAX .50		
MA3234	HEAT	.20	1.05	0.13	0.02	.21	.11	.06	.08	.02	.027		.03	0.003	.002	.001							.41		
MA3234	PROD	.18	1.07	0.12	0.01	.21	.11	.06	.08	.02	.032		.03	0.003	.001	.001							.39		
MA3234	PROD	.20	1.06	0.14	0.02	.21	.10	.06	.08	.02	.033		.04	0.004	.003	.002							.42		
** END OF DATA THIS SHEET **																									
*C.E. IS BASED ON THE FOLLOWING EQUATION(S): $CE=C+(MN/6)+(CR+MO+V)/5+(NI+CU)/15$																									

\*C.E. IS BASED ON THE FOLLOWING EQUATION(S):  $CE = C + (MN/6) + (CR+MO+V)/5 + (NI+CU)/15$ 

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT. ELEMENTS REPORTED IN MASS FRACTION (%)

LESENA QUALITY CONTROL

PAGE 1 OF 2

JOB:

ITEM:

stock  
24" x H - 1/2 in

LESENA STEEL

ACCEPTABLE TO  
ASME  
REQUIREMENTS

13-P207

22 32

Order#: 262621 Seq: 1 PO#: 32-22233-21 Heat#: MA3234 Mill: U.S. Steel  
Part#: P 24 XS S6 S B Part Desc: Pipe 24 (609.6mm O.D.) EXTRA HEAVY SMLS A5A106-B SRL BEVELLED END (.500W)



UNITED STATES STEEL

**TUBULAR PRODUCTS**  
**CERTIFIED TEST REPORT**  
 (IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 11/17/11  
 TIME: 04:46:59  
 SERIAL NO: L0038461

MILL ORDER/ITEM NO <b>DA00223 02</b>		SHIPPERS NO. <b>T11580</b>		P.O. NUMBER <b>G1-2590</b>		0010857												
MATERIAL COND: <b>AS ROLLED</b>				O.D.: <b>24.000 (609.600)</b>				WALL: <b>0.500 (12.700)</b>				In (mm)						
PRODUCT IDENTIFICATION		FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING												
						DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS				% SHEAR			
											1	2	3	AVG	1	2	3	AVG
<b>MA3234</b>		<b>OK</b>				<b>DEG</b>												
<b>** END OF DATA THIS SHEET **</b>																		
LEGEND      L - LONGITUDINAL      T - TRANSVERSE      B - BODY      W - WELD      HAZ - HEAT AFFECTED ZONE																		
TESTING / INSPECTION INFORMATION																		
TEST / INSPECTION										YES		RESULTS / COMMENTS						
FULL LENGTH VISUAL										X								
FULL LENGTH EMI										X		OD <u>  X  </u> OD/ID <u>      </u> L <u>  X  </u> LT <u>      </u> 10.0% NOTCH						
FULL LENGTH MPI																		
FULL LENGTH UT												ID <u>      </u> OD/ID <u>      </u> L <u>      </u> LT <u>      </u>						
END AREA INSPECTION (PLAIN END)										MPI <u>      </u> UT <u>      </u>								
SPECIAL END AREA (SEA) INSP										MPI <u>      </u> UT <u>      </u>								
FULL LENGTH DRIFT												DRIFT MANDREL SIZE: <u>      </u>						
ADDITIONAL NOTES/COMMENTS																		
MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT. PRODUCT WAS HOT ROLLED AND HOT FINISHED PIPE ALSO MEET THE REQUIREMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C																		

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: **R. HARRIS - MANAGER, Q.A.**

DATE 11/17/11

**LESENA STEEL**

ACCEPTABLE TO  
**ASME**  
 REQUIREMENTS

13-P207

(22) (32)

**LESENA QUALITY CONTROL**

JOB: *Stock*

ITEM: *24" X 4*

ACCEPTED DATE

PAGE 2 OF 2

Order#: 262621 Seq: 1 PO#: 32-22/33-21 Heat#: MA3234 Mill: U.S. Steel  
 Part#: P 24 XS S6 S B Part Desc: Pipe 24 (609.6mm O.D.) EXTRA HEAVY SMLS A/SA106-B SRL BEVELLED END (.500W)

Order#: 262621 Seq: 3 PO#: 32-22/33-21 Heat#: MA3234 Mill: U.S. Steel  
 Part#: PC 24 XS S6 5 Part Desc: Crop Pipe 24 XS SMLS SAA106-B 5



UNITED STATES STEEL

TUBULAR PRODUCTS  
 CERTIFIED TEST REPORT  
 (IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 11/17/11  
 TIME: 04:46:59  
 SERIAL NO: L0038461

MILL ORDER/ITEM NO DA00223 02		SHIPPER'S NO. T11580		P.O. NUMBER G1-2590		VEHICLE ID 8018PC ON																			
SOLD TO ADDRESS U S STEEL TUBULAR PRODUCTS CANADA C/O COMCO PIPE & SUPPLY CO 333 7TH AVE SW STE 2150 PO BOX 457 CALGARY AB T2C 2Z1				MAIL TO ADDRESS U S STEEL TUBULAR PRODUCTS CANADA C/O COMCO PIPE & SUPPLY CO 333 7TH AVE SW STE 2150 PO BOX 457 CALGARY AB T2C 2Z1				VENDOR USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055																	
SPECIFICATION AND GRADE PIPE CARBON SMLS STD PIPE ASTM A106-*08 GRADE B ASME SA106-*2010 EDITION GRADE B ASTM A53-*07 GRADE B ASME SA53-*2010 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *:2003/COR.1:2005 AND MR0103-2007																									
MATERIAL COND: AS ROLLED				O.D.: 24.000 (609.600)		I.D. (mm)		WALL: 0.500 (12.700)		I.D. (mm)															
PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD		EXT %	TENSILE PSI	Y/T	ELONG % (IN 2" )	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)													
				MIN: 40000	MAX: 49900								MIN: 70000	MAX: 77000											
MA3234	STRIP/L/B	AR	1.500	49900	.50	.50	77000	0.65	40.5	B 83.2	1000	5													
** END OF DATA THIS SHEET **																									
LEGEND: L - LONGITUDINAL U - UPSET T - TRANSVERSE NM - NORMALIZED QT - QUENCH & TEMPERED SR - STRESS RELIEVED AR - AS ROLLED TR - THERMOMECHANICAL ROLLED B - BODY W - WELD																									
PRODUCT IDENTIFICATION	TYPE											C.E.*													
		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO							MAX	
MA3234	HEAT	20	1.05	0.13	0.02	21	11	.06	.08	.02	.027	.03	0.003	.002	.001										.41
MA3234	PROD	18	1.07	0.12	0.01	21	11	.06	.08	.02	.032	.03	0.003	.001	.001										.39
MA3234	PROD	20	1.06	0.14	0.02	21	10	.06	.08	.02	.033	.04	0.004	.003	.002										.42
** END OF DATA THIS SHEET **																									

\*C.E. IS BASED ON THE FOLLOWING EQUATION(S):  $CE = C + (MN/6) + (CR + MO + V) / 5 + (NI + CU) / 15$

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT. ELEMENTS REPORTED IN MASS FRACTION (%)

LESENA STEEL

ACCEPTABLE TO  
 ASME  
 REQUIREMENTS

LESENA QUALITY CONTROL

PAGE 1 OF 2

JOB:

ITEM:

Stock

74" V H

13-P107

22

32



UNITED STATES STEEL

TUBULAR PRODUCTS  
CERTIFIED TEST REPORT  
(IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 11/17/11  
TIME: 04:46:59  
SERIAL NO: L0038461

MILL ORDER/ITEM NO <b>DA00223 02</b>		SHIPPER'S NO. <b>T11580</b>		P.O. NUMBER <b>G1-2590</b>		0010857																																		
MATERIAL COND: <b>AS ROLLED</b>		O.D.: <b>24.000 (609.600)</b>				In (mm)				WALL: <b>0.500 (12.700)</b>				In (mm)																										
PRODUCT IDENTIFICATION <b>MA3234</b>	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	DIR	TEST LOC.	TEMP	SIZE	TEST COND.	CHARPY V-NOTCH IMPACT TESTING FT-LBS				% SHEAR																										
										1	2	3	AVG	1	2	3	AVG																							
DEG																																								
** END OF DATA THIS SHEET **																																								
LEGEND      L - LONGITUDINAL      T - TRANSVERSE      B - BODY      W - WELD      HAZ - HEAT AFFECTED ZONE TESTING / INSPECTION INFORMATION <table border="1"> <thead> <tr> <th>TEST / INSPECTION</th> <th>YES</th> <th>RESULTS / COMMENTS</th> </tr> </thead> <tbody> <tr> <td>FULL LENGTH VISUAL</td> <td>X</td> <td></td> </tr> <tr> <td>FULL LENGTH EMI</td> <td>X</td> <td>OD <u>X</u>    OD/ID <u>      </u>    L <u>X</u>    LT <u>      </u>    10.0% NOTCH</td> </tr> <tr> <td>FULL LENGTH MPI</td> <td></td> <td></td> </tr> <tr> <td>FULL LENGTH UT</td> <td></td> <td>ID <u>      </u>    OD/ID <u>      </u>    L <u>      </u>    LT <u>      </u></td> </tr> <tr> <td>END AREA INSPECTION (PLAIN END)</td> <td></td> <td>MPI <u>      </u>    UT <u>      </u></td> </tr> <tr> <td>SPECIAL END AREA (SEA) INSP</td> <td></td> <td>MPI <u>      </u>    UT <u>      </u></td> </tr> <tr> <td>FULL LENGTH DRIFT</td> <td></td> <td>DRIFT MANDREL SIZE: <u>      </u></td> </tr> </tbody> </table>																	TEST / INSPECTION	YES	RESULTS / COMMENTS	FULL LENGTH VISUAL	X		FULL LENGTH EMI	X	OD <u>X</u> OD/ID <u>      </u> L <u>X</u> LT <u>      </u> 10.0% NOTCH	FULL LENGTH MPI			FULL LENGTH UT		ID <u>      </u> OD/ID <u>      </u> L <u>      </u> LT <u>      </u>	END AREA INSPECTION (PLAIN END)		MPI <u>      </u> UT <u>      </u>	SPECIAL END AREA (SEA) INSP		MPI <u>      </u> UT <u>      </u>	FULL LENGTH DRIFT		DRIFT MANDREL SIZE: <u>      </u>
TEST / INSPECTION	YES	RESULTS / COMMENTS																																						
FULL LENGTH VISUAL	X																																							
FULL LENGTH EMI	X	OD <u>X</u> OD/ID <u>      </u> L <u>X</u> LT <u>      </u> 10.0% NOTCH																																						
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FULL LENGTH UT		ID <u>      </u> OD/ID <u>      </u> L <u>      </u> LT <u>      </u>																																						
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SPECIAL END AREA (SEA) INSP		MPI <u>      </u> UT <u>      </u>																																						
FULL LENGTH DRIFT		DRIFT MANDREL SIZE: <u>      </u>																																						
ADDITIONAL NOTES/COMMENTS MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT. PRODUCT WAS HOT ROLLED AND HOT FINISHED PIPE ALSO MEET THE REQUIREMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C																																								

LESENA STEEL

ACCEPTABLE TO  
ASME  
REQUIREMENTS

13-P207

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: R. HARRIS - MANAGER, Q.A.

DATE 11/17/11

LESENA QUALITY CONTROL

JOB: Stock

ITEM: 24" x H

ACCEPTED DATE: 12/2/11

PAGE 2 OF 2

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Order#: 262621 Seq: 4 PO#: 32-22/33-21 Heat#: MA3234 Mill: U.S. Steel  
 Part#: PC 24 XS S6 5 Part Desc: Crop Pipe 24 XS SMLS SA/A106-B 5



UNITED STATES STEEL

TUBULAR PRODUCTS  
 CERTIFIED TEST REPORT  
 (IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 11/17/11  
 TIME: 04:46:59  
 SERIAL NO: L0038461

MILL ORDER/ITEM NO DA00223 02		SHIPPERS NO. T11580		P.O. NUMBER G1-2590		VEHICLE ID 8018PC ON															
SOLD TO ADDRESS U S STEEL TUBULAR PRODUCTS CANADA C/O COMCO PIPE & SUPPLY CO 333 7TH AVE SW STE 2150 PO BOX 457 CALGARY AB T2C 2Z1				MAIL TO ADDRESS U S STEEL TUBULAR PRODUCTS CANADA C/O COMCO PIPE & SUPPLY CO 333 7TH AVE SW STE 2150 PO BOX 457 CALGARY AB T2C 2Z1				VENDOR USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055													
SPECIFICATION AND GRADE  PIPE CARBON SMLS STD PIPE ASTM A106-*08 GRADE B ASME SA106-*2010 EDITION GRADE B ASTM A53-*07 GRADE B ASME SA53-*2010 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *:2003/COR.1:2005 AND MR0103-2007																					
MATERIAL COND: AS ROLLED				O.D.: 24.000 (609.600) In (mm)				WALL: 0.500 (12.700) In (mm)													
PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD	EXT %	TENSILE	Y/T	ELONG %	HARDNESS	MIN HYDRO	DWELL(SEC)										
				PSI	.50	PSI		(IN 2" )	SCALE:HRB	PSI											
MA3234	STRIP/L/B	AR	1.500	MIN: 40000		MIN: 70000	MAX:	MIN:	MIN: 66.0	1000	5										
				MAX:		MAX:	29.5	MAX: 99.5													
		**	END OF DATA THIS SHEET	.50		77000	0.65	40.5	B 83.2	1000	5										
LEGEND: L - LONGITUDINAL T - TRANSVERSE QT - QUENCH & TEMPERED AR - AS ROLLED B - BODY W - WELD U - UPSET NM - NORMALIZED SR - STRESS RELIEVED TR - THERMOMECHANICAL ROLLED																					
PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO			C.E.*
																					MAX
MA3234	HEAT		20	105	013	002	21	11	06	08	02	027		03	0003	002	001				.41
MA3234	PROD		18	107	012	001	21	11	06	08	02	032		03	0003	001	001				.39
MA3234	PROD		20	106	014	002	21	10	06	08	02	033		04	0004	003	002				.42
			** END OF DATA THIS SHEET **																		

\*C.E. IS BASED ON THE FOLLOWING EQUATION(S):  $CE = C + (MN/6) + (CR+MO+V)/5 + (NI+CU)/15$

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT. ELEMENTS REPORTED IN MASS FRACTION (%)

LESENA STEEL

ACCEPTABLE TO  
 ASME  
 REQUIREMENTS

LESENA QUALITY CONTROL

JOB: Stock  
 ITEM: 24" V4

PAGE 1 OF 2

22 32

13-P107



UNITED STATES STEEL

**TUBULAR PRODUCTS**  
**CERTIFIED TEST REPORT**  
 (IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049 "type 3.1")

DATE: 11/17/11  
 TIME: 04:46:59  
 SERIAL NO: L0038461

MILL ORDER/ITEM NO <b>DA00223 02</b>		SHIPPERS NO. <b>T11580</b>		P.O. NUMBER <b>G1-2590</b>		0010857													
MATERIAL COND: <b>AS ROLLED</b>				O.D.: <b>24.000 (609.600)</b>				In (mm) <b>0.500 (12.700)</b>				WALL: <b>0.500 (12.700)</b>							
PRODUCT IDENTIFICATION <b>MA3234</b>	FLAT <b>OK</b>	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING														
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS				% SHEAR					
												1	2	3	AVG	1	2	3	AVG
					DEG														
** END OF DATA THIS SHEET **																			
LEGEND      L - LONGITUDINAL      T - TRANSVERSE      B - BODY      W - WELD      HAZ - HEAT AFFECTED ZONE																			
TEST / INSPECTION					YES	TESTING / INSPECTION INFORMATION													
FULL LENGTH VISUAL					X	RESULTS / COMMENTS													
FULL LENGTH EMI					X	OD <u>  X  </u> OD/ID <u>      </u> L <u>  X  </u> LT <u>      </u> 10.0% NOTCH													
FULL LENGTH MPI																			
FULL LENGTH UT						ID <u>      </u> OD/ID <u>      </u> L <u>      </u> LT <u>      </u>													
END AREA INSPECTION (PLAIN END)						MPI <u>      </u> UT <u>      </u>													
SPECIAL END AREA (SEA) INSP						MPI <u>      </u> UT <u>      </u>													
FULL LENGTH DRIFT						DRIFT MANDREL SIZE: <u>      </u>													
ADDITIONAL NOTES/COMMENTS  MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT. PRODUCT WAS HOT ROLLED AND HOT FINISHED PIPE ALSO MEET THE REQUIREMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C																			

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: **R. HARRIS - MANAGER, Q.A.**

DATE 11/17/11

LESENA STEEL

ACCEPTABLE TO  
**ASME**  
 REQUIREMENTS

22

32

13-P107

LESENA QUALITY CONTROL

JOB: Stock  
 ITEM: 24" XH  
 ACCEPTED DATE: 3/8/13  
 SIGNATURE: [Signature]

PAGE 2 OF 2

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Order#: 262621 Seq: 4 PO#: 32-22/33-21 Heat#: MA3234 Mill: U.S. Steel  
 Part#: PC 24 XS S6 5 Part Desc: Crop Pipe 24 XS SMLS SAA/106-B 5

4023



**TUBOS REUNIDOS INDUSTRIAL, S.L.U**  
Barrio Sagarribal, 2 - 01470 AMURRIO (Spain)



EN 10204:2004 / 3.1

**CERTIFICADO DE CALIDAD**  
**MILL TEST CERTIFICATE**

PAG. 1 / 4

Nº 0000310184/1 Rev. 000

<b>CLIENTE:</b> CUSTOMER		<b>PEDIDO / PARTIDA:</b> P. ORDER / ITEM	120892-00 1.
<b>PRODUCTO:</b> ARTICLE	TUBERÍA SIN SOLDADURA LAMINADA EN CALIENTE HOT FINISHED SEAMLESS TUBES	<b>REF. FABRICA:</b> WORK ORDER	300013331 000010
<b>EXTREMOS:</b> ENDS	BISELADOS BEVELLED ENDS	<b>PROTECCIÓN SUPERF:</b> EXT. COATING	LACA SECA EXTERIOR OD DRY LACQUERED
<b>NORMA / GRADO:</b> APL. STANDARD AND GRADE	A/SA53-10&A/SA106-11/5L07PSL1 A53 B / A106 B/C / API5L B/X42	<b>PROCESO FUSION:</b> MELTING PROCESS	HORNO ELECTRICO ACERO TOTALMENTE CALMADO ELECTRIC FURNACE / FULLY KILLED
<b>ESPEC. ADICIONALES:</b> ADDITIONAL SPEC.	NACE MR0175/ISO 15156.PUB.2009 NACE MR0103.2007	<b>PAB. DE PALANQUILLA:</b> BILLET'S MANUFACTURE	COLADA CONTINUA CONTINUOUS CASTING
<b>DIMENSIONES:</b> DIMENSIONS	2" NB X 0.218" X 38		
<b>MARCAS:</b> MARKING	<b>ESTAMPADO:</b> DIE STAMPING	SPAIN	
	<b>PINTADO:</b> STENCILED	TRI SL-0011 (SELLO APD (MM/AA) 2 NPS X 0.218" ASTM/ASME A/SA53/106/1 LPI B/C/X42 PSL1 SMLS 3000 B PSI (LONG. TUBO EN PIES) FT HN (COLADA) N ACE MR0175/ISO 15156 + MR0103	
	<b>CODIGO COLOR:</b> COLOUR CODE		
<b>TRAT. TERMICO:</b> HEAT TREATMENT	NORM. BRUTO LAM. ENFR. AL AIRE / AS ROLLED COOLED IN STILL AIR 920 °C		

Lista de Bultos / 123493  
Packing List

**DESCRIPCION SUMINISTRO. / DESCRIPTION OF DELIVERY (1)**

ITEM FAB. T.R. ITEM	ITEM CLI. CLIENTE ITEM	LONG. INDIV (F) INDIVIDUAL LENGTH	COLADA CAST NR.	Nº TUBOS QUANTITY	LONG. TOTAL (F) LENGTH	PESO(KG) WEIGHT
000010	1.	38,000 - 42,000	110470	648	23,491,240	58,074
000010	1.	38,000 - 42,000	110474	868	34,093,240	77,500
000010	1.	38,000 - 42,000	110475	477	18,368,603	41,983
000010	1.	38,000 - 42,000	110537	673	23,635,858	59,398
000010	1.	38,000 - 42,000	110538	674	25,876,839	58,801
000010	1.	38,000 - 42,000	110539	383	14,442,289	33,538
000010	1.	38,000 - 42,000	110700	776	30,176,182	68,556
000010	1.	38,000 - 42,000	110701	729	28,710,695	65,178
<b>TOTAL</b>				<b>5,228</b>	<b>202,794,946</b>	<b>463,028</b>

TUBOS REUNIDOS INDUSTRIAL GARANTIZA QUE TODAS LOS TUBOS CUBIERTOS POR ESTE CERTIFICADO CUMPLEN LOS REQUISITOS DEL PEDIDO Y CON LAS ESPECIFICACIONES ARRIBA MENCIONADAS.  
TUBOS REUNIDOS INDUSTRIAL CERTIFY THAT ALL THE TUBES COVERED BY THIS CERTIFICATE COMPLY WITH ORDER REQUIREMENTS AND ABOVE MENTIONED SPECIFICATIONS.

AMURRIO 01.07.2012

CONTROL DE CALIDAD DE TUBOS REUNIDOS  
INDUSTRIAL  
TUBOS REUNIDOS INDUSTRIAL QUALITY CONTROL

ACEPTADO

P.O. 1

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: Davit Arm  
ACCEPTED DATE: 4/8/13  
SIGNATURE: [Signature]

LESENA STEEL

ACCEPTABLE TO  
AGREE  
REQUIREMENTS

13-P208

LESENA QUALITY CONTROL

JOB: Stock  
ITEM: 2" sch80  
ACCEPTED DATE: 3/20/13  
SIGNATURE: [Signature]



**TUBOS REUNIDOS INDUSTRIAL, S.L.U**  
Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)



EN 10204:2004 / 3.1

**CERTIFICADO DE CALIDAD**  
**MILL TEST CERTIFICATE**

PAG. 2 / 4

Nº 0000310184/1 Rev. 000

**ENSAYOS NO DESTRUCTIVOS / NDT**

ENSAYO / TEST	%CONTROL / TEST RATE(X)	REQUISITOS / REQUIREMENTS	RESULTADO / RESULT
VISUAL Y DIMENSIONAL/ VISUAL & DIMENSIONAL INSP.	100%		O.K.
F.HIDROSTATICA/ HYDROTEST	100%	3.000,0 PSI 5 SEC.	O.K.
INSP. POR PASO DE ANILLO/ RING GAUGES INSPECTION	100%	ACC. TO API 5L / ISO 3183	O.K.

**ENSAYOS TECNOLÓGICOS Y METALÚRGICOS / TECHNOLOGICAL AND METALLURGICAL TEST**

DOBLADO  
BENDING

ACI A/SA33/SA106/3L -OK

**ANÁLISIS DE COLADA / CAST ANALYSIS**

	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	V	Al	Ti	Nb	B	C.E.
MIN.		0,29	0,10												
MAX.	0,23	1,06		0,015	0,0100	0,400	0,400	0,150	0,400	0,080	0,060	0,030	0,020	0,0010	0,40
110470	0,19	0,84	0,21	0,008	0,0060	0,100	0,100	0,070	0,250	0,003	0,003	0,001	0,004	0,0002	0,39
110474	0,19	0,83	0,23	0,007	0,0040	0,100	0,100	0,070	0,250	0,003	0,003	0,001	0,003	0,0010	0,39
110475	0,19	0,83	0,21	0,008	0,0020	0,120	0,090	0,070	0,260	0,003	0,003	0,001	0,004	0,0003	0,39
110537	0,18	0,83	0,25	0,013	0,0090	0,100	0,100	0,050	0,280	0,001	0,001	0,001	0,003	0,0001	0,37
110538	0,17	0,83	0,23	0,010	0,0050	0,110	0,090	0,050	0,270	0,001	0,001	0,001	0,006	0,0001	0,36
110539	0,19	0,80	0,25	0,009	0,0050	0,090	0,120	0,050	0,310	0,002	0,005	0,001	0,003	0,0001	0,38
110700	0,18	0,83	0,22	0,011	0,0040	0,130	0,090	0,050	0,320	0,002	0,002	0,002	0,001	0,0001	0,38
110701	0,19	0,85	0,23	0,012	0,0040	0,120	0,100	0,050	0,310	0,003	0,006	0,001	0,006	0,0002	0,39

**ANÁLISIS DE PRODUCTO / PRODUCT ANALYSIS**

	C	Mn	Si	P	S	Cr	Ni	Mo	Cu	V	Al	Ti	Nb	B	C.E.
MIN.		0,29	0,10												
MAX.	0,23	1,06		0,015	0,0100	0,400	0,400	0,150	0,400	0,080	0,060	0,030	0,020	0,0010	0,40
110470	0,19	0,85	0,21	0,008	0,0070	0,100	0,100	0,080	0,250	0,004	0,006	0,002	0,003	0,0005	0,39
110474	0,19	0,83	0,21	0,008	0,0070	0,100	0,100	0,080	0,250	0,004	0,006	0,002	0,003	0,0005	0,39
110474	0,18	0,81	0,23	0,007	0,0030	0,090	0,100	0,070	0,250	0,003	0,003	0,001	0,004	0,0010	0,37
110474	0,18	0,81	0,23	0,007	0,0030	0,090	0,100	0,070	0,250	0,003	0,003	0,001	0,004	0,0010	0,37
110475	0,19	0,83	0,21	0,008	0,0030	0,120	0,090	0,070	0,270	0,004	0,003	0,001	0,003	0,0004	0,39
110475	0,19	0,83	0,21	0,008	0,0030	0,120	0,090	0,070	0,270	0,004	0,003	0,001	0,003	0,0004	0,39
110537	0,17	0,79	0,24	0,011	0,0080	0,100	0,100	0,040	0,300	0,001	0,004	0,001	0,001	0,0001	0,36
110537	0,17	0,79	0,24	0,011	0,0080	0,100	0,100	0,040	0,300	0,001	0,004	0,001	0,001	0,0001	0,36
110538	0,16	0,80	0,24	0,010	0,0050	0,110	0,090	0,050	0,280	0,003	0,003	0,001	0,003	0,0001	0,35
110538	0,16	0,80	0,24	0,010	0,0050	0,110	0,090	0,050	0,280	0,003	0,003	0,001	0,003	0,0001	0,35
110539	0,19	0,80	0,26	0,010	0,0050	0,090	0,130	0,050	0,310	0,003	0,008	0,001	0,003	0,0002	0,38
110539	0,19	0,80	0,26	0,010	0,0050	0,090	0,130	0,050	0,310	0,003	0,008	0,001	0,003	0,0002	0,38
110700	0,18	0,80	0,22	0,011	0,0040	0,120	0,100	0,050	0,340	0,001	0,004	0,001	0,002	0,0001	0,38
110700	0,18	0,80	0,22	0,011	0,0040	0,120	0,100	0,050	0,340	0,001	0,004	0,001	0,002	0,0001	0,38
110701	0,18	0,84	0,23	0,011	0,0030	0,120	0,100	0,040	0,320	0,002	0,004	0,001	0,002	0,0001	0,38
110701	0,18	0,84	0,23	0,011	0,0030	0,120	0,100	0,040	0,320	0,002	0,004	0,001	0,002	0,0001	0,38

AMURRIO 02.07.2012

CONTROL DE CALIDAD DE TUBOS REUNIDOS  
INDUSTRIAL  
TUBOS REUNIDOS INDUSTRIAL (QUALITY CONTROL)

Alex VILLANUEVA

P.O. 1

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: Davit Arm  
ACCEPTED DATE: 4/8/13  
SIGNATURE: [Signature]

LESENA STEEL

ACCEPTABLE TO  
ASME  
REQUIREMENTS

13-P208

LESENA QUALITY CONTROL

JOB: Stock  
ITEM: 2" sch 80  
ACCEPTED DATE: 3/20/13  
SIGNATURE: [Signature]



**TUBOS REUNIDOS INDUSTRIAL, S.L.U**  
Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)



EN 10204:2004 / 3.1

**CERTIFICADO DE CALIDAD**  
**MILL TEST CERTIFICATE**

PAG. 3 / 4

Nº 0000310184/1 Rev. 000

**FORMULAS**

	(01)	(02)	(03)
MIN.	0.150	0.060	1.000
MAX.	0.011	0.009	0.534
110470	0.011	0.009	0.534
110470	0.008	0.007	0.553
110474	0.008	0.007	0.553
110475	0.010	0.009	0.534
110475	0.010	0.009	0.534
110537	0.003	0.002	0.541
110537	0.003	0.002	0.541
110538	0.009	0.008	0.533
110538	0.009	0.008	0.533
110539	0.007	0.006	0.583
110539	0.007	0.006	0.583
110700	0.004	0.003	0.611
110700	0.004	0.003	0.611
110701	0.005	0.004	0.582
110701	0.005	0.004	0.582

(01) Nb + Ti + V  
(02) Nb + V  
(03) Cr + Ni + Mo + Cu + V

**ENSAYOS DE TRACCIÓN**  
**TENSILE TEST**

COLADA CAST	Nº	L/T (1)	T/P (2)	DIMENSION (Inches)	L.ELAST. YIELD POINT (Pd) (3)	R.TRACC. T. STRENGTH (Ps) (4)	ALARG. ELONG. (%) (5)	DUREZA HARDNESS (HRB)
					42.000	70.000	99	
110470	0001	L	P	0.720 x 0.248	50.765	78.310	32	84
110470	0001	L	P	0.717 x 0.244	49.628	75.082	34	81
110474	0001	L	P	0.752 x 0.248	51.334	78.921	34	83
110474	0001	L	P	0.720 x 0.248	49.201	77.611	34	82
110475	0001	L	P	0.705 x 0.248	47.068	75.082	34	81
110475	0001	L	P	0.740 x 0.248	48.775	73.944	34	81
110537	0001	L	P	0.752 x 0.248	49.770	75.630	32	81
110537	0001	L	P	0.705 x 0.248	48.490	72.806	34	80
110538	0001	L	P	0.752 x 0.248	48.064	74.797	34	80
110538	0001	L	P	0.756 x 0.248	49.770	75.366	34	82
110539	0001	L	P	0.736 x 0.248	50.623	74.371	36	81
110539	0001	L	P	0.756 x 0.244	51.192	77.215	36	82
110700	0001	L	P	0.744 x 0.248	50.908	77.641	34	82
110700	0001	L	P	0.752 x 0.244	49.770	76.504	34	81
110701	0001	L	P	0.740 x 0.244	49.912	76.504	38	82
110701	0001	L	P	0.740 x 0.244	52.756	77.926	34	83

AMURRIO 02.07.2012

CONTROL DE CALIDAD DE TUBOS REUNIDOS  
INDUSTRIAL  
TUBOS REUNIDOS INDUSTRIAL (QUALITY CONTROL)

Alex VINDRE

**LESENA STEEL**

ACCEPTABLE TO  
**ASME**  
REQUIREMENTS

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: Davit Arm  
ACCEPTED DATE: 4/8/13  
SIGNATURE: *[Signature]*

LESENA QUALITY CONTROL

JOB: Stock  
ITEM: 2" sch 80  
ACCEPTED DATE: 3/20/13  
SIGNATURE: *[Signature]*



**TUBOS REUNIDOS INDUSTRIAL, S.L.U**  
 Barrio Sagarribai, 2 - 01470 AMURRIO (Spain)



EN 10204:2004 / 3.1

**CERTIFICADO DE CALIDAD  
 MILL TEST CERTIFICATE**

PAG. 4 / 4

Nº 0000310184/1 Rev. 000

- (1) : L = LONGITUDINAL // T = TRANSVERSAL
- (2) : T = Full size tube // P = Strip specimen
- (3) : yield point (0.2%)
- (4) : Lo = 2" (50.8 mm)

ANEXOS / ANNEX

"MERCURY FREE"  
 "NO WELD REPAIR"

"BILLETS ARE PRODUCED AT OUR AMURRIO STEEL PLANT, WHICH IS ALSO  
 CERTIFIED TO ISO 9001, THE SAME AS OUR TUBE PLANT".

**LESENA QUALITY CONTROL**

JOB: *Stock*  
 ITEM: *2" sch 80*  
 ACCEPTED DATE: *3/20/13*  
 SIGNATURE: *[Signature]*

AMURRIO 02.07.2012

CONTROL DE CALIDAD DE TUBOS REUNIDOS  
 INDUSTRIAL  
 TUBOS REUNIDOS INDUSTRIAL - QUALITY CONTROL

*[Signature]*  
 P.O. 1

**LESENA QUALITY CONTROL**

JOB: *12-32*  
 ITEM: *Davit Arm*  
 ACCEPTED DATE: *4/8/13*  
 SIGNATURE: *[Signature]*

**LESENA STEEL**

ACCEPTABLE TO  
**ASME**  
 REQUIREMENTS

*13-P208*



# INSPECTION CERTIFICATE CERTIFICAT DE INSPECTIE (UNI EN 10204 3.1 / ISO 10474 3.1.B)

Number / Numar: 11/02641  
Page / Pagina: 1 / 5  
Date / Data: January 31, 2011

Silcotub S.A. Plant  
93, Mihai Viteazul Blvd.  
450131 Zalau, Săleț  
România  
Tel: + 40 260 820720  
Fax: + 40 260 861591

Customer / Client: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Comanda clientului - Item: G1-1553		Customer's Reference / Referința clientului:		Manufacturer's Works Order N° / Comanda de vânzare: 2211522/008	
Manufacture Process / Proces de fabricație:		Product Type / Tip de produs: See note nr.1 vezi nota nr.1		Surface / Suprafața: INTERNALLY BARE, EXTERNALLY VARNISHED, INTERIOR NEPROTEJATE, EXTERIOR LACUITA,			
Standard or Specification / Normă sau specificație: See note nr.2 vezi nota nr.2		Steel Grade / Grad de oțel: See note nr.3 vezi nota nr.3		Ends / Capete: BEVELLED AS PER API AJ 2429-4 SANFRENATE CONFORM API AJ 2429-4			
Dimensions / Dimensiuni: 73mm O.D. x 5.16mm W.T.	Schedule / Program: 40	Length / Lungime: 5490 mm ± 6700 mm	Quantity / Cantitate: 160Pcs/buc. 3053,18 ft 17617,1 lb 930.61 mt 7991 kg	Nominal Weight / Greutate nominală:			

## DELIVERY NOTES / NOTE DE LIVRARE

Delivery Notes / Note de livrare		Delivery Notes / Note de livrare	
Job Number / Nr. Comanda Interna: EX/112972/8		Town / Oraș: EDMONTON	
Shipping Note / Aviz de expeditie: 00000821 - 31/01/2011		Country / Țară: CANADA	
Address / Adresa: 5910 - 17TH STREET NW			

## TENSILE TEST / TEST DE TRACȚIUNE

Heat N° Serie N°	Sample N° Proba N°	Specimen condition Condiție epruvetă				Specimen dimensions Dimensiuni epruvetelor		Test temp Temperatura încercării	Y.S. EUL 0.5%		U.T.S. Req.	Y.S./U.T.S. Req. Max. 0.93	Elongation / Alungire			
		Ls	Sc	Type	Ort	Size Dimensiune	Area Secțiune		Min: 42.00 Max: 72.00	Min: 60.00 Max: 90.00			Lo	Min.	Min.	Obt.
703671	B4881/L	B	AM	Ss	L	19.67 x 5.58	111.40	+20	57.00	74.00	0.77	0.78	50.0	21.5%	31.5%	
703670	B7502/L	B	AM	Ss	L	19.69 x 5.54	110.70	+20	56.00	72.00	0.78	0.78	50.0	21.5%	31.8%	

AM: As manufactured / laminat	Ls: Location of sample / Locația probei	Ort: Orientation / Orientare	Ss: Strip specimen / Rectangular
B: Body / Corp	Max: Maximum / Maxim	Req: Max: Required maximum / Cerința maximă	U.T.S: Ultimate Tensile Strength / Rezistența la rupere
L: Longitudinal / Longitudinal	Min: Minimum / Minim	Req: Required / Cerința	Y.S: Yield Strength / Rezistența la curgere
Lo: Initial length / Lungime inițială	Obt: Obtained / Obținut	Sc: Specimen condition / Starea epruvetel	

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

Acest certificat a fost editat de un sistem computerizat și este valid cu semnătură electronică. Pe certificatul original brandul "Tenaris" este colorat în verde și este ștampat. În cazul în care proprietarul certificatului original va elibera o copie a acestuia, el va atesta conformitatea cu originalul, asumându-și toată responsabilitatea pentru utilizarea nepermisă sau ilegală. Orice modificare și/sau falsificare va fi pedepsită de lege.

FOR03171

LESENA QUALITY CONTROL

JOB: 12-32 MI

ITEM: Davit Socket M2

ACCEPTED DATE: 4/8/13

SIGNATURE: [Signature]

LESENA QUALITY CONTROL

JOB: STORK

ITEM: 2 1/2" sch 40

ACCEPTED DATE: 1/16/13

SIGNATURE: [Signature]

ACCEPTED DATE: 1/16/13

SIGNATURE: [Signature]



**Tenaris**

ACCEPTABLE TO  
ASME  
REQUIREMENTS



Order#: 251917 Seq: 2 PO#: 5834 Heat#: 703671 Mill: Tenaris Silcotub  
 Part#: P 2.5 STD S6 S B Part Desc: Pipe 2-1/2 (73mm O.D.) STANDARD SMLS A/SA 106-B SRL BEVELLED END (.203W)



# INSPECTION CERTIFICATE CERTIFICAT DE INSPECTIE (UNI EN 10204 3.1 / ISO 10474 3.1.B)

Number / Numar:

11/02641

Page / Pagina:

3 / 5

Date / Data: January 31, 2011

Silcotub S.A. Plant  
 93, Mihai Viteazul Blvd.  
 450131 Zalau, Săilej  
 România  
 Tel: +40 260 620720  
 Fax: +40 260 661581

Customer / Client: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Comanda clientului - Item: G1-1553		Customer's Reference / Referinta clientului:		Manufacturer's Work Order N° / Comanda de vanzare: 2211522/008	
Manufacture Process / Proces de fabricatie:		Product Type / Tip de produs: See note nr.1 vezi nota nr.1		Surface / Suprafata: INTERNALLY BARE, EXTERNALLY VARNISHED, INTERIOR NEPROTEJATE, EXTERIOR LACUITA,			
Standard or Specification / Norma sau specificatie: See note nr.2 vezi nota nr.2		Steel Grade / Grad de oțel: See note nr.3 vezi nota nr.3		Ends / Capete: BEVELLED AS PER API AJ 2429-4 SANFRENATE CONFORM API AJ 2429-4			
Dimensions / Dimensiuni: ø 73mm O.D. x 5.16mm W.T.	Schedule / Program:	Length / Lungime: 5490 mm ± 6700 mm	Quantity / Cantitate: 160Pcs/buc. 3053,18 ft 930.61 mt	17617,1 lb 7991 kg	Nominal Weight / Greutate nominala:		

## SUPERFICIAL HARDNESS / DURITATE SUPERFICIALA

AM: As manufactured/ laminat	B: Body / Corp	LS: Location of sample / Locatia probei	SC: Specimen condition / Starea epruvetei
------------------------------	----------------	---	---

## FLATTENING TEST / APLATISARE

Standard / Norma:						Standard / Norma:					
Heat N° Sarja N°	Sample N° Proba N°	Zone	Sc	Test Frequency Frecventa incercarii	Result Rezultat	Heat N° Sarja N°	Sample N° Proba N°	Zone	Sc	Test Frequency Frecventa incercarii	Result Rezultat
703671	B4881/L	E1	AM	1 pipe of the lot	Good / Conform	703670	B7502/L	E1	AM	1 pipe of the lot	Good / Conform

AM: As manufactured/ laminat	E1, E2: Ends of Sampling / Capetele testat	SC: Specimen condition / Starea epruvetei
------------------------------	--	---

## HYDROSTATIC TEST / TEST HIDROSTATIC

Pressure / Presiune	Time / Timp	Results / Rezultat
Unit / Unitate de masura	Value / Valoare	Seconds / Secunde
psi	3,000	5
Satisfactory / Conform		

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FOR03171

### LESENA QUALITY CONTROL

JOB: 12-13  
 ITEM: Pavit Socket M1, M2  
 ACCEPTED DATE: 4/8/13

### LESENA QUALITY CONTROL

JOB: STOCK  
 ITEM: 2 1/2" sch 40  
 ACCEPTED DATE: 1/16/13

### LESENA STEEL

ACCEPTABLE TO  
 ASME  
 REQUIREMENTS

Order#: 251917 Seq: 2 PO#: 5834 Heat#: 703671 Mill: Tenaris Silcotub  
Part#: P 2.5 STD S6 S B Part Desc: Pipe 2-1/2 (73mm O.D.) STANDARD SMLS A/SA 106-B SRL BEVELLED END (.203W)



**INSPECTION CERTIFICATE**  
**CERTIFICAT DE INSPECTIE**  
(UNI EN 10204 3.1 / ISO 10474 3.1.B)

Number / Numar:

11/02641

Page / Pagina:

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Date / Data: January 31, 2011

Silcotub S.A. Plant  
53, Mihai Viteazul Blvd.  
450131 Zalau, Satej  
Romania  
Tel: +40 260 620720  
Fax: +40 260 561561

Customer / Client: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Comanda clientului - Item: G1-1553		Customer's Reference / Referinta clientului:		Manufacturer's Works Order N° / Comanda de vanzare: 2211522/008	
Manufacture Process / Proces de fabricatie:		Product Type / Tip de produs: See note nr.1 vezi nota nr.1		Surface / Suprafata: INTERNALLY BARE, EXTERNALLY VARNISHED, INTERIOR NEPROTEJATE, EXTERIOR LACUITE,			
Standard or Specification / Norma sau specificatie: See note nr.2 vezi nota nr.2		Steel Grade / Grad de otel: See note nr.3 vezi nota nr.3		Ends / Capete: BEVELLED AS PER API AJ 2429-4 SANFRENATE CONFORM API AJ 2429-4			
Dimensions / Dimensiuni: ø 73mm O.D. x 5.16mm W.T.	Schedule / Program:	Length / Lungime: 5490 mm ± 6700 mm	Quantity / Cantitate: 160 Pcs/buc. 3053,18 ft 930.61 mt	17617,1 lb 7991 kg	Nominal Weight / Greutate nominala:		

**SUPPLEMENTARY INFORMATION / INFORMATIE SUPPLEMENTARA**

STANDARD EDITIONS EDITIILE NORMELOR	
Standard: ASTM A 106/ASME SA 106 Year: 2007 Standard: CSA Z245.1 Year: 2007	Norma: ASTM A 106/ASME SA 106 An: 2007 Norma: CSA Z245.1 An: 2007
PRODUCT DESCRIPTION NOTES NOTE DESCRIERE PRODUS	
Note 1 is the full description of the 'Product type' SEAMLESS HOT FINISHED PIPES FOR HIGH TEMPERATURE SERVICES (WITH EXTRA REQUIREMENTS)	Note 1 si descrierea completa a 'Tip de produs' TEVI FARA SUDURA PT. CONDUCTE LAMINATE LA CALD, PT. TEMPERATUR I INALTE CU CERINTE SUPLEMENTARE FA DE NORMA
Note 2 is the full description of the 'Standard or specification' ACC. TO ASTM A 106, ASME SA 106 SECT. II PART A, CSA Z245.1-07 APR-07, PSP00373 REV.0 + TEMPLATE LP CANVA	Note 2 si descrierea completa a 'Norma sau specificatie' NORMA ASTM A 106, ASME SA 106, CSA Z245.1-07 APR-07, PSP00373 REV.0 + TEMPLATE LP CANVA
Note 3 is the full description of the 'Steel grade' STEEL GR. B ASTM A 106 /SA 106/290 SS CSA Z245.1 CAT. I	Note 3 si descrierea completa a 'Grad de otel' OTEL GR. B ASTM A 106, /SA 106/290 SS CSA Z245.1 CAT. I
Supplementary Information Informatie Suplimentara	
NONDESTRUCTIVE TEST - EDDY CURRENT ACC. TO ASTM E309: WITHOUT OBJECTIONS NONDESTRUCTIVE TEST - EMI ACC. TO ASTM E 570: WITHOUT OBJECTIONS MATERIAL ACCORDING TO NACE MR-01.75/NACE MR-01.03 VISUAL AND DIMENSIONAL CONTROL HAS BEEN CARRIED OUT WITH SATISFACTORY RESULT STEEL IS FULLY KILLED AND PRODUCED BY ELECTRIC FURNACE TO A FINE GRAIN PRACTICE THE PRODUCT SUPPLIED IS IN COMPLIANCE WITH THE REQUIREMENTS OF THE ORDER	CONTROL NEDISTRUCTIV EDDY CURRENT CONFORM ASTM E 309: FARA OBIECTII CONTROL NEDISTRUCTIV EMI CONFORM ASTM E 570: FARA OBIECTII MATERIAL CONFORM NACE MR-01.75/ NACE MR-01.03 CONTROLUL VIZUAL DIMENSIONAL S-A REALIZAT CU REZULTATE SATISFACATOARE OTELUL ESTE PRODUS IN CUPTOR ELECTRIC COMPLET CALMAT CONFORM UNEI PRACTICI DE OBTINERE A UNUI GRAUNTE FIN PRODUSUL LIVRAT ESTE IN CONFORMITATE CU CERINTELE COMENZII

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"Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking  
upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

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in verde si stampat. In cazul in care proprietarul certificatului original va emite o copie a acestuia, el va atesta conformitatea cu originalul,  
asumandul la el responsabilitatea pentru utilizarea nepermisa sau ilegala. Orice modificare sau falsificare va fi pedesita de lege.

FOR03171

**LESENA QUALITY CONTROL**

JOB:

12-13

ITEM:

Davit Socket M1, M2

ACCEPTED DATE:

1. 4/8/13

**LESENA QUALITY CONTROL**

JOB:

STOCK

ITEM:

2 1/2" Sch 40

ACCEPTED DATE:

1/16/13

SIGNATURE:

**LESENA STEEL**

ACCEPTABLE TO  
**ASME**  
REQUIREMENTS



**INSPECTION CERTIFICATE**  
**CERTIFICAT DE INSPECTIE**  
 (UNI EN 10204 3.1 / ISO 10474 3.1.B)

Number / Numar:

11/02641

Page / Pagina:

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Date / Data: January 31, 2011

Silcotub S.A. Plant  
 53, Mihai Viteazul Blvd.  
 450131 Zalău, Sălaj  
 România  
 Tel: + 40 260 520720  
 Fax: + 40 260 561581

Customer / Client: COMCO PIPE & SUPPLY CO.		Customer's Order Item / Comanda clientului - Item: G1-1553		Customer's Reference / Referinta clientului:		Manufacturer's Works Order N° / Comanda de vanzare: 2211522/008	
Manufacture Process / Proces de fabricatie:		Product Type / Tip de produs: See note nr.1 vezi nota nr.1		Surface / Suprafata: INTERNALLY BARE, EXTERNALLY VARNISHED, INTERIOR NEPROTEJATE, EXTERIOR LACUITE,			
Standard or Specification / Norma sau specificatie: See note nr.2 vezi nota nr.2		Steel Grade / Grad de otel: See note nr.3 vezi nota nr.3		Ends / Capete: BEVELLED AS PER API AJ 2429-4 SANFRENATE CONFORM API AJ 2429-4			
Dimensions / Dimensiuni: ø 73mm O.D. x 5.16mm W.T.	Schedule / Program:	Length / Lungime: 5490 mm ÷ 6700 mm	Quantity / Cantitate: 160Pcs/buc. 3053,18 ft 930.61 mt	17517,1 lb 7991 kg	Nominal Weight / Greutate nominala:		

This is to certify that the product described here has been manufactured, sampled, tested, and inspected in accordance with purchaser order requirements. This certificate is not a declaration of origin nor may it be used as a declaration of origin.

Prin acest document certificam ca produsele descrise, au fost fabricate, esantionate, testate si inspectate in conformitate cu cerintele din comanda clientului. Acest certificat nu este o declaratie de origine si nu poate fi folosit in locul unei declaratii de origine.

 Quality System Certified n.110950/042 The certification covers the Tenaris Quality Management System exclusively	<b>CUSTOMER . THIRD PARTY</b>	<b>TENARIS QUALITY DEPARTMENT SIGNATURE</b>	
	INSPECTION COMPANY FIRMA TERTA DE INSPECTII	 QUALITY CERTIFICATION DEPT. DEPARTAMENT CERTIFICARE CALITATE PUSCAS Daniela	 QUALITY REGIONAL MANAGER MANAGER REGIONAL DE CALITATE MORENT Lazzlo

This certificate is issued by a computerized system and it is valid with electronic signature. On the original certificate the trade-mark green colored "Tenaris" is stamped. In case the owner of the original certificate would release a copy of it, he must attest its conformity to the original one taking upon himself the responsibility for any unlawful or not allowed use. Any alteration and/or falsification will be subjected to the law.

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FOR03171

**LESENA QUALITY CONTROL**

JOB: 12-32  
 ITEM: Davit, Socket M1, M2  
 ACCEPTED DATE: 4/18/13

**LESENA QUALITY CONTROL**

JOB: STOCK  
 ITEM: 2 1/2" Sch 40  
 ACCEPTED DATE: 1/16/13  
 SIGNATURE: [Signature]

**LESENA STEEL**

ACCEPTABLE TO  
**ASME**  
 REQUIREMENTS



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2013/01/03	Shipment No. & Date.: 1000023168 2013/01/03	TC No., Date & Time : ESA-38371 2013/01/03 - 23:09:41
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000023168 Cust. Part No.: Carrier: INTERNATIONAL FREIGHT SYSTEMS - OSH88
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4085 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.		
Dimensions (T x W x L) 0.5000 " x 120.000 " x 480.00 "	Batch No. AB6374	Heat No-MS 2259P3-03
Quantity 16,336 LB	Pcs 2	
*****CHEMICAL PROPERTIES*****		
Heat No. (wt%) 2259P3*	C 0.19	Mn 1.10
	P 0.009	S 0.005
	Si 0.330	Cr 0.04
	Ni 0.15	Cu 0.04
	Mo 0.01	Al 0.034
	Nb 0.000	V 0.015
	B 0.0002	Ti 0.003
	DO 0.4000	
*****MECHANICAL PROPERTIES*****		
Hardness Tests		
Heat No. 2259P3	Batch No. AB6374	SRCE LAB GAUGE COND LOC MTHD HARDNESS 166" ALG 0.5000 NORM B HBW 155
Impact Tests		
Heat No. 2259P3	Batch No. AB6374	SRCE LAB GAUGE COND METH DIR LOC SIZE TEMP(°F) ENERGY(ft-lbf) ENERGY AVG(ft-lbf) 166" ALG 0.5000 NORM CVN L B FULL -50 123 107 110 113

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: Socket Support (N1)  
ACCEPTED DATE: 4/12/13  
SIGNATURE: AW

Date: 2013/01/04 Time: 08:05:43 Page no: 1 of 2

(26)



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2013/01/03	Shipment No. & Date.: 1000023168 2013/01/03	TC No., Date & Time : ESA-38371 2013/01/03 - 23:09:41
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000023168 Cust. Part No.: Carrier : INTERNATIONAL FREIGHT SYSTEMS - OSH88
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
***** MECHANICAL PROPERTIES *****		
Tensile Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC YIELD(KSI) TENSILE(KSI) EL SCALE ELONG(%)
2259P3	AB6374	166" ALG 0.5000 NORM .2 T B 53.5 75.0 8" 26

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

LESENA QUALITY CONTROL

Date: 2013/01/04 Time: 08:05:43 Page no: 2 of 2

JOB: 12-32  
ITEM: (N) Socket Support  
ACCEPTED DATE: 4/2/13  
SIGNATURE: AW

(25)

ESSAR Steel Algoma Inc.

105 West St., Sault Ste. Marie, Ontario, Canada, P6A 7B4

CUSTOMER PURCHASE ORDER NUMBER 14905-STK	ENTRY DATE 2011/01/10	CREATE DATE 2011/02/23	ENTRY NUMBER 213829	SHIPPER'S NUMBER -	CARRIER NATIONAL TRANSPORTATION C -2505 :11	MILL ORDER 72179
---	--------------------------	---------------------------	------------------------	-----------------------	--	---------------------

CHARGE TO CUSTOMER NAME &amp; ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO  
L4W 2R6

SHIP TO CUSTOMER NAME &amp; ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO

## MILL TEST REPORTS

ESSAR STEEL ALGOMA INC. HEREBY  
CERTIFIES THAT THE MATERIAL HEREIN  
DESCRIBED WAS MADE AND TESTED IN  
ACCORDANCE WITH THE RULES OF THE  
SPECIFICATION SHOWN. ALL RESULTS ARE  
RETAINED IN ACCORDANCE WITH THE  
COMPANY'S STANDARD RECORD KEEPING  
PRACTICES.

M. MCLEAN  
MANAGING METALLURGIST

## CUSTOMER SPECIFICATION

HR PLATE - CARBON - ASME SA516 GR 70 (10) - CVNL 15/12 FT LBS AT -50 F - FULLY  
KILLED - FINE GRAIN - MEETS NACE MR 0103 LATEST ED. - NACE MR 0175 LATEST ED.  
- BHN 200 MAX - PER EN 10204 3.1 - PQ - NORMALIZED - FLATNESS 1/2 A-20 -  
NORMALIZED FOR 12 MINUTES MIN. @ 1670 F

## SUPPLEMENTARY INSTRUCTIONS

TEST CERT 1: SM1 905-206-9449 TEST CERT 2: PLATE TEST COUPON:

INSP T/R

TEST REPORTS REQUIRED

2000174690 PF

CUST  
USE

RESALE

2011/02/23 19:44

THIS MILL TEST REPORT MAY NOT BE  
REPRODUCED EXCEPT IN FULL WITHOUT  
WRITTEN APPROVAL OF ESSAR STEEL ALGOMA  
INC. IF YOU RECEIVE THIS DOCUMENT  
AND ARE NOT THE INTENDED RECEIVER,  
PLEASE CALL (705)945-2624 COLLECT FOR  
INSTRUCTIONS ON METHOD OF DISPOSAL OF  
DOCUMENT.

MEETS EN 10204 3.1  
ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM  
ALL HEATS FULLY KILLED  
HEATS INDICATED WITH (\*) FINE GRAINED  
HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS

\*\*\*\*\* PRODUCT SHIPPED \*\*\*\*\*

CUSTOMER ITEM 00002 OUR ITEM 008 DIMENSIONS .375 X 120 X 480 "

PLATE NUMBER	HEAT-MS	NO. PIECES	WEIGHT	PLATE NUMBER	HEAT-MS	NO. PIECES	WEIGHT
04622	1954L-02	1	6125	04623	1954L-03	2	12251

\*\*\*\*\* MECHANICAL PROPERTIES \*\*\*\*\*

## TENSILE TESTS:

HEAT	PLATE NUMBER	* SAMPLE *	* TEST *	YIELD	TENSILE	% ELONG
		SRCE	GAUGE	COND METH DIR	KSI	KSI
1954L	04622	166"	.3750	N .2 T	56.0	78.4
1954L	04623	166"	.3750	N .2 T	55.4	78.0

## HARDNESS TESTS:

HEAT	PLATE NUMBER	SRCE	GAUGE	* TEST *	HARDNESS
			IN	COND METH	
1954L	04622	166"	.3750	N BH	159
1954L	04623	166"	.3750	N BH	158

LESENA QUALITY CONTROL

JOB: 12-32

ITEM: # 27

ACCEPTED DATE: 05/16/13

SIGNATURE: *[Signature]*

LAB  
ALG  
ALG

LAB  
ALG  
ALG

PAGE 5 OF 6

## \*\*WARNING\*\*

THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

27

ESSAK Steel Algoma Inc.

105 West St., Sault Ste. Marie, Ontario, Canada, P6A 7B4

CCL

12-32

CUSTOMER PURCHASE ORDER NUMBER 14905-STK	ENTRY DATE 2011/01/10	CREATE DATE 2011/02/23	INVOICE NUMBER 213829	SHIPPER'S NUMBER -	CARRIER NATIONAL TRANSPORTATION C -2505 :11	MILL ORDER 72179
---	--------------------------	---------------------------	--------------------------	-----------------------	--	---------------------

CHARGE TO CUSTOMER NAME &amp; ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO  
L4W 2R6

SHIP TO CUSTOMER NAME &amp; ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO

## MILL TEST REPORTS

ESSAK STEEL ALGOMA INC HEREBY  
CERTIFIES THAT THE MATERIAL HEREIN  
DESCRIBED WAS MADE AND TESTED IN  
ACCORDANCE WITH THE RULES OF THE  
SPECIFICATION SHOWN. ALL RESULTS ARE  
RETAINED IN ACCORDANCE WITH THE  
COMPANY'S STANDARD RECORD KEEPING  
PRACTICES.

M. MCLEAN  
MANAGING METALLURGIST

## CUSTOMER SPECIFICATION

HR PLATE - CARBON - ASME SA516 GR 70 (10) - CVNL 15/12 FT LBS AT -50 F - FULLY  
KILLED - FINE GRAIN - MEETS NACE MR 0103 LASTEST ED. - NACE MR 0175 LATEST ED.  
- BHN 200 MAX - PER EN 10204 3.1 - PVQ - NORMALIZED - FLATNESS 1/2 A-20 -  
NORMALIZED FOR 12 MINUTES MIN. @ 1670 F

## SUPPLEMENTARY INSTRUCTIONS

TEST CERT 1: SM1 905-206-9449 TEST CERT 2: PLATE TEST COUPON:

INSP T/R

TEST REPORTS REQUIRED

2000174690 PF

CUST  
USE

RESALE

2011/02/23 19:44

THIS MILL TEST REPORT MAY NOT BE  
REPRODUCED EXCEPT IN FULL WITHOUT  
WRITTEN APPROVAL OF ESSAK STEEL ALGOMA  
INC. IF YOU RECEIVE THIS DOCUMENT  
AND ARE NOT THE INTENDED RECEIVER,  
PLEASE CALL (705)945-2624 COLLECT FOR  
INSTRUCTIONS ON METHOD OF DISPOSAL OF  
DOCUMENT.

\* \* \* \* \* M E C H A N I C A L P R O P E R T I E S \* \* \* \* \*

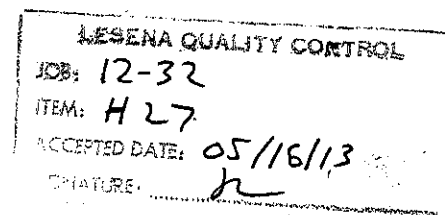
## IMPACT TESTS:

HEAT	PLATE NUMBER	SRCE	GAUGE IN	COND	METH	DIR	SIZE	TEMP	* FTLB	* AVG*
1954L	04622	166"	.3750	N	CVN	L	3/4	-50F	79 86	59 75
1954L	04623	166"	.3750	N	CVN	L	3/4	-50F	88 107	93 96

SPEC LAB  
ASTM ALG  
ASTM ALG

\* \* \* \* \* C H E M I C A L P R O P E R T I E S \* \* \* \* \*

HEAT	(WT %)	C	MN	P	S	SI	CR	NI	CU	MO	AL	CB	V	B	DO
1954L**		.20	1.08	.009	.004	.34	.02	.15	.04	.00	.028	.000	.014	.0002	.40



PAGE 6 OF 6

## \*\*WARNING\*\*

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27

14680-STK	2010/11/19	2010/12/17	206028	-	NATIONAL TRANSPORTATION C -1365-(11) 70168
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## CHARGE TO CUSTOMER NAME &amp; ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO  
L4W 2R6

## SHIP TO CUSTOMER NAME &amp; ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO

## MILL TEST REPORTS

ESSAR STEEL ALGOMA INC HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES

M. MCLEAN  
MANAGING METALLURGIST

## CUSTOMER SPECIFICATION

HR PLATE - CARBON - ASME SA516 GR 70 (10) - CVNL 15/12 FT LBS AT -50 F - FINE  
GRAIN - FULLY KILLED - BHN < 200 - EN 10204 3.1 - NACE MR 0175 LATEST ED. -  
PVQ - NORMALIZED - FLATNESS 1/2 A-20 - NORMALIZED FOR 12 MINUTES MIN. @ 1670 F

## SUPPLEMENTARY INSTRUCTIONS

TEST CERT 1: SM1 905-206-9449 TEST CERT 2: PLATE TEST COUPON:

## INSP T/R

TEST REPORTS REQUIRED

2000168681 PF

CUST  
USE

RESALE

2010/12/20 14:10

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MEETS EN 10204 3.1

ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM

ALL HEATS FULLY KILLED

HEATS INDICATED WITH (\*) FINE GRAINED

HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS

\*\*\*\*\* PRODUCT SHIPPED \*\*\*\*\*

CUSTOMER ITEM 00001 OUR ITEM 001 DIMENSIONS .375 X 120 X 480 "

PLATE NUMBER	HEAT-MS	NO. PIECES	WEIGHT	PLATE NUMBER	HEAT-MS	NO. PIECES	WEIGHT
74641	0033L-01	2	12251	74642	0033L-01	2	12251
74643	0033L-51	2	12251				

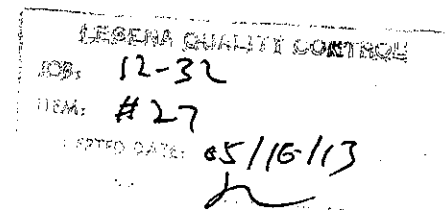
\*\*\*\*\* MECHANICAL PROPERTIES \*\*\*\*\*

## TENSILE TESTS:

HEAT	PLATE NUMBER	* SAMPLE *	* TEST *	YIELD	TENSILE	% ELONG
		SRCE	GAUGE	COND METH DIR	KSI	KSI
0033L	74641	166"	.3750	N .2 T	53.4	77.0
0033L	74642	166"	.3750	N .2 T	53.1	77.0
0033L	74643	166"	.3750	N .2 T	53.3	75.4

## HARDNESS TESTS:

HEAT	PLATE NUMBER	SRCE	GAUGE	* TEST *	HARDNESS
			IN	COND METH	
0033L	74641	166"	.3750	N BH	157
0033L	74642	166"	.3750	N BH	153



LAB  
ALG  
ALG  
ALG

LAB  
ALG  
ALG

PAGE 1 OF 2

NG\*\*

THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN ARE NOT TO BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING IN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL

27



ESSAR STEEL ALGOMA INC.

105 West St. North St. Mark, Ontario, Canada, PAA 1R4

LC 2

12-32

14680-STK	2010/11/19	2010/12/17	206028	-	NATIONAL TRANSPORTATION C -1365-(11	MILL ORDER 70168
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CHARGE TO CUSTOMER NAME & ADDRESS

SHIP TO CUSTOMER NAME & ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO  
L4W 2R6

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO

# MILL TEST REPORTS

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M. MCLEAN  
MANAGING METALLURGIST

## CUSTOMER SPECIFICATION

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## SUPPLEMENTARY INSTRUCTIONS

TEST CERT 1: SM1 905-206-9449 TEST CERT 2: PLATE TEST COUPON:

THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-2624 COLLECT FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT

INSP T/R TEST REPORTS REQUIRED

2000168681 PF

CUST  
USE RESALE

2010/12/20 14:10

## \*\*\*\*\* MECHANICAL PROPERTIES \*\*\*\*\*

HEAT	PLATE NUMBER	SRCE	GAUGE IN	* TEST * COND METH	HARDNESS	LAB
0033L	74643	166"	.3750	N BH	154	ALG

## IMPACT TESTS:

HEAT	PLATE NUMBER	SRCE	GAUGE IN	* * * * TEST * * * *	FULLSIZE ENERGY	SPEC LAB
				COND METH DIR SIZE TEMP * FTLB * AVG*		
0033L	74641	166"	.3750	N CVN L 3/4 -50F 83 80 90 84		ASTM ALG
0033L	74642	166"	.3750	N CVN L 3/4 -50F 69 73 58 67		ASTM ALG
0033L	74643	166"	.3750	N CVN L 3/4 -50F 73 71 78 74		ASTM ALG

## \*\*\*\*\* CHEMICAL PROPERTIES \*\*\*\*\*

HEAT	(WT %)	C	MN	P	S	SI	CR	NI	CU	MO	AL	CB	V	B	DO
		TI	SN	N	AS	ZR	PB	SB							
0033L**		.20	1.10	.011	.009	.32	.03	.02	.06	.00	.037	.000	.001	.0002	.39
		.002													

ESSAR QUALITY CONTROL

102: 12-32

104: H27

TESTED DATE: 05/16/13

## \*\*WARNING\*\*

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(27)



CAMBRIDGE STEEL MILL  
160 ORION PLACE  
CAMBRIDGE ON N1T 1R9 CAN

## Chemical and Physical Test Report

MADE IN CANADA

228096

Ship To :  
DEBRO STEEL DIV.  
7 BLAIR DRIVE  
BRAMPTON, ON L6T 2H4

BOL Shippers No : 1301-0000000579

Purchase Order No : 31010

Sales Order No : 175466

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
R5/8	A36/44W	ASTM A36/A36M-08; CSA G40.21-300W-04(44W)		
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb B Sn Al Ti Zr Ca Zn C Eqv		
N123352	.19	.65 .012 .035 .20 .27 .13 .11 .040 .003 .002 .0002 .023 .001 .00100 .001 .00010 .00200 .35		20
Mechanical Test:	Yield	54625 PSI, 376.63 MPA	Tensile:	77564 PSI, 534.78 MPA
Customer Requirements	CASTING:	STRAND CAST	%El:	27.0/8in, 27.0/200MM
Mechanical Test:	Yield	55798 PSI, 384.71 MPA	Tensile:	76700 PSI, 528.83 MPA
Customer Requirements	CASTING:	STRAND CAST	%El:	23.0/8in, 23.0/200MM
Red R	.81.4	: 1		
SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
R3/4	A36/44W	ASTM A36/A36M-08; CSA G40.21-300W-04(44W)		
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb B Sn Al Ti Zr Ca Zn C Eqv		
N123634	.19	.61 .010 .045 .20 .33 .13 .09 .040 .003 .002 .0001 .021 .001 .00100 .002 .00010 .00400 .35		20
Mechanical Test:	Yield	51114 PSI, 352.42 MPA	Tensile:	74324 PSI, 512.45 MPA
Customer Requirements	CASTING:	STRAND CAST	%El:	23.0/8in, 23.0/200MM
Mechanical Test:	Yield	52619 PSI, 362.8 MPA	Tensile:	75869 PSI, 523.1 MPA
Customer Requirements	CASTING:	STRAND CAST	%El:	26.0/8in, 26.0/200MM
Red R	56.6	: 1		

Customer Notes: NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

This material, including the billets, was melted and manufactured in Canada

Bhaskar Yalamanchili

Quality Director

Gerdau

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Metallurgical Services Manager  
CAMBRIDGE STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER, AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller.

Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.

## LESENA QUALITY CONTROL

JOB:

12-32

ITEM:

Handles

ACCEPTED DATE:

4/10/13

SIGNATURE:

AW

28 38

228095



CAMBRIDGE STEEL MILL  
160 ORION PLACE  
CAMBRIDGE ON N1T 1R9 CAN

## Chemical and Physical Test Report

MADE IN CANADA

Ship To :  
DEBRO STEEL DIV.  
7 BLAIR DRIVE

BRAMPTON, ON

BOL Shippers No : 1301-0000000567

Purchase Order No : 31010

Sales Order No : 175463

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
R3/4	A36/44W	ASTM A36/A36M-08; CSA G40.21-300W-04(44W)		
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb B Sn Al Ti Zr Zn C Eqv		
N123114	.18	.60 .018 .042 .20 .32 .12 .13 .050 .003 .002 .0002 .018 .001 .00100 .002 .00200 .35		20'
Mechanical Test:	Yield	52557 PSI, 362.37 MPA	Tensile:	75803 PSI, 522.64 MPA %El: 25.5/8in, 25.5/200MM Red R 56.6 : 1
Customer Requirements	CASTING: STRAND CAST			
Mechanical Test:	Yield	52290 PSI, 360.53 MPA	Tensile:	76196 PSI, 525.35 MPA %El: 26.0/8in, 26.0/200MM Red R 56.6 : 1
Customer Requirements	CASTING: STRAND CAST			
SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
R1	A36/44W	CSA G40.21-300W-04(44W); ASTM A36M-08		
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb B Sn Al Ti Zr Ca Zn C Eqv		
N123538	.19	.69 .012 .036 .21 .36 .16 .12 .060 .004 .002 .0002 .017 .002 .00100 .002 .00010 .00200 .38		20'
Mechanical Test:	Yield	52312 PSI, 360.68 MPA	Tensile:	75786 PSI, 522.53 MPA %El: 24.0/8in, 24.0/200MM Red R 31.8 : 1
Customer Requirements	CASTING: STRAND CAST			
Mechanical Test:	Yield	51516 PSI, 355.19 MPA	Tensile:	75181 PSI, 518.35 MPA %El: 25.0/8in, 25.0/200MM Red R 31.8 : 1
Customer Requirements	CASTING: STRAND CAST			

Customer Notes: NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

This material, including the billets, was melted and manufactured in Canada

Bhaskar Yalamanchili

Quality Director

Gerdau

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Metallurgical Services Manager  
CAMBRIDGE STEEL MILL

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In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller.

Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.

## LESENA QUALITY CONTROL

JOB:

ITEM:

ACCEPTED DATE:

SIGNATURE:

12-32  
U BRkt

4/10/13

29

## LESENA QUALITY CONTROL

JOB:

ITEM:

ACCEPTED DATE:

SIGNATURE:

Stock  
3/4" Rod

4/10/13

# CERTIFICATE OF INSPECTION & TEST

ORIGINAL



**ST&H CORPORATION**  
411-3 Shinwol-ri, Jinryemyun, Gimhae-si Gyungnam, Korea  
Tel: 82.51.744-4680(5 line) Fax: 82.51.744-4670  
E-mail: stcorp@kornet.net

(EN 10204 3.1)

Certified to ISO9001:2008, ISO14001:2004, PED97/23/EC by LRQA

Certified API Spec Q1 and API Spec 6A (Licence No : 6A-1284)



CE  
995 050010 101

Customer : COMCO PIPE & SUPPLY CO				Contract No. : G1-3758				Report No : MHJ7706				Date: DEC.26.2012	
Spec. For Material : ASTM/ASME A/SA105N-11(NACE MR-0175)												Heat Treatment	
Chemical Composition (%)		C	Si	Mn	P	S	Ni	Cr	Mo	Cu	V	Nb	910°C NORMALIZED & A.C
Heat No.	MAX	0.350	0.350	1.050	0.035	0.040	0.400	0.300	0.120	0.400	0.080		
	MIN		0.100	0.600									
B4505 ✓		0.230	0.210	0.930	0.009	0.006	0.012	0.158	0.018	0.010	0.003		Dimensional Inspection
Tension Test													
Size of Specimen(mm)		Yield Strength MPa	Tensile Strength MPa	Elongation %	Red of Area %	Charpy Impact Test (10x10 mm Specimen Size)			Hardness Test (HB)	Bending Test 90:120(180°)	ANSI B16.5 - 2009  GOOD		
Dia	Gage Length					Individual min	Average min	Notch Type					
12.5	50	MAX				Test Result			187				
		MIN	250.000	485.000	22.000	30.000	①	②					③
12.5	50		375.000	575.000	37.500	62.000				146, 150			
ITEM / SIZE		Q'TY	ITEM / SIZE		Q'TY	ITEM / SIZE		Q'TY	ITEM / SIZE		Q'TY	Ultrasonic Examination	
150LBS WNFF XH 24"		12	<del>BLANK</del>			BLANK						N/A	
150LBS BLFF 24"		12										Magnetic Particle Examination	
150LBS BLRF 24"		30										N/A	
150LBS WNRF XH 24"		14										Remarks : **CE = 0.42 (LONG FORMULAR)	
150LBS WNRF STD 24"		20											

NOTE :  
1MPa = 145.037 psi  
1MPa = 0.145037 ksi  
1psi = 0.006895 MPa  
1ksi = 6.89476 MPa  
W.C:Water Cool O.C:Oil Cool  
A.C:Air Cool N.A:Non Action  
N:Normalized A:Annealed  
Q.T:Quenched and Tempered  
N.T:Normalized and Tempered

We hereby certify that the material herein has been made and tested in accordance with the above specification and also with the requirements called for by the above order.

Witnessed by/ K. S. KIM Manage of Q.A Dept/ H. J. LEE



ST-801-14-00

LESENA QUALITY CONTROL

JOB:

12-32

ITEM:

M2

ACCEPTED DATE:

4/2/13

31

ST&H CORPORATION

# ORIGINAL

## HUFFAZ SEAMLESS PIPE INDUSTRIES LTD.

QUALITY CONTROL DEPARTMENT  
MILL TEST REPORT

CCD-014-MTG

Date: 12-06-04 Rev: 01

CERTIFICATE NO.: K062201

ISSUE DATE: 02-06-2011

Customer M/s: (LOT # 01)

Purchase Order No.: 1210 CAN/DEC (DATE: 12-03-2010) / LC# 2010IM03185 & 17-12-2010

Commodity: Cold Drawn Carbon Steel Seamless Pipes

Inspection Certificate: 31-C EN-10204:1991 (DIN 50049)

Work Order No.: P-20110118-138

Product Delivered on: 02-06-2011

3rd Party Inspection M/s: MOODY INTERNATIONAL

Product Standard: API 5L Gr. B (PSL1) 44th Edition / ASTM A106-99/ A53

Page No.: 1 OF 1

ASME SA106-02 / SA 53 Gr.B

Product					QCD Control			Mechanical Test			Performance Test			Hardness	Other Test	Chemical Composition (%)																		Hydro Static Test		Visual Dimension Check
Size NPS Dxbtl	No Of Pipes	Qty. (FL)	Weght KGS	Heat #	Lab Ref	Sample No	Type & Orient	Yield Strength (Mpa)	Tensile Strength (Mpa)	Elong (%) & Elong (mm)	Bond Test	Flat Test	Flare Test	HRC	C	Si	Mn	P	S	Cr	Cu	Ni	Mo	V	Al	Ti	Nb	CE	Ni+Ti+V	Pressure (PSI)	Holding Time (Sec)					
Product Standard Specification:									Min.245	Min.415	Min 24 24.0% 25.0% 20.0% 50.8 mm	80°	H Value mm	NA*	Max.22 HRC	NA*	Max.28	Min.10	Max.1.20	Max.30	-	-	-	-	-	-	-	-	-	-	Max.43	≤15%	2500	5		
2-1/2" x 0.375" (Sch 160) x 21 FL	150	3150	14301	24167	HL-	138-10-01	S Long	358.01	478.14	43.70	OK	-	-	4.0	20.00	22.00	87.00	13.00	6.00	3.80	5.10	2.40	0.50	0.08	29.00	0.10	35.85	0.2	2500	5	OK					
2" x 0.438" (Sch XXH) x 21 FL	128	2688	11012		HL-	138-09-01	S Long	360.17	480.22	44.49	OK	-	-	3.0	20.00	21.00	85.00	14.00	6.00	3.80	5.20	2.40	0.40	0.08	30.00	0.10	35.47	0.2	2500	5	OK					
2" x 0.154" (Sch 40) x 21 FL	1456	30576	50756	11100968	HL-	138-07-01	S Long	329.84	439.79	31.50	OK	-	-	1.0	18.00	18.00	50.00	9.00	6.00	8.70	10.80	4.50	0.70	0.10	22.00	2.50	29.24	2.8	2500	5	OK					
5M L S B L K D X X 1					HL-	138-07-02	S Long	332.56	443.50	30.71	OK	-	-	2.0	18.00	19.00	50.00	11.00	6.00	8.70	10.70	4.50	0.80	0.10	22.00	2.50	29.27	2.8	2500	5	OK					
					HL-	138-07-03	S Long	334.26	445.73	30.31	OK	-	-	3.0	18.00	20.00	50.00	11.00	6.00	8.80	10.70	4.60	0.80	0.20	23.00	2.50	29.31	2.7	2500	5	OK					
					HL-	138-07-04	S Long	332.43	443.24	30.90	OK	-	-	1.0	18.00	20.00	50.00	12.00	7.00	8.70	10.80	4.50	0.70	0.10	22.00	2.40	29.25	2.5	2500	5	OK					
					HL-	138-07-04	S Long	332.43	443.24	30.90	OK	-	-	2.0	18.00	20.00	50.00	9.00	6.00	8.70	10.70	4.50	0.80	0.10	23.00	2.50	29.27	2.8	2500	5	OK					
Product Delivered: Partially/Full					Remarks: Certification according to 3.1-C EN 10204:1991 100 % HYDROSTATIC TESTED Heat Treatment Temp.: 800°C																															
AS					We hereby certify that the material(s) described herein has(have) been manufactured, sampled, tested and inspected in accordance with the product specifications and requirements of the Contract/Purchase Order and that the results are in compliance with the requirements of that specifications.										NPS = Nominal Pipe Size, Tr = Transverse, Gr Cool, D = Outside Diameter, Long = Longitudinal, FS = Full Section, S = Strip, GL = Gauge Length (mm/in), Offset Orientation, TW = Wall Thickness, L = Length										Huffaz Seamless Pipe Industries Ltd. Quality Control Department											

NA: These tests are not applicable for product(s) in API 5L Grade B (PSL 1) 44th Edition ASTM A106-99/ A53 / ASME SA 106-02 / SA 53 Gr.B Standard.

Customer Representative: \_\_\_\_\_

3rd Party Inspector: \_\_\_\_\_

Reviewed  
Witnessed  
Date: 02-06-2011  
PK 0003

HEAD OFFICE: 207, 210 2nd Floor, Mashreq Center  
Block No. 14, Gulshan-e-Iqbal, Karachi-75300,  
Pakistan.

TEL: (0211) 414241 - 414242 - 414243  
FAX: (0211) 414244  
E-mail: huffaz@cyber.net.pk  
Web: www.huffaz.com.pk

FACTORY: 90 Km. Super Highway, Nourabad Industrial  
Estate, District Jamshoro, Sindh, Pakistan.  
Tel. No. (022) 4008000-4008001-4007458  
Fax No. (022) 4018192

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: M2 Davit  
ACCEPTED DATE: 4/10/13

LESENA QUALITY CONTROL

JOB: Stock  
ITEM: 2" x x H  
ACCEPTED DATE: 1/30/13

ACCEPTABLE TO  
ASME  
REQUIREMENTS

# RUUKKI

## VASTAANOTTOTODISTUS INSPECTION CERTIFICATE

EN 10 204-3.1 (2004)

2/10

A 27492 -001  
30.10.2012

Tilaja Purchaser OLBERT METAL SALES LIMITED LST 2J8 MISSISSAUGA CANADA Tilaus nro Order No. TO-9392	Tilauksen vahvistus Order Confirmation 27492	Vastaanottaja Consignee OLBERT METAL SALES LIMITED LST 2J8 MISSISSAUGA CANADA Asiakkaan merkki Shipping mark	Päivämäärä Date 28.11.2012 Valmistajan merkki Mark of the Manufacturer
---	---	---	---

Todistus Certificate 31	Laivaus Shipping EDENBORG	Laatuleimaus Quality Stamping SA516GR70MTLTV	Tarkastajan leima Stamp of Inspector Mxx
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Toimitustyyppi Delivery type TOTAL DELIVERY	Sulatus nro levy nro Cast No. Plate No. XXXXX XXX XX XXX	Tarkastajan leima Stamp of Surveyor
--	---	--

Tuote Product HEAVY PLATES	Toleranssit Tolerances ASME SA-20, 2011A	Muut leimaukset Other Stamps	Tekniset vaatimukset ja/tai viralliset määräykset Technical terms of Delivery and/or Official Regulations
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Laatuvaatimukset Quality Specifications SA516 GR 70 MTLTV ASME SA516-11A/ASTM A516-10 PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20			
---	--	--	--

Positio Item	Mitat mm Dimensions mm	Merkki Mark	Kpl Pcs	Paino kg Weight kg	Sulatus levy nro Cast plate No	SP nro SP No	UT UT	MT MT
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### NORMALIZED STEEL PLATES

TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0  
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.

SURFACE CONDITION EN 10 163-2:2005 CLASS B3

003	12.70 X 3048	X	12192	1/2X120X480 OMS PO 9392	2	7410	58396	028	028
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TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0

MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.

SURFACE CONDITION EN 10 163-2:2005 CLASS B3

004	15.88 X 3048	X	12192	5/8X120X480 OMS PO 9392	2	9264	58640	021	021
-----	--------------	---	-------	-------------------------	---	------	-------	-----	-----

004	15.88 X 3048	X	12192		2	9264	58640	023	023
-----	--------------	---	-------	--	---	------	-------	-----	-----

TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0

MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.

SURFACE CONDITION EN 10 163-2:2005 CLASS B3

005	19.05 X 2438	X	12192	3/4X96X480 OMS PO 9392	2	8892	58640	011	011
-----	--------------	---	-------	------------------------	---	------	-------	-----	-----

005	19.05 X 2438	X	12192		2	8892	58640	012	012
-----	--------------	---	-------	--	---	------	-------	-----	-----

TOLERANCES WIDTH +12.5 -3.0 LENGTH +22.0 -3.0

MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.

SURFACE CONDITION EN 10 163-2:2005 CLASS B3

006	19.05 X 3048	X	12192	3/4X120X480 OMS PO 9392	1	5557	58393	013	013
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006	19.05 X 3048	X	12192		1	5557	58393	024	024
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006	19.05 X 3048	X	12192		1	5557	58393	031	031
-----	--------------	---	-------	--	---	------	-------	-----	-----

006	19.05 X 3048	X	12192		1	5557	58393	032	032
-----	--------------	---	-------	--	---	------	-------	-----	-----

006	19.05 X 3048	X	12192		1	5557	58393	033	033
-----	--------------	---	-------	--	---	------	-------	-----	-----

006	19.05 X 3048	X	12192		1	5557	58393	034	034
-----	--------------	---	-------	--	---	------	-------	-----	-----

TOLERANCES WIDTH +12.5 -3.0 LENGTH +22.0 -3.0

MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.

SURFACE CONDITION EN 10 163-2:2005 CLASS B3

007	22.23 X 3048	X	12192	7/8X120X480 OMS PO 9392	1	6485	57251	023	023
-----	--------------	---	-------	-------------------------	---	------	-------	-----	-----

007	22.23 X 3048	X	12192		1	6485	57744	021	021
-----	--------------	---	-------	--	---	------	-------	-----	-----

### Raabe Steel Works

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and inspection

*Jaakko Juuso*

JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name:  
Kotipaikka Registered Office:

RUUKKI METALS OY  
HELSINKI

Osoite Address:

PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone:

020 5911  
+358 20 5911

Telekopio Telefax:

020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

### LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: M2 Gussets  
ACCEPTED DATE: 4/3/13  
SIGNATURE: *AV*

36 37

Tämä on sähköinen kopio alkuperäisestä asiakirjasta.  
This is an electronic copy of the original document.

# RUUKKI

## AINESTODISTUS TEST REPORT

EN 10 204-3.1 (2004)

6/10  
A 27492 -001  
30.10.2012

Tilaja Purchaser  
OLBERT METAL SALES LIMITED  
SUITE 305  
Tilaus nro Order No.  
TO-9392

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
SUITE 305  
Asiakkaan merkki Shipping mark

Päivämäärä Date  
28.11.2012 LV  
Valmistajan merkki  
Mark of the Manufacturer

Laji Grade  
SA516 GR 70 MTLTV

Lisävaatimukset Additional requirements

Jatkuvavalettua happiterästä  
Oxygen steel, continuous casting  
Fully killed, Fine grain practiced

Laatuselvitys Quality Specifications

PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

N 920C,T=1.1(MIN)XTHICKN(MM)

Pos. Item	Sulatus, k:erä nro Cast, test No	T-tila Cond	Vetokoe    Tensile test																Taivutuskoe Bend test		Huom Nb	Päästö Tempering	F			
			K2	F	RP02 KSI	RT05 KSI	REL KSI	REH KSI	1	RM KSI	2	3	A %	50	80	200	REH /RM	RM * A5	1	RAZ %				2	3	Keskiarvo Average
002	58397	015	N	F1		50					74															
003	58396	011	N	F1		51					75															
003	58396	012	N	F1		51					75															
003	58396	013	N	F1		50					74															
003	58396	021	N	F1		50					73															
003	58396	028	N	F1		51					75															
004	58640	021	N	F1		50					75															
004	58640	023	N	F1		50					75															
005	58640	011	N	F1		48					74															
005	58640	012	N	F1		51					75															
006	58393	013	N	F1		49					75															
006	58393	024	N	F1		47					73															
006	58393	031	N	F1		47					74															
006	58393	032	N	F1		48					74															

K2: F1=TOP,TRANSV.

N=NORMALIZED

Pos. Item	Sulatus, K:erä nro Cast, test No	Isukoke Impact test							Sitkeämurtuma Ductile fracture				Erikoiskokeet Special tests					Huom Nb	Päästö Tempering F
		K3	F	1	2	3	Keskiarvo Average		1	2	3	Keskiarvo Average	K4	F	1	2	Keskiarvo Average		
002	58397	015	115	-051	83	96	81	87					1B				148		
003	58396	011	111	-051	124	126	116	122					1B				142		
003	58396	012	111	-051	94	87	101	94					1B				144		
003	58396	013	111	-051	100	111	97	103					1B				146		
003	58396	021	111	-051	85	101	65	83					1B				144		
003	58396	028	111	-051	92	97	102	97					1B				145		
004	58640	021	111	-051	103	101	80	94					1B				141		
004	58640	023	111	-051	96	91	89	92					1B				142		
005	58640	011	111	-051	111	126	123	120					1B				141		
005	58640	012	111	-051	75	69	77	74					1B				112		
006	58393	013	111	-051	95	97	101	97					1B				128		
006	58393	024	111	-051	105	103	80	96					1B				143		
006	58393	031	111	-051	107	94	76	92					1B				141		
006	58393	032	111	-051	111	115	105	111					1B				141		

K3: 115=CH-V/ISO-V(J),7.5X10,TOP, LONGIT,KV600 111=CH-V/ISO-V(J),10X10,TOP, LONGIT,KV600  
K4: 1B=HARDNESS/HB TOP

Raabe Steel Works

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and inspection

*Jaakko Juuso*

JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osasto Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: M2 Gussets  
ACCEPTED DATE: 4/3/13  
SIGNATURE: *AK*

36 37

# RUUKKI

## ANALYYSITODISTUS ANALYSIS CERTIFICATE ANALYSEBESCHEINIGUNG COMPOSITIO CHIMIQUE CERTIFICAT СЕРТИФИКАТ АНАЛИЗА

9/10  
A 27492 -001  
30.10.2012 -

Sulatus nro Cast No Schmelzen Nr. No de coulée № Плавки	Koe nro Test No Prüf Nr. Essai No № Пробы	Positio Item Pos. Poste Пос.	Cekv Ceq Cqg Ceqv	Analysi % Chemical composition % Chemisch Zusammensetzung % Composition Chimique % Анализ плавки % (*-ppm)	Päivämsärrä Date Datum Date Дата 28.11.2012 LV														
				C	SI	MN	P	S	AL	NB	V	TI	CU	CR	NI	MO	N	SN	B
58393	001	.39	.188	.33	1.11	.008	.001	.032	.001	.010	.004	.013	0.04	0.04	.004	.004	.004	.0004	
58397	002	.37	.181	.32	1.08	.009	.002	.039	.000	.007	.004	.011	0.04	0.03	.003	.005	.005	.0002	
58396	003	.38	.187	.32	1.09	.008	.001	.033	.001	.008	.004	.010	0.04	0.03	.003	.004	.003	.0003	
58640	004	.38	.190	.30	1.08	.010	.002	.025	.000	.009	.003	.008	0.05	0.03	.003	.004	.002	.0002	
58640	005	.38	.190	.30	1.08	.010	.002	.025	.000	.009	.003	.008	0.05	0.03	.003	.004	.002	.0002	
58393	006	.39	.188	.33	1.11	.008	.001	.032	.001	.010	.004	.013	0.04	0.04	.004	.004	.004	.0004	
57251	007	.40	.199	.35	1.09	.010	.001	.040	.015	.008	.004	.011	0.05	0.04	.005	.003	.003	.0002	
57744	007	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003	
57251	008	.40	.199	.35	1.09	.010	.001	.040	.015	.008	.004	.011	0.05	0.04	.005	.003	.003	.0002	
57744	009	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003	
58475	009	.42	.209	.37	1.14	.010	.001	.041	.015	.008	.004	.014	0.05	0.04	.004	.003	.004	.0003	
57744	010	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003	

### LESENA QUALITY CONTROL

JOB: 12-13  
ITEM: M2 Gussets  
ACCEPTED DATE: 4/3/13  
SIGNATURE: *[Signature]*

36 37

CEQ=C+MN/6+(CR+MO+V)/5+(NI+CU)/15

### Raabe Steel Works

Testaus ja tarkastus  
Prüfung und Kontrolle

Testing and Inspection  
Essais et Contrôle

Испытание и контроль качества

Steel manufactured and supplied by Rautaruukki is free from radiation.  
Производимая на металлургическом комбинате «Rautaruukki» и поставляемая заказчику сталь не излучает радиацию.

*[Signature]*

JAAKKO JUUSO

Valtuutettu tarkastaja  
Sachverständiger

Authorized inspection representative  
Inspector autorisé

Уполномоченный инспектор

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telfax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7





ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8009604 000020 2013/05/01		Shipment No. & Date.: 1000044801 2013/05/01		TC No., Date & Time : ESA-69300 2013/05/01 - 17:03:18											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19148-8271 / 2 BOL NO.: 12919 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 5836											
Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 30 min per inch Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2, SA20 Fine Grain Fully Killed															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec					Cust Use : PVQ										
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L) 1.2500 " x 120.000 " x 480.00 "		Batch No. AD5130	Heat No-MS 5939P3-02	Quantity 20,419 LB	Pcs 1										
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%) 5939P3*	C 0.24	Mn 1.02	P 0.015	S 0.009	Si 0.240	Cr 0.15	Ni 0.03	Cu 0.07	Mo 0.01	Al 0.041	Nb 0.000	V 0.001	B 0.0002	Ti 0.003	DO 0.45
*****MECHANICAL PROPERTIES*****															
Tensile Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)			
5939P3	AD5130	✓	166"	ALG	1.2500	N	.2	T B	47.0	77.0	2"	33			

LEENA QUALITY CONTROL  
JOB: 12-32  
ITEM: LL1,2 10" x 32.5"  
ACCEPTED DATE: 05/09/13  
SIGNATURE: *[Signature]*

39

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8009604 000020 2013/04/30		Shipment No. & Date.: 1000044511 2013/04/30		TC No., Date & Time : ESA-68836 2013/04/30 - 17:21:04											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19148-8271 / 2 BOL NO.: 12916 a-b Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 2540											
Customer Specification : HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 30 min per inch Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2. SA20 Fine Grain Fully Killed															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec					Cust Use : PVQ										
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs										
1.2500 " x 120.000 " x 480.00 "		AD5131	5939P3-04	20,419 LB	1										
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs										
1.2500 " x 120.000 " x 480.00 "		AD5132	5939P3-53	20,419 LB	1										
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
5939P3*	0.24	1.02	0.015	0.009	0.240	0.15	0.03	0.07	0.01	0.041	0.000	0.001	0.0002	0.003	0.45
*****MECHANICAL PROPERTIES*****															
Tensile Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)			
5939P3	AD5131	166"	ALG	1.2500	N	.2	T	B	46.0	77.0	2"	31			
5939P3	AD5132 ✓	166"	ALG	1.2500	N	.2	T	B	49.0	79.0	2"	35			

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: L1,2 10'x 32.5"  
ACCEPTED DATE: 05/09/13  
SIGNATURE: *JK*

39

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000130 2012/12/13		Shipment No. & Date.: 1000023068 2013/01/02		TC No., Date & Time : ESA-38122 2013/01/03 - 10:50:16											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19025-STK / 13 BOL NO.: 1000023068 Cust. Part No.: Carrier: GBS & SONS TRUCKING LTD. - 414 REV											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 30 min per inch CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs				
2.0000 " x 120.000 " x 288.00 "		AB6700	2138P3-05	19,602 LB	1	2.0000 " x 120.000 " x 288.00 "		AB6701	2138P3-54	19,602 LB	1				
2.0000 " x 120.000 " x 288.00 "		AB6702	2259P3-05	19,602 LB	1										
***** CHEMICAL PROPERTIES *****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
2138P3*	0.19	1.08	0.012	0.004	0.320	0.02	0.15	0.03	0.00	0.026	0.000	0.014	0.0003	0.002	0.3900
2259P3*	0.19	1.10	0.009	0.005	0.330	0.04	0.15	0.04	0.01	0.034	0.000	0.015	0.0002	0.003	0.4000
***** MECHANICAL PROPERTIES *****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
2138P3	AB6700	166"	ALG	2.0000	NORM	B	HBW	151							
2138P3	AB6701	166"	ALG	2.0000	NORM	B	HBW	151							
2259P3	AB6702	166"	ALG	2.0000	NORM	B	HBW	151							

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY JOB SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: 7L 1,2,3,4  
ACCEPTED DATE: 4/11/13  
SIGNATURE:

Date: 2013/01/03 Time: 10:50:16 Page no: 1 of 2



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000130 2012/12/13	Shipment No. & Date.: 1000023068 2013/01/02	TC No., Date & Time : ESA-38122 2013/01/03 - 10:50:16
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 13 BOL NO.: 1000023068 Cust. Part No.: Carrier: GBS & SONS TRUCKING LTD. - 414 REV
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 30 min per inch CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
***** MECHANICAL PROPERTIES *****		
Impact Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC SIZE TEMP(°F) ENERGY(ft-lbf) ENERGY AVG(ft-lbf)
2138P3	AB6700	166" ALG 2.0000 NORM CVN L B FULL -50 77 87 77 81
2138P3	AB6701	166" ALG 2.0000 NORM CVN L B FULL -50 64 59 84 69
2259P3	AB6702	166" ALG 2.0000 NORM CVN L B FULL -50 83 64 90 79
Tensile Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC YIELD(KSI) TENSILE(KSI) EL SCALE ELONG(%)
2138P3	AB6700	166" ALG 2.0000 NORM .2 T B 48.0 75.0 2" 32
2259P3	AB6702	166" ALG 2.0000 NORM .2 T B 48.5 75.0 2" 32

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Date: 2013/01/03 Time: 10:50:16 Page no: 2 of 2

JOB: 12-32  
ITEM: TL 1,2,3,4  
ACCEPTED DATE: 4/1/13  
SIGNATURE:

(L2)



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8003452 000020 2013/01/24	Shipment No. & Date.: 1000026966 2013/01/24	TC No., Date & Time : ESA-44016 2013/01/24 - 22:34:28											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 18383-STK / 2 BOL NO.: 1000026966 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 44008 269											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (09) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, per EN 10204 3.1, per latest Ed. & Addenda of ASME Code Section II Fully Killed Fine Grain As Rolled Flatness 1/2 A20 Std Thickness Tol PVQ Top and Bottom Standard Surface No Weld Repair													
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370													
Insp T/R : Test Report As Per Spec		Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.													
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM													
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS. PLATES PRODUCED FROM COIL.													
Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs				
0.2500 " x 96.000 " x 480.00 "	C03519	3315P3-56	6,534 LB	2	0.2500 " x 96.000 " x 480.00 "	C03520	3315P3-56	3,267 LB	1				
0.2500 " x 96.000 " x 480.00 "	C03521	3315P3-56	3,267 LB	1									
*****CHEMICAL PROPERTIES*****													
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	Ti
3315P3*	0.23	0.98	0.012	0.003	0.250	0.14	0.02	0.03	0.00	0.033	0.000	0.001	0.002
*****MECHANICAL PROPERTIES*****													
Hardness Tests													
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS					
3315P3		106"	ALG	0.2500	AR	F	HBW	186					
3315P3		106"	ALG	0.2500	AR	F	HBW	159					

LESENA QUALITY CONTROL	
JOB:	Stock
ITEM:	NP. FB
ACCEPTED DATE:	03/24/13
SIGNATURE:	<i>[Signature]</i>

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

41

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8003452 000020 2013/01/24	Shipment No. & Date.: 1000026966 2013/01/24	TC No., Date & Time : ESA-44016 2013/01/24 - 22:34:28										
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 18383-STK / 2 BOL NO.: 1000026966 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 44008 269										
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (09) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, per EN 10204 3.1, per latest Ed. & Addenda of ASME Code Section II Fully Killed Fine Grain As Rolled Flatness 1/2 A20 Std Thickness Tol PVQ Top and Bottom Standard Surface No Weld Repair												
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R : Test Report As Per Spec		Cust Use : PVQ										
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
3315P3	C03519	106"	ALG	0.2500	AR	.2	T	F	49.4	77.0	2"	22
3315P3	C03520	106"	ALG	0.2500	AR	.2	T	F	49.4	77.0	2"	22
3315P3	C03521	106"	ALG	0.2500	AR	.2	T	F	49.4	77.0	2"	22
3315P3	C03519	106"	ALG	0.2500	AR	.2	T	M	47.8	76.4	2"	22
3315P3	C03520	106"	ALG	0.2500	AR	.2	T	M	47.8	76.4	2"	22
3315P3	C03521	106"	ALG	0.2500	AR	.2	T	M	47.8	76.4	2"	22
3315P3	C03519	106"	ALG	0.2500	AR	.2	T	B	49.7	77.7	2"	22
3315P3	C03520	106"	ALG	0.2500	AR	.2	T	B	49.7	77.7	2"	22
3315P3	C03521	106"	ALG	0.2500	AR	.2	T	B	49.7	77.7	2"	22

LESENA QUALITY CONTROL	
JOB:	Stock
ITEM:	N.P. F.B.
ACCEPTED DATE:	3/22/13
SIGNATURE:	<i>[Signature]</i>

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

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41



# METALLURGICAL TEST REPORT

NORTH AMERICAN STAINLESS  
6870 HIGHWAY 42 EAST  
GHENT, KY 41045

6870 HIGHWAY 42 EAST

Certificate: 682890 1 Mail To:

Ship To:

Date: 11/01/2011 Page: 1

Customer: 007050 001

Steel: 304/304L

Finish: HRAP

Your Order: 26662

NAS Order: PN 0015640 11

Corrosion: ASTM A262/02aE;180Bend-OK

## PRODUCT DESCRIPTION:

STAINLESS STEEL CONT.MILL PLATE, HRAP; UNS 30400/30403  
ASTM A240/10,A480/10,A666/10; ASME SA240/10,SA480/10,SA666/10  
CHEM ONLY ON FOLLOWING ASTM: A276/10,A479/10a,A484/10,A312/09  
CHEM ONLY ON FOLLOWING ASME: SA312/10,SA479/10  
AMS5511H/5513J XMRK; MIL-S-5059D AMD3(X CRN MEAS); MIL-S-4043B  
NACE MR0175/01, MR0103/07; QQS766D-A X MAG PERM  
MIN. SOLUTION ANNEAL TEMP 1900F, WATER QUENCHED

## REMARKS:

Mat'l is Free of Mercury Contamination. No weld repairs.  
EN 10204:2004 3.1; QQS763F Cond A; RoHS Compliant  
Material is Free of Radioactive Contamination  
NAS Steel Making Process: EAF, AOD, & Cont. Casting  
Product Mfg.by a Quality Mgt.Sys. in Conf. w/ISO 9001  
\*Melted & Manufactured in the USA; Mat'l is DFARS Compliant  
EN 10204 3.1.B

Product Id	Coil #	Skid #	Thickness	Width	Weight	-----Length-----	Mark	Pieces	Commodity Code
D89340	04A1M5 C		.1830	60.0000	3,045	SHEETS	240.00	21	4

## CHEMICAL ANALYSIS CM(Country of Melt) ES(Spain) US(United States) ZA(South Africa) JP(Japan)

HEAT	CM	C	CR	CU	MN	MO	N	NI	P	S
A1M5 ✓	US	.0184	18.0540	.6315	1.5450	.3705	.0722	8.0415	.0400	.0010
SI										
.3390										

## MECHANICAL PROPERTIES

Product Id#	Coil #	1 d o i c r	UTS KSI	.2% YS KSI	ELONG %-2"	Hard RB	Tail Hard
D89340	04A1M5	F T	89.47	47.05	49.82	85.50	86.50

LESENA QUALITY CONTROL

JOB: 12-32

ITEM: Name Pl Bkt.

ACCEPTED DATE: 4/10/13

SIGNATURE:

NAS hereby certifies that the analysis on this certification is correct and the material meets the specifications stated.

Technical Dept. Mgr.

ERIC HESS

11/01/2011

**OUTOKUMPU****INSPECTION CERTIFICATE 3.1**  
EN 10204 3.1Certificate No.  
Zeugnis Nr.  
N° de certificat


462622/002

Page  
Seite  
Page

1(01)

Date Datum Date

20.11.07

Delivery address, Empfänger, Utu de livraison <b>ROLARK STAINLESS STEEL INC.</b> <b>PAUL KELLY</b> <b>140 PLANCHET ROAD</b> <b>CONCORD, ONT. L4K 2C7</b> <b>CANADA</b>				<b>ROLARK STAINLESS STEEL INC.</b> <b>PAUL KELLY</b> <b>140 PLANCHET ROAD</b> <b>CONCORD, ONT. L4K 2C7</b> <b>CANADA</b>			
Requirements, Anforderungen, Edigeuiss <b>ASTM A240/A240M -07</b> <b>ASME 2007 SEC. II PART A SA-240</b> <b>ASTM A240/A240M -07</b> <b>ASME 2007 SEC. II PART A SA-240</b> <b>EN 10028-7</b>				Our Order No. Unser Auftrag Nr. Notre commande n° <b>22583</b>		Your order, Ihre Bestellung, Votre commande <b>18334</b> <b>MADE IN FINLAND</b>	
Product, Erzeugnisform, Produkt <b>COIL, STAINLESS STEEL</b>				Mark of Manufacturer Zeichen des Lieferanten Signe de producteur <b>OUTOKUMPU</b>		Process Erzeugnisverfahren Mode de fabrication <b>AOD</b>	
Grade, Werkstoff, Marque <b>TYPE 304L TYPE 304 1.4307</b>				Tolerances Toleranzen, Tolérances <b>ASTM A 480</b>		Inspector's stamp Zeichen d. Sachverständigen Poinçon de l'expert 	
Marking, Kennzeichnung, Marquage <b>A/SA-240 304L 1</b>				Marking, Verständzeichen, Marques 			
Line Reihe Ligne	Item Position Poste	Charge test No. Schmelz-Probennr. Coulée n°	Size, Abmessungen, Dimensions		Quantity Stückzahl Nombre	Weight, Gewicht, Poids	Finish Ausführung Fini
1	4	65548 5	0,25" X 48"			15124 LBS	1
2	7	65658 2	0,25" X 60"			29916 LBS	1
Chemical composition, Chemische Zusammensetzung, Composition chimique							
	C	Si	Mn	P	S	Cr	Ni
	%	%	%	%	%	%	%
65548	0,020	0,37	1,65	0,031	0,005	18,2	8,1
65658	0,026	0,40	1,61	0,033	0,002	18,1	8,1
Mechanical properties, Mechanische Eigenschaften, Caractéristiques mécaniques							
Line Reihe Ligne	Location Ort Lieu	Rp0,2 N/mm²	Rp1,0 N/mm²	Rm N/mm²	A5 %	A50 %	Hardness Härte/Dureté HRB
1	E	301	350	619	53	52	88
2	E	296	345	621	53	53	85
Identify test, Versuchsgegenstand, Contrôle d'identification Size, Abmessungen, Dimensions Surface, Oberfläche, Surface Test of integrity, Prüfung auf Integrität, Korros. Test de corré, Intégrité <b>ASTM A262-02A83 PRACTICE E : OK</b>							<b>OK</b> <b>OK</b> <b>OK</b>
MATERIAL FULFILLS ALSO REQUIREMENTS: <b>ASTM A480/A480M, ASME SA480/SA480M, ASTM A666</b> <b>MATERIAL IS FREE FROM MERCURY CONTAMINATION</b> <b>MATERIAL IS FREE OF CUBAN NICKEL</b> <b>HEAT TREATMENT 1040 C</b> <b>TENSILE STRENGTH (RM) IS LESS THAN 800 N/MM2</b> <b>C &lt; 0.25% S &lt; 0.05% P &lt; 0.05%</b> <b>NO WELDS</b>							We certify that the above mentioned products comply with the terms of the order contract. Wir bestätigen, dass die Lieferung den Vereinbarungen der Bestellung entspricht. Nous certifions que les produits susmentionnés et/ou suscités sont conformes aux prescriptions de la commande. This test certificate is made by controlled ADP-system and is valid without signature. Dieses Zeugnis wurde von einem überprüften Datenverarbeitungssystem erstellt und ist ohne Unterschrift gültig. Ce certificat a été établi par un système informatique contrôlé et est valide sans signature. <b>Outokumpu Stainless Oy</b> <b>Anne-Maria Salmi</b> Authorized Inspector Werkstoffverständiger Inspecteur (titulaire) <b>ANNE-MARIA SALMI</b> FIN-00400 Turku, Finland Tel. +358 10 4321 Fax +358 10 432 230 www.outokumpu.com Company: Turku, Finland, Business Identity Code 0422346-9

RECEIVED BY: CONTROL

JOB: 12-32

DIM: 1 1/4" x 19 x 112 5/8" #43

ACCEPTED DATE: 11/18/2008

SIGNATURE: [Signature]

1000P18334

(43)





US-ML-PETERSBURG  
25801 HOFHEIMER WAY  
PETERSBURG, VA 23803  
USA

CERTIFIED MATERIAL TEST REPORT

CUSTOMER SHIP TO RUSSEL METALS INC 15 CHERRY BLOSSOM RD CAMBRIDGE, ON N3H 4R7 Canada		CUSTOMER BILL TO RUSSEL METALS INC 1900 MINNESOTA CRT MISSISSAUGA, ON L5N 3C9 Canada		GRADE 992/572-50	SHAPE / SIZE WFBEAM SHAPE_I / 10 X 49# / 250 X 73	
SALES ORDER 214100/000060		SPECIFICATION / DATE of REVISION A572/A572M-07 A992/A992M-11 ASTM A6/A6M-11		LENGTH 60'00"	WEIGHT 5,880 LB	HEAT / BATCH 6010270904 ✓
CUSTOMER PURCHASE ORDER NUMBER 34026092-WF512		BILL OF LADING 1330-0000013177		DATE 01/02/2013		

CHEMICAL COMPOSITION													
C %	Mn %	P %	S %	Si %	Cu %	Ni %	Cr %	Mo %	Sn %	V %	Nb %	Al %	
0.08	0.94	0.012	0.031	0.21	0.37	0.10	0.07	0.015	0.015	0.002	0.018	0.003	

CHEMICAL COMPOSITION	
CEqvA6 %	0.3

MECHANICAL PROPERTIES		UTS		YS		UTS		G/L		G/L	
YS	KSI	UTS	KSI	YS	MPa	UTS	MPa	G/L	Inch	G/L	mm
51.4		67.4		354		465		8.000		200.0	
51.3		67.9		354		468		8.000		200.0	

MECHANICAL PROPERTIES		Y/T ratio	
Elong %	Y/T ratio %		
25.90	0.763		
25.80	0.755		

COMMENTS / NOTES

TEST CERT. #  
  
C62266

LEGEND: QUALITY CONTROL  
JOB: 12-32  
ITEM: 44 - W10 X 49 H  
ACCEPTED DATE: 05/07/13  
SIGNATURE:

44

The above figures are certified chemical and physical test records as contained in the permanent records of company. This material, including the billers, was melted and manufactured in the USA. We certify that these data are correct and in compliance with specified requirements. CMTR complies with EN 10204 3.1.

BHASKAR YALAMANCHILI  
QUALITY DIRECTOR

WADE LUMPKINS  
QUALITY ASSURANCE MGR.



US-ML-PETERSBURG  
25801 HOFHEIMER WAY  
PETERSBURG, VA 23803  
USA

## CERTIFIED MATERIAL TEST REPORT

Page 1/1

CUSTOMER SHIP TO RUSSEL METALS INC 15 CHERRY BLOSSOM RD CAMBRIDGE, ON N3H 4R7 Canada		CUSTOMER BILL TO RUSSEL METALS INC 1900 MINNESOTA CRT MISSISSAUGA, ON L5N 3C9 Canada		GRADE 992/572-50	SHAPE / SIZE WFBEAM SHAPE_1 / 10 X 49# / 250 X 73	
SALES ORDER 214100/000060		LENGTH 60'00"		WEIGHT 41,160 LB	HEAT / BATCH 6010270908 ✓	
CUSTOMER PURCHASE ORDER NUMBER 34026092-WF512		BILL OF LADING 1330-0000013177		DATE 01/02/2013		
SPECIFICATION / DATE or REVISION A572/A572M-07 A992/A992M-11 ASTM A6/A6M-11						

C6-2266  
PAGE 2 OF 2

CHEMICAL COMPOSITION												
C %	Mn %	P %	S %	Si %	Cu %	Ni %	Cr %	Mo %	Sn %	V %	Nb %	Al %
0.08	0.94	0.012	0.031	0.21	0.37	0.10	0.07	0.015	0.015	0.002	0.018	0.003

CHEMICAL COMPOSITION												
CEq <sub>A6</sub> %												
0.3												

MECHANICAL PROPERTIES											
YS KSI	UTS KSI	YS MPa	UTS MPa	G/L Inch	G/L mm						
51.4	67.4	354	465	8.000	200.0						
51.3	67.9	354	468	8.000	200.0						

MECHANICAL PROPERTIES			
Elong. %	Y/T ratio %		
25.90	0.763		
25.80	0.755		

COMMENTS / NOTES	<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>LESINA QUALITY CONTROL</p> <p>JOB: 12-32</p> <p>ITEM: (48) W10 X 49#</p> <p>ACCEPTED DATE: 05/07/12</p> <p>SIGNATURE: _____</p> </div>
------------------	--

44

The above figures are certified chemical and physical test records as contained in the permanent records of company. This material, including the billets, was melted and manufactured in the USA. We certify that these data are correct and in compliance with specified requirements. CMTR complies with EN 10204 3.1.

*Maskar*

BHASKAR YALAMANCHILI  
QUALITY DIRECTOR

*Wade A. L...*

WADE LUMPKINS  
QUALITY ASSURANCE MGR.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8007126 000030 2013/01/31		Shipment No. & Date.: 1000028791 2013/02/05		TC No., Date & Time : ESA-46616 2013/02/05 - 15:05:34											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19303-STK / 3 BOL NO.: 1000028791 Cust.Part No.: Carrier : NATIONAL TRANSPORTATION - 6201(1137)											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs					
0.5000 " x 120.000 " x 480.00 "		AC2064	3605P3-53	16,336 LB	2	0.5000 " x 120.000 " x 480.00 "	AC2882	3781P3-04	16,336 LB	2					
0.5000 " x 120.000 " x 480.00 "		AC2883	3781P3-53	16,336 LB	2										
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3605P3*	0.19	1.10	0.009	0.004	0.330	0.03	0.19	0.05	0.01	0.031	0.000	0.016	0.0002	0.003	0.4000
3781P3*	0.20	1.08	0.011	0.003	0.340	0.02	0.14	0.02	0.00	0.029	0.000	0.015	0.0002	0.003	0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
3605P3	AC2064	166"	ALG	0.5000	N	B	HBW	158							
3781P3	AC2882	166"	ALG	0.5000	N	B	HBW	156							
3781P3	AC2883	166"	ALG	0.5000	N	B	HBW	156							

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL

12-32

Leg Repads

ACCEPTED DATE:

SIGNATURE:

Date:2013/02/05 Time:17:05:14 Page no:1 of 2

45



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8007126 000030 2013/01/31	Shipment No. & Date.: 1000028791 2013/02/05	TC No., Date & Time : ESA-46616 2013/02/05 - 15:05:34										
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19303-STK / 3 BOL NO.: 1000028791 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 6201(1137)										
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Fine Grain Fully Killed No Weld Repair												
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R : Test Report As Per Spec		Cust Use : PVQ										
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Impact Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)
3605P3	AC2064	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	74 111 113	99
3781P3	AC2882	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	108 125 122	118
3781P3	AC2883	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	98 88 104	97
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
3605P3	AC2064	166"	ALG	0.5000	N	.2	T	B	53.7	77.5	8"	27
3781P3	AC2882	166"	ALG	0.5000	N	.2	T	B	51.2	74.6	8"	29
3781P3	AC2883	166"	ALG	0.5000	N	.2	T	B	52.5	75.8	8"	29

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	Leg Repads
ACCEPTED DATE:	4/3/13
SIGNATURE:	<i>[Signature]</i>

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2012/12/15	Shipment No. & Date.: 1000022861 2013/01/02	TC No., Date & Time : ESA-37980 2013/01/02 - 18:11:54													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES INC KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES INC KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000022861 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 14008 (265)													
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs						
0.5000 " x 120.000 " x 480.00 "	AB6375	2259P3-03	16,336 LB	2	0.5000 " x 120.000 " x 480.00 "	AB6376	2259P3-53	16,336 LB	2						
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
2259P3*	0.19	1.10	0.009	0.005	0.330	0.04	0.15	0.04	0.01	0.034	0.000	0.015	0.0002	0.003	0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
2259P3	AB6375	166"	ALG	0.5000	NORM	B	HBW	155							
2259P3	AB6376	166"	ALG	0.5000	NORM	B	HBW	153							

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: Log Repads  
ACCEPTED DATE: 4/3/13  
SIGNATURE: [Signature]

45

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2012/12/15	Shipment No. & Date.: 1000022861 2013/01/02	TC No., Date & Time.: ESA-37980 2013/01/02 - 18:11:54										
Sold to Customer Name and Address: CANADIAN PLATE AND PROFILES INC KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES INC KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000022861 Cust. Part No.: Carrier: TRIPLE K TRANSPORT LTD - 14008 (265)										
Customer Specification: HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair												
Supplementary Instructions: Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R: Test Report As Per Spec		Cust Use: PVQ										
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Impact Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)
2259P3	AB6376	166"	ALG	0.5000	NORM	CVN	L	B	FULL	-50	110 196 101	136
2259P3	AB6375	166"	ALG	0.5000	NORM	CVN	L	B	FULL	-50	115 106 118	113
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
2259P3	AB6376	166"	ALG	0.5000	NORM	.2	T	B	52.5	74.5	8"	26
2259P3	AB6375	166"	ALG	0.5000	NORM	.2	T	B	53.5	74.5	8"	27

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	Leg Repairs
ACCEPTED DATE:	4/3/13
SIGNATURE:	<i>[Signature]</i>

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

45

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2013/01/03		Shipment No. & Date.: 1000023168 2013/01/03		TC No., Date & Time : ESA-38371 2013/01/03 - 23:09:41											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000023168 Cust. Part No.: Carrier : INTERNATIONAL FREIGHT SYSTEMS - OSH88											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L) 0.5000 " x 120.000 " x 480.00 "		Batch No. AB6374	Heat No-MS 2259P3-03	Quantity 16,336 LB	Pcs 2										
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%) 2259P3*	C 0.19	Mn 1.10	P 0.009	S 0.005	Si 0.330	Cr 0.04	Ni 0.15	Cu 0.04	Mo 0.01	Al 0.034	Nb 0.000	V 0.015	B 0.0002	Ti 0.003	DO 0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
2259P3	AB6374	166"	ALG	0.5000	NORM	B	HBW	155							
Impact Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(R-lbf)	ENERGY AVG(R-lbf)			
2259P3	AB6374	166"	ALG	0.5000	NORM	CVN	L	B	FULL	-50	123 107 110	113			

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: Leg Repads  
ACCEPTED DATE: 4/3/13  
SIGNATURE: [Signature]

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

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46



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2013/01/03		Shipment No. & Date.: 1000023168 2013/01/03		TC No., Date & Time : ESA-38371 2013/01/03 - 23:09:41								
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000023168 Cust.Part No.: Carrier : INTERNATIONAL FREIGHT SYSTEMS - OSH88								
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair												
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R : Test Report As Per Spec				Cust Use : PVQ								
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
2259P3	AB6374	166"	ALG	0.5000	NORM	.2	T	B	53.5	75.0	8"	26

<b>LESENA QUALITY CONTROL</b>	
JOB:	12-32
ITEM:	leg Repairs
ACCEPTED DATE:	4/8/13
SIGNATURE:	<i>[Signature]</i>

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

46

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ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2012/12/15	Shipment No. & Date.: 1000022861 2013/01/02	TC No., Date & Time : ESA-37980 2013/01/02 - 18:11:54													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES INC KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES INC KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000022861 Cust. Part No.: Carrier: TRIPLE K TRANSPORT LTD - 14008 (265)													
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVN L Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs						
0.5000 " x 120.000 " x 480.00 "	AB6375	2259P3-03	16,336 LB	2	0.5000 " x 120.000 " x 480.00 "	AB6376	2259P3-53	16,336 LB	2						
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
2259P3*	0.19	1.10	0.009	0.005	0.330	0.04	0.15	0.04	0.01	0.034	0.000	0.015	0.0002	0.003	0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
2259P3	AB6375	166"	ALG	0.5000	NORM	B	HBW	155							
2259P3	AB6376	166"	ALG	0.5000	NORM	B	HBW	153							

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: Leg Repair  
ACCEPTED DATE: 4/3/13  
SIGNATURE: [Signature]

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

46

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ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000040 2012/12/15	Shipment No. & Date.: 1000022861 2013/01/02	TC No., Date & Time : ESA-37980 2013/01/02 - 18:11:54
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND-PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 4 BOL NO.: 1000022861 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 14008 (265)
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
***** MECHANICAL PROPERTIES *****		
Impact Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC SIZE TEMP(°F) ENERGY(ft-lbf) ENERGY AVG(ft-lbf)
2259P3	AB6376	166" ALG 0.5000 NORM CVN L B FULL -50 110 196 101 136
2259P3	AB6375	166" ALG 0.5000 NORM CVN L B FULL -50 115 106 118 113
Tensile Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC YIELD(KSI) TENSILE(KSI) EL SCALE ELONG(%)
2259P3	AB6376	166" ALG 0.5000 NORM .2 T B 52.5 74.5 8" 26
2259P3	AB6375	166" ALG 0.5000 NORM .2 T B 53.5 74.5 8" 27

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	Leg Repad
ACCEPTED DATE:	4/3/13
SIGNATURE:	<i>AW</i>

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

46

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ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8007126 000020 2013/02/01	Shipment No. & Date.: 1000028791 2013/02/05	TC No., Date & Time : ESA-46615 2013/02/05 - 15:05:34													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19303-STK / 2 BOL NO.: 1000028791 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 6201(1137)													
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min. CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L) 0.5000 " x 96.000 " x 480.00 "	Batch No. AC2084	Heat No-MS 3605P3-03													
Quantity 13,068 LB	Pcs 2														
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%) 3605P3*	C 0.19	Mn 1.10	P 0.009	S 0.004	Si 0.330	Cr 0.03	Ni 0.19	Cu 0.05	Mo 0.01	Al 0.031	Nb 0.000	V 0.016	B 0.0002	Ti 0.003	DO 0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
3605P3	AC2084	166"	ALG	0.5000	N	B	HBW	155							
Impact Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)			
3605P3	AC2084	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	102 111 76	96			

LESENA QUALITY CONTROL

JOB: 12-32

ITEM: Leg Repairs

ACCEPTED DATE: 4/3/13

SIGNATURE: [Signature]

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

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ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8007126 000020 2013/02/01		Shipment No. & Date.: 1000028791 2013/02/05		TC No., Date & Time : ESA-46615 2013/02/05 - 15:05:34								
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19303-STK / 2 BOL NO.: 1000028791 Cust.Part No.: Carrier : NATIONAL TRANSPORTATION - 6201(1137)								
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Fine Grain Fully Killed No Weld Repair												
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R : Test Report As Per Spec				Cust Use : PVQ								
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MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
3605P3	AC2084	166"	ALG	0.5000	N	.2	T	B	53.8	77.0	8"	25

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: Leg Repairs  
ACCEPTED DATE: 4/3/13  
SIGNATURE: [Signature]

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

46

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ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 9006986 000020 2013/02/10		Shipment No. & Date.: 1000030099 2013/02/12		TC No., Date & Time.: ESA-48712 2013/02/13 - 15:47:25											
Sold to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO No./Item: 19149-8270 / 2 BOL NO.: 1000030099 Cust. Part No.: Carrier: NATIONAL TRANSPORTATION - 6837 #137											
Customer Specification: HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 30 min per inch Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed															
Supplementary Instructions: Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R: Test Report As Per Spec				Cust Use: PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705) 945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204 2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L) 1.5000" x 120.000" x 468.00"		Batch No. AC1687	Heat No.-MS 3442P3-04	Quantity 23,890 LB	Pcs 1										
CHEMICAL PROPERTIES															
Heat No. (wt%) 3442P3*	C 0.22	Mn 1.01	P 0.008	S 0.003	Si 0.250	Cr 0.15	Ni 0.02	Cu 0.04	Mo 0.00	Al 0.023	Nb 0.000	V 0.001	B 0.0002	Ti 0.002	DO 0.4200
MECHANICAL PROPERTIES															
Tensile Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)			
3442P3	AC1687	166"	ALG	1.5000	N	2	T		51.0	77.0	2"	35			

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Date: 2013/02/15 Time: 10:46:20 Page no: 1 of 1

LESENA QUALITY CONTROL	
JOB:	1233 119 1/2 x 154
ITEM:	Strainer Fl (3 Pcs)
ACCEPTED DATE:	3/28/13
SIGNATURE:	<i>[Signature]</i>

48



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006986 000020 2013/01/25		Shipment No. & Date.: 1000027336 2013/01/27		TC No., Date & Time.: ESA-44602 2013/01/28 - 10:52:12											
Sold to Customer Name and Address: CANADIAN PLATE AND PROFILES INC KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES INC KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 18149-8270 / 2 BOL NO.: 1000027336 Cust. Part No.: Carrier: NATIONAL TRANSPORTATION - 5836 1118											
Customer Specification: HR STEEL PLATE Carbon ASME SA516 GR 70 (11A) Normalized Normalize Temp 1670 °F 30 min per inch Sld Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 SA20 Fine Grain Fully Killed															
Supplementary Instructions: Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R: Test Report As Per Spec				Cust Use: PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705) 945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)		Batch No.	Heat No.-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No.-MS	Quantity	No. of Pcs					
1.5000" x 120.000" x 468.00"		AC1688	3442P3-04	23,890 LB	1	1.5000" x 120.000" x 468.00"	AC1688	3442P3-08	23,890 LB	1					
***** CHEMICAL PROPERTIES *****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3442P3*	0.22	1.01	0.008	0.003	0.250	0.15	0.02	0.04	0.00	0.023	0.000	0.001	0.0002	0.002	0.4200
***** MECHANICAL PROPERTIES *****															
Tensile Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)			
3442P3	AC1688	166"	ALG	1.5000	N	2	T	B	49.0	76.7	2"	38			
3442P3	AC1688	166"	ALG	1.5000	N	2	T	B	49.0	75.1	2"	32			

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELEIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Date: 2013/01/28 Time: 12:05:43 Page no: 1 of 1

LESENA QUALITY CONTROL	
JOB:	12-33
ITEM:	Strainer
ACCEPTED DATE:	3/28/13
SIGNATURE:	



CAMBRIDGE STEEL MILL  
160 ORION PLACE  
CAMBRIDGE ON N1T 1R9 CAN  
(519) 740-2488

Chemical and Physical Test Report  
MADE IN UNITED STATES

Page 7 of 15

N-093784

SHIP TO DEBRO STEEL, DIV OF PREMOTALCO 7 BLAIR DRIVE  BRAMPTON, ON L6T 2H4	INVOICE TO DEBRO STEEL DIV. PREMETALCO INC 7 BLAIR DR. BRAMPTON, ON L6T 2H4	SHIP DATE 09/24/12  CUST. ACCOUNT NO 60073947
--	---	---

PRODUCED IN: ST PAUL

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
R2 1/2	44W	CSA-G10.21-04 GR 44W	2077769-01	31010-01
HEAT I.D.	C	Mn P S Si Cu Ni Cr Mo V Nb N Sn Al Ti Ca Zn Co		
M675927	.17	.96 .007 .032 .21 .18 .08 .07 .014 .003 .000 .0095 .033 .001 .000001 .00100 .01200 .006		

Mechanical Test: Yield 45700 PSI, 315.09 MPA Tensile: 74500 PSI, 513.66 MPA %E: 31.0/2in, 31.0/50.8mm Red R 8.63 Idl Diam: .57 Corrosion Index: 4.3

Customer Requirements SOURCE: GA-STP CASTING: STRAND CAST

Comment melted and MFG in the USA

melt shop heat M122421 melt dtd 7/13/2012, roll lot M675927 roll dtd 8/15/2012

Mechanical Test: Yield 47800 PSI, 329.57 MPA Tensile: 73000 PSI, 503.32 MPA %E: 31.0/2in, 31.0/50.8mm Red R 8.63 Idl Diam: .57 Corrosion Index: 4.3

Customer Requirements SOURCE: GA-STP CASTING: STRAND CAST

Comment made in the USA

LESENA QUALITY CONTROL

JOB:

ITEM:

ACCEPTED DATE:

SIGNATURE:

12-32

2 1/2" stay Bars

10/12/12

AV

50

Customer Notes

NO WELD REPAIRMENT PERFORMED. STEEL NOT EXPOSED TO MERCURY.

This material, including the billets, was melted and manufactured in the United States of America

Bhaskar Yalamanchili  
Quality Director  
Gerdau

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

Metallurgical Services Manager  
ST PAUL STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER, AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller.

Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.

# ESSAR Steel Algoma Inc.

105 West Street, Sault Ste. Marie, Ontario Canada P6A 7B4

CUSTOMER PURCHASE ORDER NUMBER 17232-STK	ENTRY DATE 2012/02/09	CREATE DATE 2012/03/23	TALLY NUMBER S99735	SHIPPER'S NO. 38-	CARRIER NATIONAL TRANS	-11897C	MILL ORDER 17136
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CHARGE TO CUSTOMER NAME AND ADDRESS  
CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO  
L4W 2R6

SHIP TO CUSTOMER NAME AND ADDRESS  
CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO

## MILL TEST REPORTS

ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES.

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

### CUSTOMER SPECIFICATION

HR MULTIPLE CERTIFIED PLATE - CARBON - ASTM A516 GR 70/ASME SA516 GR 70 (10)  
(11A) - CVNL 15/12 FT LBS AT -50 F - FULLY KILLED - FINE GRAIN - SULFIDE SHAPE  
CONTROL CALCIUM TREATED - MEETS NACE MR 0103 LATEST ED - NACE MR 0175 LATEST  
ED. - BHN <200 - PER EN 10204 3.1 - PVO - NORMALIZED - FLATNESS 1/2 A-20 -  
NORM FOR 34 MINUTES MIN. @ 1670 F - NO WELD REPAIRS ALLOWED

### SUPPLEMENTARY INSTRUCTIONS

TEST CERT 1: DAVE JANELLE 905-206-1370 TEST CERT 2: DRAFTING@CA  
NADIANPLATE.COM PLATE TEST COUPON:

THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-2624 COLLECT FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.

INSP TR TEST REPORTS REQUIRED

E000199735 CH

CUST USE RESALE

2012/03/26 12:12

MEETS EN 10204:2004 TYPE 3.1  
ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM  
ALL HEATS FULLY KILLED  
HEATS INDICATED WITH (\*) FINE GRAINED  
HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS

\*\*\*\*\* PRODUCT SHIPPED \*\*\*\*\*

CUSTOMER ITEM 00004 OUR ITEM 503 DIMENSIONS 1.000 X 120 X 480 "

PLATE NUMBER	HEAT-MS	NO. PIECES	WEIGHT
65276	3638M-06	1	16335

PLATE NUMBER	HEAT-MS	NO. PIECES	WEIGHT
65319	3638M-06	1	16335

\*\*\*\*\* MECHANICAL PROPERTIES \*\*\*\*\*

### TENSILE TESTS:

HEAT	PLATE NUMBER	SRCE	Gauge	COND	TEST METH	DIR	YIELD KSI	TENSILE KSI	% ELONG
3638M	65276	166"	1.0000	N	.2	T	55.0	78.0	36(2")
3638M	65319	166"	1.0000	N	.2	T	48.4	74.0	36(2")

### HARDNESS TESTS:

HEAT	PLATE NUMBER	SRCE	Gauge	IN	COND	TEST METH	HARDNESS
3638M	65276	166"	1.0000	N	HBW	153	
3638M	65319	166"	1.0000	N	HBW	149	

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	12" $\phi$ Rebar
ACCEPTED DATE:	4/5/13
SIGNATURE:	<i>[Signature]</i>

LAB  
ALG  
ALG

LAB  
ALG  
ALG

55

PAGE 1 OF 2

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



# ESSAR Steel Algoma Inc.

105 West Street, Sault Ste. Marie, Ontario Canada P6A 7B4

CUSTOMER PURCHASE ORDER NUMBER 17232-STK	ENTRY DATE 2012/02/09	CREATE DATE 2012/03/23	TALLY NUMBER S99735	SHIPPER'S NO. 38-	CARRIER NATIONAL TRANS	-11897C	MILL ORDER 17136
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CHARGE TO CUSTOMER NAME AND ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO  
L4W 2R6

SHIP TO CUSTOMER NAME AND ADDRESS

CANADIAN PLATE AND PROFILES INC  
920 KAMATO ROAD  
MISSISSAUGA ONTARIO

## MILL TEST REPORTS

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K. UGHADPAGA

MANAGER, METALLURGICAL SERVICES

### CUSTOMER SPECIFICATION

HR MULTIPLE CERTIFIED PLATE - CARBON - ASTM A516 GR 70/ASME SA516 GR 70 (10) (11A) - CVNL 15/12 FT LBS AT -50 F - FULLY KILLED - FINE GRAIN - SULFIDE SHAPE CONTROL CALCIUM TREATED - MEETS NACE MR 0103 LATEST ED. - NACE MR 0175 LATEST ED. - BHN <200 - PER EN 10204 3.1 - PVO - NORMALIZED - FLATNESS 1/2 A-20 - NORM FOR 34 MINUTES MIN. @ 1670 F - NO WELD REPAIRS ALLOWED

### SUPPLEMENTARY INSTRUCTIONS

TEST CERT 1: DAVE JANELLE 905-206-1370 TEST CERT 2: DRAFTING@CA  
NADIANPLATE.COM PLATE TEST COUPON:

INSP TR TEST REPORTS REQUIRED

E000199735 CH

CUST  
USE RESALE

2012/03/26 12:12

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\*\*\*\*\* MECHANICAL PROPERTIES \*\*\*\*\*

### IMPACT TESTS:

HEAT	PLATE NUMBER	SRCE	GAUGE IN	COND	METH	DIR	SIZE	TEMP	FULLSIZE	ENERGY	SPEC LAB
3638M	65276	166"	1.0000	N	CVN	L	FULL	-50F	74	70	56 67
3638M	65319	166"	1.0000	N	CVN	L	FULL	-50F	47	73	75 65

ASTM ALG  
ASTM ALG

\*\*\*\*\* CHEMICAL PROPERTIES \*\*\*\*\*

HEAT	(WT %)	C	MN	P	S	SI	CR	NI	CU	MO	AL	CB	V	B	DO
3638M**		0.21	1.07	0.007	0.004	0.32	0.02	0.15	0.04	0.00	0.024	0.000	0.014	0.0001	0.41

### LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: 12"φ Repad  
ACCEPTED DATE: 4/5/13  
SIGNATURE: [Signature]

PAGE 2 OF 2

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000080 2012/12/11		Shipment No. & Date.: 1000020606 2012/12/14		TC No., Date & Time : ESA-34182 2012/12/14 - 19:21:50											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19025-STK / 8 BOL NO.: 1000020606 Cust. Part No.: Carrier : INTERNATIONAL FREIGHT SYSTEMS - 6a302 (81)											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 34 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs					
1.0000 " x 120.000 " x 480.00 "		AB6081	2138P3-03	16,335 LB	1	1.0000 " x 120.000 " x 480.00 "	AB6082	2138P3-03	16,335 LB	1					
1.0000 " x 120.000 " x 480.00 "		AB6083	2138P3-04	16,335 LB	1										
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
2138P3*	0.19	1.08	0.012	0.004	0.320	0.02	0.15	0.03	0.00	0.026	0.000	0.014	0.0003	0.002	0.3900
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
2138P3	AB6083	166"	ALG	1.0000	NORM	B	HBW	150							
2138P3	AB6082	166"	ALG	1.0000	NORM	B	HBW	150							
2138P3	AB6081	166"	ALG	1.0000	NORM	B	HBW	151							

LESENA QUALITY CONTROL

JOB: 12-32

ITEM:

ACCEPTED DATE:

SIGNATURE:

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

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ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000080 2012/12/11		Shipment No. & Date.: 1000020606 2012/12/14		TC No., Date & Time : ESA-34182 2012/12/14 - 19:21:50								
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19025-STK / 8 BOL NO.: 1000020606 Cust. Part No.: Carrier : INTERNATIONAL FREIGHT SYSTEMS - 6a302 (81								
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 34 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair												
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp TIR : Test Report As Per Spec				Cust Use : PVQ								
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705) 945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Impact Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)
2138P3	AB6083	166"	ALG	1.0000	NORM	CVN	L	B	FULL	-50	118 104 103	108
2138P3	AB6082	166"	ALG	1.0000	NORM	CVN	L	B	FULL	-50	118 98 89	102
2138P3	AB6081	166"	ALG	1.0000	NORM	CVN	L	B	FULL	-50	129 91 102	107
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
2138P3	AB6083	166"	ALG	1.0000	NORM	.2	T	B	50	77	2"	34
2138P3	AB6082	166"	ALG	1.0000	NORM	.2	T	B	49	75	2"	37
2138P3	AB6081	166"	ALG	1.0000	NORM	.2	T	B	49	75	2"	34

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	12"φ 10"φ Repairs
ACCEPTED DATE:	4/2/13
SIGNATURE:	<i>AW</i>

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

55 56 57

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8004571 000010 2012/10/27	Shipment No. & Date.: 1000012968 2012/10/29	TC No., Date & Time : ESA-22183 2012/10/30 - 20:30:57													
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 18651-STK / 1 BOL NO.: 1000012968 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 35099 (250)													
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 34 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Code section II part A applies Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec		Cust Use : PVQ													
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs						
1,0000 " x 120,000 " x 480.00 "	AB0907	0811P3-02	16,335 LB	1	1,0000 " x 120,000 " x 480.00 "	AB0908	0811P3-54	16,335 LB	1						
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
0811P3*	0.19	1.08	0.009	0.004	0.330	0.05	0.16	0.04	0.01	0.030	0.000	0.015	0.0002	0.003	0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
0811P3	AB0907	166"	ALG	1.0000	N	B	HBW	153							
0811P3	AB0908	166"	ALG	1.0000	N	B	HBW	150							

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	84 Repad
ACCEPTED DATE:	4/2/13
SIGNATURE:	AK

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

58

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8004571 000010 2012/10/27	Shipment No. & Date.: 1000012968 2012/10/29	TC No., Date & Time : ESA-22183 2012/10/30 - 20:30:57
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 18651-STK / 1 BOL NO.: 1000012968 Cust. Part No.: Carrier : TRIPLE K TRANSPORT LTD - 35099 (250)
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 34 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Code section II part A applies Fine Grain Fully Killed No Weld Repair		
Supplementary Instructions : Test Cert 1:drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
***** MECHANICAL PROPERTIES *****		
Impact Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC SIZE TEMP(°F) FULLENERGY(r- lbf) FULL AVG(r-lbf)
0811P3	AB0907	166" ALG 1.0000 N CVN L B FULL -50 101 74 89 88
0811P3	AB0908	166" ALG 1.0000 N CVN L B FULL -50 89 108 107 101
Tensile Tests		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC YIELD(KSI) TENSILE(KSI) EL SCALE ELONG(%)
0811P3	AB0907	166" ALG 1.0000 N .2 T B 50.5 75.5 2" 36
0811P3	AB0908	166" ALG 1.0000 N .2 T B 50.0 77.0 2" 37

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	8"φ Repad
ACCEPTED DATE:	4/2/13
SIGNATURE:	<i>AV</i>

58

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8007126 000030 2013/01/31		Shipment No. & Date.: 1000028791 2013/02/05		TC No., Date & Time : ESA-46616 2013/02/05 - 15:05:34											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19303-STK/3 BOL NO.: 1000028791 Cust Part No.: Carrier : NATIONAL TRANSPORTATION - 6201(1137)											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalize Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed. *Addenda of ASME Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED. HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.															
Dimensions (T x W x L)		Batch No.	Heat No-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No-MS	Quantity	No. of Pcs					
0.5000 " x 120.000 " x 480.00 "		AC2064	3605P3-53	16,336 LB	2	0.5000 " x 120.000 " x 480.00 "	AC2882	3781P3-04	16,336 LB	2					
0.5000 " x 120.000 " x 480.00 "		AC2883	3781P3-53	16,336 LB	2										
*****CHEMICAL PROPERTIES*****															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
3605P3*	0.19	1.10	0.009	0.004	0.330	0.03	0.19	0.05	0.01	0.031	0.000	0.016	0.0002	0.003	0.4000
3781P3*	0.20	1.08	0.011	0.003	0.340	0.02	0.14	0.02	0.00	0.029	0.000	0.015	0.0002	0.003	0.4000
*****MECHANICAL PROPERTIES*****															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
3605P3	AC2064	166"	ALG	0.5000	N	B	HBW	158							
3781P3	AC2882	166"	ALG	0.5000	N	B	HBW	156							
3781P3	AC2883	166"	ALG	0.5000	N	B	HBW	156							

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

LESENA QUALITY CONTROL

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL

Date: 2013/02/05 Time: 17:05:14 Page no: 1 of 2

JOB: 12-32  
ITEM: 80 Repad  
ACCEPTED DATE: 4/2/13  
SIGNATURE: [Signature]



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8007126 000030 2013/01/31		Shipment No. & Date.: 1000028791 2013/02/05		TC No., Date & Time : ESA-46616 2013/02/05 - 15:05:34								
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19303-STK / 3 BOL NO.: 1000028791 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 6201(1137)								
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 17 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed.+Addenda of ASME Fine Grain Fully Killed No Weld Repair												
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R : Test Report As Per Spec				Cust Use : PVQ								
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Impact Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)
3605P3	AC2064	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	74 111 113	99
3781P3	AC2882	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	108 125 122	118
3781P3	AC2883	166"	ALG	0.5000	N	CVN	L	B	FULL	-50	98 88 104	97
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
3605P3	AC2064	166"	ALG	0.5000	N	.2	T	B	53.7	77.5	8"	27
3781P3	AC2882	166"	ALG	0.5000	N	.2	T	B	51.2	74.6	8"	29
3781P3	AC2883	166"	ALG	0.5000	N	.2	T	B	52.5	75.8	8"	29

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	80 Repair
ACCEPTED DATE:	4/2/13
SIGNATURE:	<i>[Signature]</i>

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

59

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

# RUIKKI


## VASTAANOTTOTODISTUS INSPECTION CERTIFICATE

EN 10 204-3.1 (2004)

2/10

A 27492 -001

30.10.2012

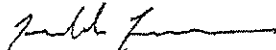
Tilaja Purchaser OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Tilaus nro Order No. TO-9392		Vastaanottaja Consignee OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Asiakkaan merkki Shipping mark		Päivämäärä Date 28.11.2012 Valmistajan merkki Mark of the Manufacturer	
Todistus Certificate 31		Tilauksen vahvistus Order Confirmation 27492			
Toimitustyyppi Delivery type TOTAL DELIVERY		Laatuvaraus Quality Stamping SA516GR70MTLV		Tarkastajan leima Stamp of Inspector Mxx	
Tuote Product HEAVY PLATES Laji Grade SA516 GR 70 MTLV ASME SA516-11A/ASTM A516-10 Laatuselitys Quality Specifications PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20		Sulatus nro levy nro Cast No. Plate No. XXXXX XXX XX XXX Toleranssit Tolerances ASME SA-20, 2011A		Vastaanottajan leima Stamp of Surveyor Muut leimaukset Other Stamps	
Tekniset vaatimukset ja/tai viralliset määräykset Technical terms of Delivery and/or Official Regulations					

Positio Item	Mitat mm Dimensions mm	Merkki Mark	Kpl Pcs	Paino kg Weight kg	Sulatus levy nro Cast plate No	SP nro SP No	UT	MT
<b>NORMALIZED STEEL PLATES</b>								
TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
003	12.70 X 3048	X 12192 1/2X120X480 OMS PO 9392	2	7410	58396	028	028	
TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
004	15.88 X 3048	X 12192 5/8X120X480 OMS PO 9392	2	9264	58640	021	021	
004	15.88 X 3048	X 12192	2	9264	58640	023	023	
TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
005	19.05 X 2438	X 12192 3/4X96X480 OMS PO 9392	2	8892	58640	011	011	
005	19.05 X 2438	X 12192	2	8892	58640	012	012	
TOLERANCES WIDTH +12.5 -3.0 LENGTH +22.0 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
006	19.05 X 3048	X 12192 3/4X120X480 OMS PO 9392	1	5557	58393	013	013	
006	19.05 X 3048	X 12192	1	5557	58393	024	024	
006	19.05 X 3048	X 12192	1	5557	58393	031	031	
006	19.05 X 3048	X 12192	1	5557	58393	032	032	
006	19.05 X 3048	X 12192	1	5557	58393	033	033	
006	19.05 X 3048	X 12192	1	5557	58393	034	034	
TOLERANCES WIDTH +12.5 -3.0 LENGTH +22.0 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
007	22.23 X 3048	X 12192 7/8X120X480 OMS PO 9392	1	6485	57251	023	023	
007	22.23 X 3048	X 12192	1	6485	57744	021	021	

Raabe Steel Works

Tätten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and Inspection

  
JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUIKKI METALS OY  
Kotipaikka Registered Office: HELSINKI  
Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Tekopuhelin Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 23894457

Tämä on sähköinen kopio alkuperäisestä asiakirjasta.  
This is an electronic copy of the original document.

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: 10"φ 8"φ Repairs  
ACCEPTED DATE: 4/5/13

60 61



# RUUKKI

## AINESTODISTUS TEST REPORT

EN 10 204-3.1 (2004)

6/10  
A 27492 -001  
30.10.2012

Tilaaaja Purchaser  
OLBERT METAL SALES LIMITED  
SUITE 305  
Tilaus nro Order No.  
TO-9392

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
SUITE 305  
Asiakkaan merkki Shipping mark

Päivämäärä Date  
28.11.2012 LV  
Valmistajan merkki  
Mark of the Manufacturer

Laji Grade  
SA516 GR 70 MTLTV

Lisävaatimukset Additional requirements

Jatkuvavalettua happiterästä  
Oxygen steel, continuous casting  
Fully killed, Fine grain practiced

Laatuselvitys Quality Specifications  
PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

N 920C,T=1.1(MIN)XTHICKN(MM)

Pos. Item	Sulatus, Kera nro Cast, test No	T-tila Cond	Tensile test														Taivutuskoe Bend test		Huom Nb	Päästö Tempering			
			K2	F	RP02 KSI	RT05 KSI	REL KSI	REH KSI	RM KSI			A %			REH /RM	RM * A5	RAZ %				Keskiarvo Average	K5	D = X t
										1	2	3	50	80	200			1	2	3			
002	58397 015	N F1			50						74					28							
003	58396 011	N F1			51						75					26							
003	58396 012	N F1			51						75					27							
003	58396 013	N F1			50						74					26							
003	58396 021	N F1			50						73					25							
003	58396 028	N F1			51						75					25							
004	58640 021	N F1			50						75					29							
004	58640 023	N F1			50						75					28							
005	58640 011	N F1			48						74					27							
<del>005</del>	<del>58640 012</del>	N F1			51						75					26							
006	58393 013	N F1			49						75					30							
006	58393 024	N F1			47						73					29							
006	58393 031	N F1			47						74					28							
006	58393 032	N F1			48						74					27							

K2: F1=TOP,TRANSV.

N=NORMALIZED

Pos. Item	Sulatus, Kera nro Cast, test No	Iskutuskoe Impact test						Sitkeämurtuma Ductile fracture				Erikoiskokeet Special tests				Huom Nb	Päästö Tempering
		K3	F	1	2	3	Keskiarvo Average	1	2	3	Keskiarvo Average	K4	F	1	2	Keskiarvo Average	K5
002	58397 015	115	-051	83	96	81	87					1B				148	
003	58396 011	111	-051	124	126	116	122					1B				142	
003	58396 012	111	-051	94	87	101	94					1B				144	
003	58396 013	111	-051	100	111	97	103					1B				146	
003	58396 021	111	-051	85	101	65	83					1B				144	
003	58396 028	111	-051	92	97	102	97					1B				145	
004	58640 021	111	-051	103	101	80	94					1B				141	
004	58640 023	111	-051	96	91	89	92					1B				142	
005	58640 011	111	-051	111	126	123	120					1B				141	
005	58640 012	111	-051	75	69	77	74					1B				112	
006	58393 013	111	-051	95	97	101	97					1B				128	
006	58393 024	111	-051	105	103	80	96					1B				143	
006	58393 031	111	-051	107	94	76	92					1B				141	
006	58393 032	111	-051	111	115	105	111					1B				141	

K3: 115=CH-V/ISO-V(J),7.5X10, TOP, LONGIT, KV600 111=CH-V/ISO-V(J),10X10, TOP, LONGIT, KV600  
K4: 1B=HARDNESS/HB TOP

### Raabe Steel Works

Testaus ja tarkastus Testing and Inspection

*Jaakko Juuso*

JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

### LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: 10"φ 8"φ Repad  
ACCEPTED DATE: 4/5/13  
SIGNATURE: *[Signature]*

60 61

# RUUKKI

## ANALYYSITODISTUS ANALYSIS CERTIFICATE ANALYSEBESCHEINIGUNG COMPOSITIO CHIMIQUE CERTIFICAT СЕРТИФИКАТ АНАЛИЗА

9/10  
A 27492 -001  
30.10.2012

Sulatus nro Cast No Schmelzen Nr. No de coulée № Плавки	Koe nro Test No Prüf Nr. Essai No № Пробы	Posito Item Poste Poste № Пробы	Cekv Ceq Ceq Ceq Ceq	Analysi % Chemical composition % Chemisch Zusammensetzung % Composition Chimique % Анализ пробы % (*ppm)	C	SI	MN	P	S	AL	NB	V	TI	CU	CR	NI	MO	N	SN	B
58393	001	.39	.188	.33	1.11	.008	.001	.032	.001	.010	.004	.013	0.04	0.04	.004	.004	.004	.004	.004	.0004
58397	002	.37	.181	.32	1.08	.009	.002	.039	.000	.007	.004	.011	0.04	0.03	.003	.005	.005	.0002		
58396	003	.38	.187	.32	1.09	.008	.001	.033	.001	.008	.004	.010	0.04	0.03	.003	.004	.003	.0003		
58640	004	.38	.190	.30	1.08	.010	.002	.025	.000	.009	.003	.008	0.05	0.03	.003	.004	.002	.0002		
58640	005	.38	.190	.30	1.08	.010	.002	.025	.000	.009	.003	.008	0.05	0.03	.003	.004	.002	.0002		
58393	006	.39	.188	.33	1.11	.008	.001	.032	.001	.010	.004	.013	0.04	0.04	.004	.004	.004	.0004		
57251	007	.40	.199	.35	1.09	.010	.001	.040	.015	.008	.004	.011	0.05	0.04	.005	.003	.003	.0002		
57744	007	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003		
57251	008	.40	.199	.35	1.09	.010	.001	.040	.015	.008	.004	.011	0.05	0.04	.005	.003	.003	.0002		
57744	009	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003		
58475	009	.42	.209	.37	1.14	.010	.001	.041	.015	.008	.004	.014	0.05	0.04	.004	.003	.004	.0003		
57744	010	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003		

CEQ=C+MN/6+(CR+MO+V)/S+(NI+CU)/15

### Rahe Steel Works

Testaus ja tarkastus  
Prüfung und Kontrolle

Testing and Inspection  
Essais et Contrôle

Испытание и контроль качества

Steel manufactured and supplied by Rautaruukki is free from radiation.  
Производимая на металлургическом комбинате «Рautaruukki» и поставляемая  
заказчику сталь не излучает радиации.

JAAKKO JUUSO

Valtuutettu tarkastaja  
Sachverständiger

Authorized Inspection representative  
Inspector autorisé

Уполномоченный инспектор

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telfax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	10"φ 8"φ Repads
ACCEPTED DATE:	4/5/13
SIGNATURE:	<i>[Signature]</i>

60 61

W0#8313

Page 2 of 2

V-720254



JACKSON STEEL MILL  
801 AMERISTEEL ROAD  
JACKSON TN 38305 USA

# Chemical and Physical Test Report

MADE IN UNITED STATES

SHAPE + SIZE	GRADE		SPECIFICATION														SALES ORDER	CUST P.O. NUMBER
A3 X 3 X 1/4	50W		CSA G40.21-04 50W															31010
HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	Sn	Al	Ti	C Eqv		
V918179 ✓	.14	.74	.020	.033	.22	.34	.09	.12	.030	.022	.000	.0004	.010	.002	.00100	.353		
Mechanical Test:	Yield	55210 PSI, 380.65 MPA				Tensile: 73980 PSI, 510.07 MPA				%El: 27.0/8in, 27.0/200MM				Red R 21.16				
Customer Requirements	CASTING: STRAND CAST																	
Mechanical Test:	Yield	55490 PSI, 382.59 MPA				Tensile: 74010 PSI, 510.28 MPA				%El: 28.0/8in, 28.0/200MM				Red R 21.16				
Customer Requirements	CASTING: STRAND CAST																	

SHAPE + SIZE	GRADE		SPECIFICATION														SALES ORDER	CUST P.O. NUMBER
C4 X 5.4#	50W		CSA G40.21-04 50W															31010
HEAT I.D.	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	V	Nb	B	Sn	Al	Ti	C Eqv		
V918444	.14	.70	.018	.035	.23	.27	.10	.10	.030	.021	.001	.0003	.011	.000	.00100	.355		
Mechanical Test:	Yield	51100 PSI, 352.32 MPA				Tensile: 73480 PSI, 506.63 MPA				%El: 30.0/8in, 30.0/200MM				Red R 19.2				
Customer Requirements	CASTING: STRAND CAST																	
Mechanical Test:	Yield	52760 PSI, 363.77 MPA				Tensile: 73340 PSI, 505.66 MPA				%El: 30.0/8in, 30.0/200MM				Red R 19.2				
Customer Requirements	CASTING: STRAND CAST																	

This material, including the billets, was melted and manufactured in the United States of America

*Bhaskar*

Bhaskar Yalamanchilli  
Quality Director  
Gerdau

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

*John Cusker*

Metallurgical Services Manager  
JACKSON STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER. AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller. Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.

## LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: ANGLE 3" X 3" X .25  
ACCEPTED DATE: 05/08/13  
SIGNATURE: *JK*

62



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

2/3  
p.  
7990  
No

SO No., Item & Date.: 8007677 000011 2013/03/15	Shipment No. & Date.: 1000036657 2013/03/19	TC No., Date & Time.: ESA-68290 2013/03/20 - 21:08:52
Sold to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6 ✓	Customer PO NO./Item: 19396-STK/1 BOL NO.: 1000036657 Cust. Part No.: Carrier: NATIONAL TRANSPORTATION - 0695(1009)

Customer Specification: HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 8 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed. + Addenda of ASME Fine Grain Fully Killed No Weld Repair

Supplementary Instructions: Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370

Insp I/R: Test Report As Per Spec

Cust Use: PVQ

ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES.  
THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705) 945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.

MEETS EN 10204:2004 TYPE 3.1

ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM

ALL HEATS FULLY KILLED.

HEATS INDICATED WITH (\*) FINE GRAINED.

HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS.

Dimensions (T x W x L)	Batch No.	Heat No.-MS	Quantity	No. of Pcs	Dimensions (T x W x L)	Batch No.	Heat No.-MS	Quantity	No. of Pcs
0.2500" x 96.000" x 480.00"	AD0491	4019P3-02	6,534 LB	2	0.2500" x 96.000" x 480.00"	AD0492	4019P3-02	6,534 LB	2
0.2500" x 96.000" x 480.00"	AD0493	4019P3-02	6,534 LB	2					

Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
4019P3*	0.19	1.07	0.011	0.004	0.310	0.02	0.15	0.02	0.00	0.026	0.000	0.014	0.0002	0.003	0.39

CHEMICAL PROPERTIES

MECHANICAL PROPERTIES

Hardness Tests

Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS
4019P3	AD0491	166"	ALG	0.2500	N	B	HBW	165
4019P3	AD0492	166"	ALG	0.2500	N	B	HBW	163
4019P3	AD0493	166"	ALG	0.2500	N	B	HBW	159

LESANA QUALITY CONTROL

JOB: 12-32

ITEM: 63 2" x 12.75 x 1/4" PLT

ACCEPTED DATE: 05/01/13

SIGNATURE: *JK*

K. UGHADPAGA

MANAGER METALLURGICAL SERVICES

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

No. 7990 P. 3/3

SC No., Item & Date.: 8007677 000011 2013/03/15		Shipment No. & Date.: 1000036657 2013/03/19		TC No., Date & Time.: ESA-58290 2013/03/20 - 21:08:52								
Sold to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19396-STK / 1 BOL NO.: 1000036657 Cust. Part No.: Carrier: NATIONAL TRANSPORTATION - 0695(1009)								
Customer Specification: HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 8 min CVNL Req. 15 / 12 FT-LBF at -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Latest Ed. + Addenda of ASME Fine Grain Fully Killed No Weld Repair												
Supplementary Instructions: Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370												
Insp T/R: Test Report As Per Spec				Cust Use: PVQ								
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705) 945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.												
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM												
***** MECHANICAL PROPERTIES *****												
Impact Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	FULL ENERGY(ft-lbf)	FULL AVG(ft-lbf)
4019P3	AD0491	166"	ALG	0.2500	N	CVN	L	B	1/2	-50	56 64 59	60
4019P3	AD0492	166"	ALG	0.2500	N	CVN	L	B	1/2	-50	64 64 59	62
4019P3	AD0493	166"	ALG	0.2500	N	CVN	L	B	1/2	-50	61 55 61	59
Tensile Tests												
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	YIELD(KSI)	TENSILE(KSI)	EL SCALE	ELONG(%)
4019P3	AD0491	166"	ALG	0.2500	N	.2	T	B	56.0	78.0	8"	25
4019P3	AD0492	166"	ALG	0.2500	N	.2	T	B	57.0	79.0	8"	21
4019P3	AD0493	166"	ALG	0.2500	N	.2	T	B	56.0	78.0	8"	20

63

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: 63 2' x 122.75 x 1/4" plate  
ACCEPTED DATE: 05/07/13  
SIGNATURE:

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

**"WARNING"** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

Apr. 26. 2013 4:13PM

# RUIKKI

## VASTAANOTTOTODISTUS INSPECTION CERTIFICATE

EN 10 204-3.1 (2004)

1811  
1/13  
A 27466 -001 A  
30.10.2012

Käyttäjä Purchaser  
OLBERT METAL SALES LIMITED  
15T 2J8 MISSISSAUGA CANADA  
Tilaus nro Order No.  
1811

Tilauksen vahvistus Order Confirmation  
27466

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
15T 2J8 MISSISSAUGA CANADA  
Asetuksen merkki Shipping mark

Päivämäärä Date  
31.10.2012  
Valmistajan merkki  
Mark of the Manufacturer



Todistus Certificate  
31

Lähtö Shipping  
EDENBORG

Laatustamitus Quality Stamping  
SA516GR70MTLV

Tarkastajan laima  
Stamp of Inspector  
Vastaanottajan laima  
Stamp of Surveyor

✓xx

Toimitustyyppi Delivery type  
TOTAL DELIVERY

Tuote Product

HEAVY PLATES

Laji Grade

SA516 GR 70 MTLV ASME SA516-11A/ASTM A516-10

Laatuselvitys Quality Specifications

PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

Sulatus nro levy nro Cast No. Plate No.  
XXXXX XXX XX XXX

Toleranssit Tolerances

ASME SA-20, 2011A

Tekniset vaatimukset ja/tai viralliset määräykset Technical terms of Delivery and/or Official Regulations

Profiili Item	Mitat mm Dimensions mm	Merkki Mark	Kpl Pcs	Paino kg Weight kg	Sulatus levy nro Cast plate No	SP nro SP No	UT	MT
------------------	---------------------------	----------------	------------	-----------------------	-----------------------------------	-----------------	----	----

### NORMALIZED STEEL PLATES

TOLERANCES WIDTH +9.5 -3.0 LENGTH +19.0 -3.0

MATER.SPEC. RAU-OY,, 1&2 REV.5;MM/C NOT REPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20

SURFACE CONDITION EN 10 163-2:2005 CLASS B3

001	6.35 X 3048	X	12192	1/4X120X480 OMS PO 1811	1	1852	58250	031	031
001	6.35 X 3048	X	12192		1	1852	58250	032	032
001	6.35 X 3048	X	12192		1	1852	58250	033	033
001	6.35 X 3048	X	12192		1	1852	58250	034	034
001	6.35 X 3048	X	12192		1	1852	58250	035	035
001	6.35 X 3048	X	12192		1	1852	58250	036	036
001	6.35 X 3048	X	12192		1	1852	58250	037	037
001	6.35 X 3048	X	12192		1	1852	58250	038	038
001	6.35 X 3048	X	12192		1	1852	58250	042	042
001	6.35 X 3048	X	12192		1	1852	58250	043	043
001	6.35 X 3048	X	12192		1	1852	58250	044	044
001	6.35 X 3048	X	12192		1	1852	58250	045	045
001	6.35 X 3048	X	12192		1	1852	58250	046	046
001	6.35 X 3048	X	12192		1	1852	58250	047	047
001	6.35 X 3048	X	12192		1	1852	58396	022	022
001	6.35 X 3048	X	12192		1	1852	58396	023	023
001	6.35 X 3048	X	12192		1	1852	58396	024	024
001	6.35 X 3048	X	12192		1	1852	58396	025	025
001	6.35 X 3048	X	12192		1	1852	58396	026	026
001	6.35 X 3048	X	12192		1	1852	58396	027	027

TOLERANCES WIDTH +9.5 -3.0 LENGTH +19.0 -3.0

MATER.SPEC. RAU-OY,, 1&2 REV.5;MM/C NOT REPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20

SURFACE CONDITION EN 10 163-2:2005 CLASS B3

002	9.53 X 3048	X	12192	3/8X120X480 OMS PO 1811	2	5560	58396	031	031
002	9.53 X 3048	X	12192		2	5560	58396	032	032

Raake Steel Works

Täten todistamme, että toimitus on laatuselvityksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and Inspection

*Juuso*  
JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUIKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telokopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: Insulation & Gussets  
ACCEPTED DATE: 1 - 11.10.12

Pos: 32-10

# RUIKKI


## AINESTODISTUS TEST REPORT

EN 10 204-3.1 (2004)

6/13  
A 27466 -001 A  
30.10.2012

Tilaja Purchaser  
OLBERT METAL SALES LIMITED  
SUITE 305  
Tilaus nro Order No.  
1811

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
SUITE 305  
Asiakkaan merkki Shipping mark

Päiväys Date  
31.10.2012  
Valmistajan merkki Mark of the Manufacturer  
LV  


Laji Grade  
SA516 GR 70 MTLTV

Lisävaatimukset Additional requirements

Jatkuvavalehtu haponkestä  
Oxygen steel, continuous casting  
Fully killed, fine grain practiced

Laatuselvitys Quality Specifications

PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

N 920C, T=1.1(MIN)XTHICKN(MM)

Pos. Item	Sulatus, kera nro Cast, test No	T-tila Cond	Vetokoe Testis test										Tensile test						Tensile test		Huom Nb	Päästö Tempering F
			K2	F	RP02 KSI	RT05 KSI	REL KSI	REH KSI	1	RM KSI 2	3	A % 50	80	200	REH /RM	RM-A8	RAZ % 1	2	3	Keskiarvo Average		
001	58250 031	N F1			52					75									27			
001	58250 032	N F1			52					75									26			
001	58250 033	N F1			52					75									25			
001	58250 034	N F1			52					75									27			
001	58250 035	N F1			52					75									26			
001	58250 036	N F1			51					75									26			
001	58250 037	N F1			51					75									26			
001	58250 038	N F1			51					75									26			
001	58250 042	N F1			51					75									27			
001	58250 043	N F1			51					75									27			
001	58250-044	N F1			52					75									27			
001	58250 045	N F1			52					75									26			
001	58250 046	N F1			51					75									25			
001	58250 047	N F1			51					75									26			

K2: F1=TOP,TRANSV.

N=NORMALIZED

Pos. Item	Sulatus Kera nro Cast. test No	Iskukoe Impact test							Siikkamurtuma Ductile fracture				Erkoiskokeet Special tests					Huom No	Päästö Tempering F
		K3	F	1	2	3	Keskiarvo Average	1	2	3	Keskiarvo Average	K4	F	1	2	Keskiarvo Average			
001	58250 031	113	-051	33	33	34	33					1B				145			
001	58250 032	113	-051	36	33	35	35					1B				145			
001	58250 033	113	-051	32	31	32	32					1B				139			
001	58250 034	113	-051	36	35	32	34					1B				138			
001	58250 035	113	-051	40	35	32	35					1B				144			
001	58250 036	113	-051	37	32	32	34					1B				144			
001	58250 037	113	-051	31	32	33	32					1B				135			
001	58250 038	113	-051	30	32	30	30					1B				139			
001	58250 042	113	-051	39	38	36	38					1B				144			
001	58250 043	113	-051	44	35	34	38					1B				146			
001	58250 044	113	-051	41	29	35	35					1B				133			
001	58250 045	113	-051	29	35	33	32					1B				145			
001	58250 046	113	-051	36	30	30	32					1B				145			
001	58250 047	113	-051	35	29	37	33					1B				143			

K3: 113=CH-VISO-V(J),5X10, TOP, LONGIT, Kv600  
K4: 1B=HARDNESS/HB TOP

### Raabe Steel Works

Täten todistamme, että toimitus on laatuselvityksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Tastaus ja tarkastus Testing and inspection



JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUIKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osasto Address: PL 93, P.O. Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2369445-7

LESENA QUALITY CONTROL

JOB: 12-32  
ITEM: Insulation & Gussets  
ACCEPTED DATE: 1.12.12  
(64)

# RUUKKI

## ANALYYSITODISTUS ANALYSIS CERTIFICATE ANALYSEBESCHEINIGUNG COMPOSITIO CHIMIQUE CERTIFICAT СЕРТИФИКАТ АНАЛИЗА

12/13  
A 27466 -001 A  
30.10.2012

Sulatus nro Cast No Schmelzen Nr. No de coulée № Плавки	Koe nro Test No Prüf Nr. Essai No № Проб	Posito Item Pos. Poste Поз.	Cekv Ceq Ceq Ceq Ceq	Analysit % Chemical composition % Chemisch Zusammensetzung % Composition Chimique % Анализ пробы % (* ppm)	C	SI	MN	P	S	AL	NE	V	TI	CU	CR	NI	MO	N	BN	B
58250	001	.38	.186	.32	1.10	.012	.001	.035	.001	.009	.005	.010	0.04	0.03	.003	.003	.002	.0002		
58396	001	.38	.187	.32	1.09	.008	.001	.033	.001	.008	.004	.010	0.04	0.03	.003	.004	.003	.0003		
58396	002	.38	.187	.32	1.09	.008	.001	.033	.001	.008	.004	.010	0.04	0.03	.003	.004	.003	.0003		
58393	003	.39	.188	.33	1.11	.008	.001	.032	.001	.010	.004	.013	0.04	0.04	.004	.004	.004	.0004		
58250	004	.38	.186	.32	1.10	.012	.001	.035	.001	.009	.005	.010	0.04	0.03	.003	.003	.002	.0002		
58248	005	.38	.188	.32	1.09	.011	.002	.033	.001	.008	.005	.009	0.04	0.03	.003	.005	.003	.0002		
57251	006	.40	.199	.35	1.09	.010	.001	.040	.015	.008	.004	.011	0.05	0.04	.005	.003	.003	.0002		
58475	007	.42	.209	.37	1.24	.010	.001	.041	.015	.008	.004	.014	0.05	0.04	.004	.003	.004	.0003		

Päivämäärä Date Datum Date Date  
31.10.2012

LV

CEQ=C+MN/6+(CR+MO+V)/5+(NI+CU)/15

### Raabe Steel Works

Testaus ja tarkastus Testing and Inspection Испытание и контроль качества  
Prüfung und Kontrolle Essai et Contrôle

Steel manufactured and supplied by Raabe Ruukki is free from radiation.  
Производимая на металлургическом комбинате «Раутаруукки» и поставляемая  
заказчику сталь не содержит радиацию.

JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative Уполномоченный инспектор  
Sachverständiger Inspecteur autorisé

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osasto Address: PL 65, P.O. Box 93  
FIN-02101 RAAHE, FINLAND

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+358 20 5911

Telekopio Tefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

LESENA QUALITY CONTROL

JOB: 12-32

ITEM: Insulation & Gussets

ACCEPTED DATE: 4/2/13

SIGNATURE: *[Signature]*

64



# RUUKKI

## VASTAANOTTOTODISTUS INSPECTION CERTIFICATE

EN 10 204-3.1 (2004)

1/10

A 27492 -001  
30.10.2012

Tilaaaja Purchaser OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Tilaus nro Order No. TO-9392	Vastaanottaja Consignee OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Asiakkaan merkki Shipping mark	Päivämäärä Date 28.11.2012 Valmistajan merkki Mark of the Manufacturer
---	---	---

Todistus Certificate 31	Tilauksen vahvistus Order Confirmation 27492	Laatuvaraus Quality Stamping SA516GR70MTLTV	Tarkastajan leima Stamp of Inspector Mxx
----------------------------	---	--	--

Toimitustyyppi Delivery type TOTAL DELIVERY	Sulatus nro levy nro Cast No. Plate No. XXXXXX XXX XX XXX	Muut leimaukset Other Stamps
Tuote Product HEAVY PLATES Laji Grade SA516 GR 70 MTLTV ASME SA516-11A/ASTM A516-10 Laatuselvitys Quality Specifications PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20	Toleranssit Tolerances ASME SA-20, 2011A	Tekniset vaatimukset ja/tai viralliset määräykset Technical terms of Delivery and/or Official Regulations

Positio Item	Mitat mm Dimensions mm	Merkki Marke	Kpl Pcs	Paino kg Weight kg	Sulatus levy nro Cast plate No	SP nro SP No	UT	MT
-----------------	---------------------------	-----------------	------------	-----------------------	-----------------------------------	-----------------	----	----

### NORMALIZED STEEL PLATES

TOLERANCES WIDTH +9.5 -3.0 LENGTH +19.0 -3.0  
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.  
SURFACE CONDITION EN 10 163-2:2005 CLASS B3

001	6.35 X 3048	X	12192	1/4X120X480 OMS PO 9392	1	1852	58393	040	040
001	6.35 X 3048	X	12192		1	1852	58393	041	041
001	6.35 X 3048	X	12192		1	1852	58393	042	042
001	6.35 X 3048	X	12192		1	1852	58393	043	043
001	6.35 X 3048	X	12192		1	1852	58393	044	044
001	6.35 X 3048	X	12192		1	1852	58393	045	045
001	6.35 X 3048	X	12192		1	1852	58393	046	046
001	6.35 X 3048	X	12192		1	1852	58393	047	047
001	6.35 X 3048	X	12192		1	1852	58393	048	048
001	6.35 X 3048	X	12192		1	1852	58393	049	049

TOLERANCES WIDTH +9.5 -3.0 LENGTH +19.0 -3.0  
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.  
SURFACE CONDITION EN 10 163-2:2005 CLASS B3

002	9.53 X 3048	X	12192	3/8X120X480 OMS PO 9392	2	5560	58397	011	011
002	9.53 X 3048	X	12192		2	5560	58397	012	012
002	9.53 X 3048	X	12192		2	5560	58397	013	013
002	9.53 X 3048	X	12192		2	5560	58397	014	014
002	9.53 X 3048	X	12192		2	5560	58397	015	015

TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0  
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.  
SURFACE CONDITION EN 10 163-2:2005 CLASS B3

003	12.70 X 3048	X	12192	1/2X120X480 OMS PO 9392	2	7410	58396	011	011
003	12.70 X 3048	X	12192		2	7410	58396	012	012
003	12.70 X 3048	X	12192		2	7410	58396	013	013
003	12.70 X 3048	X	12192		2	7410	58396	021	021

### Raabe Steel Works

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and Inspection

*Jaakko Juuso*

JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

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FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

Tämä on sähköinen kopio alkuperäisestä asiakirjasta.  
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65

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: H65 1x1"  
ACCEPTED DATE: 05/24/13  
SIGNATURE: \_\_\_\_\_

# RUUKKI

## VASTAANOTTOTODISTUS INSPECTION CERTIFICATE

EN 10 204-3.1 (2004)

2/10

A 27492 -001

30.10.2012

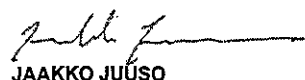
Tilaaja Purchaser OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Tilaus nro Order No. TO-9392		Vastaanottaja Consignee OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Asiakkaan merkki Shipping mark		Päivämäärä Date 28.11.2012 Valmistajan merkki Mark of the Manufacturer	
Tilauksen vahvistus Order Confirmation 27492		Laivaus Shipping EDENBORG		Tarkastajan leima Stamp of Inspector Mxx	
Todistus Certificate 31		Laatu leimaus Quality Stamping SA516GR70MTLV		Vastaanottajan leima Stamp of Surveyor	
Toimitustyyppi Delivery type TOTAL DELIVERY		Sulatus nro levy nro Cast No. Plate No. XXXXX XXX XX XXX		Muut leimaukset Other Stamps	
Tuote Product HEAVY PLATES Laji Grade SA516 GR 70 MTLTV ASME SA516-11A/ASTM A516-10 Laatuselvitys Quality Specifications PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20		Toleranssit Tolerances ASME SA-20, 2011A		Tekniset vaatimukset ja/tai viralliset määräykset Technical terms of Delivery and/or Official Regulations	

Positio Item	Mitat mm Dimensions mm	Merkki Mark	Kpl Pcs	Paino kg Weight kg	Sulatus levy nro Cast plate No	SP nro SP No	UT	MT
<b>NORMALIZED STEEL PLATES</b>								
TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
003	12.70 X 3048	X 12192 1/2X120X480 OMS PO 9392	2	7410	58396	028	028	
TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
004	15.88 X 3048	X 12192 5/8X120X480 OMS PO 9392	2	9264	58640	021	021	
004	15.88 X 3048	X 12192	2	9264	58640	023	023	
TOLERANCES WIDTH +11.0 -3.0 LENGTH +20.5 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
005	19.05 X 2438	X 12192 3/4X96X480 OMS PO 9392	2	8892	58640	011	011	
005	19.05 X 2438	X 12192	2	8892	58640	012	012	
TOLERANCES WIDTH +12.5 -3.0 LENGTH +22.0 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
006	19.05 X 3048	X 12192 3/4X120X480 OMS PO 9392	1	5557	58393	013	013	
006	19.05 X 3048	X 12192	1	5557	58393	024	024	
006	19.05 X 3048	X 12192	1	5557	58393	031	031	
006	19.05 X 3048	X 12192	1	5557	58393	032	032	
006	19.05 X 3048	X 12192	1	5557	58393	033	033	
006	19.05 X 3048	X 12192	1	5557	58393	034	034	
TOLERANCES WIDTH +12.5 -3.0 LENGTH +22.0 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
007	22.23 X 3048	X 12192 7/8X120X480 OMS PO 9392	1	6485	57251	023	023	
007	22.23 X 3048	X 12192	1	6485	57744	021	021	

Raabe Steel Works

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and Inspection

  
JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

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Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7


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LESENA QUALITY CONTROL

JOB: 12-32

ITEM: #65 1"x1"

ACCEPTED DATE: 05/24/13

SIGNATURE: 

65

# RUIKKI

## VASTAANOTTOTODISTUS INSPECTION CERTIFICATE

EN 10 204-3.1 (2004)

3/10

A 27492 -001

30.10.2012

Tilaja Purchaser OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Tilaus nro Order No. TO-9392		Vastaanottaja Consignee OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Asiakkaan merkki Shipping mark		Päivämäärä Date 28.11.2012 Valmistajan merkki Mark of the Manufacturer	
Tilausvahvistus Order Confirmation 27492		Laivaus Shipping EDENBORG		Tarkastajan leima Stamp of Inspector Mxx	
Todistus Certificate 31		Laatuleimaus Quality Stamping SA516GR70MTLV		Vastaanottajan leima Stamp of Surveyor	
Toimitustyyppi Delivery type TOTAL DELIVERY		Sulatus nro levy nro Cast No. Plate No. XXXXX XXX XX XXX		Muut leimaukset Other Stamps	
Tuote Product HEAVY PLATES Laji Grade SA516 GR 70 MTLTV ASME SA516-11A/ASTM A516-10 Laatuselvitys Quality Specifications PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20		Toleranssit Tolerances ASME SA-20, 2011A		Tekniset vaatimukset ja/tai viralliset määräykset Technical terms of Delivery and/or Official Regulations	

Positio Item	Mitat mm Dimensions mm	Merkki Marke	Kpl Pcs	Paino kg Weight kg	Sulatus levy nro Cast plate No	SP nro SP No	UT	MT
NORMALIZED STEEL PLATES								
TOLERANCES WIDTH +16.0 -3.0 LENGTH +24.0 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
008	25.40 X 3048	X 12192 1X120X480 OMS PO 9392	1	7410	57251	041	041	
008	25.40 X 3048	X 12192	1	7410	57251	042	042	
TOLERANCES WIDTH +16.0 -3.0 LENGTH +24.0 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
009	31.75 X 3048	X 12192 1 1/4X120X480 OMS PO 9392	1	9262	57744	023	023	
009	31.75 X 3048	X 12192	1	9262	58475	011	011	
TOLERANCES WIDTH +16.0 -3.0 LENGTH +24.0 -3.0								
MATER.SPEC. RAU-OY,,1&2 REV.5;MN/C NOT RAPORTED IN THE CERT;FLATNESS 6MM/M;THIC.TOL. ACC.TO SA20. VACUUM DEGASSED.								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
010	38.10 X 3048	X 12192 1 1/2X120X480 OMS PO 9392	1	11114	57744	031	031	
010	38.10 X 3048	X 12192	1	11114	57744	032	032	

\* 52 221566

LESENA QUALITY CONTROL  
 JOB: 12-32  
 ITEM: #65  
 ACCEPTED DATE: 05/24/13  
 SIGNATURE:

### Raahe Steel Works

Testaus ja tarkastus Testing and Inspection

JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUIKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osioite Address: PL 93, P.O Box 93  
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Y-tunnus Business ID: 2389445-7

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# RUUKKI

## VASTAANOTTOTODISTUS INSPECTION CERTIFICATE

EN 10 204-3.1 (2004)

4/10

A 27492 -001

30.10.2012

Tilaja Purchaser OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Tilauksen nro Order No. TO-9392		Vastaanottaja Consignee OLBERT METAL SALES LIMITED L5T 2J8 MISSISSAUGA CANADA Asiakkaan merkki Shipping mark		Päivämäärä Date 28.11.2012 Valmistajan merkki Mark of the Manufacturer	
Tilauksen vahvistus Order Confirmation 27492					

Todistus Certificate 31		Laivaus Shipping EDENBORG		Laatuselemaus Quality Stamping SA516GR70MTLV		Tarkastajan leima Stamp of Inspector	
----------------------------	--	------------------------------	--	---	--	---	--

Toimitustyyppi Delivery type TOTAL DELIVERY		Sulatus nro levy nro Cast No. Plate No. XXXXX XXX XX XXX		Vastaanottajan leima Stamp of Surveyor		Muut leimaukset Other Stamps	
--	--	---	--	---	--	---------------------------------	--

Tuote Product HEAVY PLATES Laji Grade SA516 GR 70 MTLTV ASME SA516-11A/ASTM A516-10 Laatuseleitys Quality Specifications PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20		Toleranssit Tolerances ASME SA-20, 2011A		Tekniset vaatimukset ja/tai viralliset määräykset Technical terms of Delivery and/or Official Regulations			
---	--	---	--	---	--	--	--

Positio Item	Mitat mm Dimensions mm	Merkki Marke	Kpl Pcs	Paino kg Weight kg	Sulatus levy nro Cast plate No	SP nro SP No	UT	MT
NORMALIZED STEEL PLATES								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
011	44.45 X 3048 X	7315 1 3/4X120X288 OMS PO 9392	1	7780	57746 031	031		
011	44.45 X 3048 X	7315	1	7780	57746 032	032		
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
012	50.80 X 3048 X	7315 2X120X288 OMS PO 9392	1	8891	56889 041	041		
012	50.80 X 3048 X	7315	1	8891	56889 049	049		
VACUUM DEGASSED								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
013	63.50 X 3048 X	7315 2 1/2X120X288 OMS PO 9392	1	11114	58352 031	031		
013	63.50 X 3048 X	7315	1	11114	58352 032	032		
VACUUM DEGASSED								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
014	76.20 X 2590 X	6147 3X102X242 OMS PO 9392	1	9526	58529 021	021		
014	76.20 X 2590 X	6147	1	9526	58529 022	022		
VACUUM DEGASSED								
SURFACE CONDITION EN 10 163-2:2005 CLASS B3								
015	88.90 X 2590 X	6147 3 1/2X102X242 OMS PO 9392	1	11114	58141 021	021		
015	88.90 X 2590 X	6147	1	11114	58141 022	022		

\* 10 96850  
\*\* 62 318416  
\*\*\* 62 318416

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: 4 65  
ACCEPTED DATE: 05/24/13  
SIGNATURE:

### Raabe Steel Works

Testaus ja tarkastus Testing and Inspection

JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
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Y-tunnus Business ID: 2389445-7

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Tilaaja Purchaser  
OLBERT METAL SALES LIMITED  
SUITE 305

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
SUITE 305

Paivamaara Date  
28.11.2012 LV

Tilaus nro Order No.

Asiakkaan merkki Shipping mark

Valmistajan merkki  
Mark of the Manufacturer

TO-9392

Laji Grade

Lisavaatimukset Additional requirements

Jatkuvavalettua happiterasta  
Oxygen steel, continuous casting

SA516 GR 70 MTLTV

Fully killed, Fine grain practiced

Laatuselvitys Quality Specifications

PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

N 920C,T=1.1(MIN)XTHICKN(MM)

Pos. Item	Sulatus, k-erä nro Cast, test No	T-tila Cond	Tensile test														Taivutuskoe Bend test		Huom Nb	Päästö Tempering F			
			K2	F	RP02 KSI	RT05 KSI	REL KSI	REH KSI	RM KSI			A %			REH / RM	RM * A5	RAZ %				Keskiarvo Average	K5	D = X t
										1	2	3	50	60	200			1	2	3			
001	58393	040	N	F1	52						76												
001	58393	041	N	F1	52						75												
001	58393	042	N	F1	52						76												
001	58393	043	N	F1	53						76												
001	58393	044	N	F1	52						76												
001	58393	045	N	F1	53						76												
001	58393	046	N	F1	53						77												
001	58393	047	N	F1	52						76												
001	58393	048	N	F1	52						76												
001	58393	049	N	F1	53						77												
002	58397	011	N	F1	51						75												
002	58397	012	N	F1	51						75												
002	58397	013	N	F1	50						73												
002	58397	014	N	F1	50						73												

K2: F1=TOP,TRANSV.

N=NORMALIZED

Pos. Item	Sulatus, kera nro Cast, test No	Iskukoe Impact test							Sitkeamurtuma Ductile fracture				Erikokeet Special tests					Huom Nb	Paaosto Tempering
		K3	F	1	2	3	Keskiarvo Average		1	2	3	Keskiarvo Average	K4	F	1	2	Keskiarvo Average		
001	58393	040	113	-051	33	36	41	37					1B				144		
001	58393	041	113	-051	32	35	40	36					1B				144		
001	58393	042	113	-051	32	49	35	38					1B				148		
001	58393	043	113	-051	37	32	46	38					1B				143		
001	58393	044	113	-051	40	34	38	37					1B				144		
001	58393	045	113	-051	33	34	41	36					1B				144		
001	58393	046	113	-051	39	38	45	41					1B				147		
001	58393	047	113	-051	40	35	38	38					1B				146		
001	58393	048	113	-051	37	32	41	36					1B				145		
001	58393	049	113	-051	38	39	45	41					1B				140		
002	58397	011	115	-051	91	78	89	86					1B				141		
002	58397	012	115	-051	94	96	87	92					1B				140		
002	58397	013	115	-051	83	77	79	80					1B				146		
002	58397	014	115	-051	119	119	117	118					1B				143		

K3: 113=CH-V/ISO-V(J),5X10,TOP, LONGIT,KV600 115=CH-V/ISO-V(J),7.5X10,TOP, LONGIT,KV600  
K4: 1B=HARDNESS/HB TOP

### Raahe Steel Works

Taten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and Inspection

*Jaakko Juuso*  
JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI  
Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

65

Tilaaaja Purchaser  
OLBERT METAL SALES LIMITED  
SUITE 305

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
SUITE 305

Päivämäärä Date  
28.11.2012 LV  
Valmistajan merkki  
Mark of the Manufacturer

Tilaus nro Order No.

Asiakkaan merkki Shipping mark

TO-9392

Laji Grade

Lisävaatimukset Additional requirements

SA516 GR 70 MTLTV

Jatkuvavalettua happiterästä  
Oxygen steel, continuous casting

Laatuseelvitys Quality Specifications

Fully killed, Fine grain practiced

PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

N 920C,T=1.1(MIN)XTHICKN(MM)

Pos. Item	Sulatus, kera nro Cast. test No	T-tila Cond	Tensile test										Taivutuskoe Bend test				Huom Nb	Päästö Tempering F							
			K2	F	RP02 KSI	RT05 KSI	REL KSI	REH KSI	RM KSI 1 2 3			A % 50 80 200			REH / RM	RM * A5			RAZ % 1 2 3			Keskiarvo Average	K5	D = X t	
002	58397	015	N	F1	50					74															
003	58396	011	N	F1	51					75															
003	58396	012	N	F1	51					75															
003	58396	013	N	F1	50					74															
003	58396	021	N	F1	50					73															
003	58396	028	N	F1	51					75															
004	58640	021	N	F1	50					75															
004	58640	023	N	F1	50					75															
005	58640	011	N	F1	48					74															
005	58640	012	N	F1	51					75															
006	58393	013	N	F1	49					75															
006	58393	024	N	F1	47					73															
006	58393	031	N	F1	47					74															
006	58393	032	N	F1	48					74															

K2: F1=TOP,TRANSV.

N=NORMALIZED

Pos. Item	Sulatus kera nro Cast. test No	Iskukoe K3	Impact test					Stiikemurtuma Ductile fracture				Erikoiskokeet Special tests					Huom Nb	Päästö Tempering
			F	1	2	3	Keskiarvo Average	1	2	3	Keskiarvo Average	K4	F	1	2	Keskiarvo Average		
002	58397	015	115	-051	83	96	81					1B				148		
003	58396	011	111	-051	124	126	116					1B				142		
003	58396	012	111	-051	94	87	101					1B				144		
003	58396	013	111	-051	100	111	97					1B				146		
003	58396	021	111	-051	85	101	65					1B				144		
003	58396	028	111	-051	92	97	102					1B				145		
004	58640	021	111	-051	103	101	80					1B				141		
004	58640	023	111	-051	96	91	89					1B				142		
005	58640	011	111	-051	111	126	123					1B				141		
005	58640	012	111	-051	75	69	77					1B				112		
006	58393	013	111	-051	95	97	101					1B				128		
006	58393	024	111	-051	105	103	80					1B				143		
006	58393	031	111	-051	107	94	76					1B				141		
006	58393	032	111	-051	111	115	105					1B				141		

K3: 115=CH-V/ISO-V(J),7.5X10, TOP, LONGIT, KV600 111=CH-V/ISO-V(J), 10X10, TOP, LONGIT, KV600  
K4: 1B=HARDNESS/HS TOP

### Raah Steel Works

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and Inspection

*Jaakko Juuso*  
JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUIKKI METALS OY  
Kotipaikka Registered Office: HELSINKI  
Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

65

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: H 65  
ACCEPTED DATE: 05/28/13  
SIGNATURE: *L*

Tilaja Purchaser  
OLBERT METAL SALES LIMITED  
SUITE 305  
Tilaus nro Order No.  
TO-9392

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
SUITE 305  
Asiakkaan merkki Shipping mark

Päivämäärä Date  
28.11.2012  
Valmistajan merkki Mark of the Manufacturer  
LV

Laji Grade  
SA516 GR 70 MTLTV

Lisävaatimukset Additional requirements

Jatkuvavalettua happiterästä  
Oxygen steel, continuous casting  
Fully killed, Fine grain practiced

Laatuseelvitys Quality Specifications

PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

N 920C,T=1.1(MIN)XTHICKN(MM)

Pos. Item	Sulatus, k.eri nro Cast. test No	T-tila Cond	Tensile test																		Taivutuskoee Bend test		Huom Nb	Päästö Tempering F			
			K2	F	RP02 KSI	RT05 KSI	REL KSI	REH KSI	RM KSI			A %			REH / RM	RM * AS	RAZ %			Keskiarvo Average	K5	D = X t					
									1	2	3	50	80	200			1	2	3								
006	58393	033	N	F1	47					73																	
006	58393	034	N	F1	47					74																	
007	57251	023	N	J1	50					77																	
007	57744	021	N	J1	50					77																	
008	57251	041	N	J1	50					76																	
008	57251	042	N	J1	50					77																	
009	57744	023	N	J1	49					77																	
009	58475	011	N	J1	51					78																	
010	57744	031	N	J1	51					76																	
010	57744	032	N	J1	51					76																	

K2: F1=TOP,TRANSV. J1=BOTTOM,TRANSV.

N=NORMALIZED

Pos. Item	Sulatus k.eri nro Cast. test No	Iskukoe Impact test							Sitkeämurtuma Ductile fracture				Erikoiskokeet Special tests					Huom Nb	Päästö Tempering
		K3	F	1	2	3	Keskiaivo Average		1	2	3	Keskiaivo Average	K4	F	1	2	Keskiaivo Average		
006	58393	033	111	-051	88	106	94	96					1B				141		
006	58393	034	111	-051	80	75	114	90					1B				143		
007	57251	023	151	-051	52	77	48	59					5B				143		
007	57744	021	151	-051	66	80	44	63					5B				152		
008	57251	041	151	-051	68	51	50	56					5B				153		
008	57251	042	151	-051	71	74	50	65					5B				152		
009	57744	023	151	-051	48	56	35	46					5B				151		
009	58475	011	151	-051	39	44	61	48					5B				153		
010	57744	031	151	-051	38	48	27	38					5B				152		
010	57744	032	151	-051	49	63	60	58					5B				138		

K3: 111=CH-V/ISO-V(J),10X10,TOP, LONGIT,KV600 151=CH-V/ISO-V(J),10X10,BOTTOM, LONGIT,KV600


K4: 1B=HARDNESS/HB TOP 5B=HARDNESS/HB BOTTOM

LESSON OF LIFE CONTROL  
JOB: 12-32  
ITEM: #65  
ACCEPTED DATE: 05/24/13  
SIGNATURE: \_\_\_\_\_

### Raah Steel Works

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and inspection

  
JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUIKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

65

Tilaja Purchaser  
OLBERT METAL SALES LIMITED  
SUITE 305

Vastaanottaja Consignee  
OLBERT METAL SALES LIMITED  
SUITE 305

Päivämäärä Date  
28.11.2012 LV  
Valmistajan merkki  
Mark of the Manufacturer

Tilaus nro Order No.

Asiakkaan merkki Shipping mark

TO-9392

Laji Grade  
SA516 GR 70 MTLTV

Lisävaatimukset Additional requirements

Jatkuvavalettua happiterästä  
Oxygen steel, continuous casting

Laatuselvitys Quality Specifications

Fully killed, Fine grain practiced

PRESS.VESSEL STEEL ASME CODE SEC II ED 2011A SA20

N 920C,T=1.1(MIN)XTHICKN(MM)

Pos. Item	Sulatus, kerä nro Cast. test No	T-tila Cond	Tensile test															Taivutuskoe Bend test		Huom Nb	Päästö Tempering F		
			K2	F	RP02 KSI	RT05 KSI	REL KSI	REH KSI	RM KSI			A %		REH / RM	RM * A5	RAZ %			Keskiarvo Average			K5	D = X t
										1	2	3	50	80	200			1	2	3			
011	57746	031	N	J1		46					74						27						
011	57746	032	N	J1		47					74						27						
012	56889	041	N	J1		45					73						28						
012	56889	049	N	J1		45					73						27						
013	58352	031	N	J1		47					74						26						
013	58352	032	N	J1		46					75						27						
014	58529	021	N	J1		44					73						28						
014	58529	022	N	J1		45					74						27						
015	58141	021	N	J1		44					73						28						
015	58141	022	N	J1		42					74						28						

K2: J1=BOTTOM,TRANSV.

N=NORMALIZED

Pos. Item	Sulatus, kera nro Cast. test No	Iskukoe Impact test							Sitkeämurtuma Ductile fracture				Erikoiskokeet Special tests					Huom Nb	Päästö Tempering
		K3	F	1	2	3	Keskiaivo Average		1	2	3	Keskiaivo Average	K4	F	1	2	Keskiaivo Average		
011	57746	031	1B1	-040	50	44	64	52											
011	57746	032	1B1	-040	62	44	60	55											
012	56889	041	1B1	-040	38	55	24	39											
012	56889	049	1B1	-040	46	49	42	46											
013	58352	031	1B1	-031	43	63	63	56											
013	58352	032	1B1	-031	45	61	39	49											
014	58529	021	1B1	-031	47	16	42	35											
014	58529	022	1B1	-031	60	61	48	56											
015	58141	021	1B1	-020	38	40	14	31											
015	58141	022	1B1	-020	46	36	38	40											

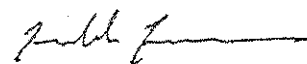
K3: 1B1=CH-V/ISO-V(J),10X10,BOTTOM T/4, LONGIT.

LABORATORY CONTROL  
JOB: 12-32  
ITEM: 465  
ACCEPTED DATE: 05/24/13  
SIGNATURE: \_\_\_\_\_

### Raah Steel Works

Täten todistamme, että toimitus on tilausvahvistuksen mukainen.  
We hereby certify that the material described above has been tested and complies with the terms of the order confirmation.

Testaus ja tarkastus Testing and Inspection

  
JAAKKO JUUSO

Valtuutettu tarkastaja Authorized inspection representative

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI  
Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telekopio Telefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

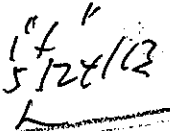
65



## ANALYYSITODISTUS ANALYSIS CERTIFICATE ANALYSEBESCHEINIGUNG COMPOSITIO CHIMIQUE CERTIFICAT СЕРТИФИКАТ АНАЛИЗА

9/10  
A 27492 -001  
30.10.2012

Sulatus nro Cast No Schmelzen Nr. No de coulée № Плавки	Koe nro Test No Prüf Nr. Essai No № Пробы	Positiio Item Pos. Poste Поз.	Cekv Ceq C8q C8q Ceq	Analysi % Chemical composition % Chemisch Zusammensetzung % Composition Chimique % Анализ пробы % (* = ppm)	C	SI	MN	P	S	AL	NB	V	TI	CU	CR	NI	MO	N	SN	B
58393	001	.39	.188	.33	1.11	.008	.001	.032	.001	.010	.004	.013	0.04	0.04	.004	.004	.004	.004	.0004	
58397	002	.37	.181	.32	1.08	.009	.002	.039	.000	.007	.004	.011	0.04	0.03	.003	.005	.005	.0002		
58396	003	.38	.187	.32	1.09	.008	.001	.033	.001	.008	.004	.010	0.04	0.03	.003	.004	.003	.0003		
58640	004	.38	.190	.30	1.08	.010	.002	.025	.000	.009	.003	.008	0.05	0.03	.003	.004	.002	.0002		
58640	005	.38	.190	.30	1.08	.010	.002	.025	.000	.009	.003	.008	0.05	0.03	.003	.004	.002	.0002		
58393	006	.39	.188	.33	1.11	.008	.001	.032	.001	.010	.004	.013	0.04	0.04	.004	.004	.004	.0004		
57251	007	.40	.199	.35	1.09	.010	.001	.040	.015	.008	.004	.011	0.05	0.04	.005	.003	.003	.0002		
57744	007	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003		
57251	008	.40	.199	.35	1.09	.010	.001	.040	.015	.008	.004	.011	0.05	0.04	.005	.003	.003	.0002		
57744	009	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003		
58475	009	.42	.209	.37	1.14	.010	.001	.041	.015	.008	.004	.014	0.05	0.04	.004	.003	.004	.0003		
57744	010	.42	.211	.36	1.13	.013	.002	.041	.015	.008	.004	.010	0.05	0.04	.007	.003	.003	.0003		

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: #65  
ACCEPTED DATE: 05/28/13  
SIGNATURE: 

CEQ=C+MN/6+(CR+MO+V)/5+(NI+CU)/15

### Raabe Steel Works

Testaus ja tarkastus  
Prüfung und Kontrolle  
Testing and Inspection  
Essais et Contrôle  
Испытание и контроль качества

Steel manufactured and supplied by Rautaruukki is free from radiation.  
Производимая на металлургическом комбинате «Рautaruukki» и поставляемая заказчику сталь не излучает радиации.

  
JAAKKO JUUSO

Valtuutettu tarkastaja  
Sachverständiger  
Authorized inspection representative  
Inspector autorisé  
Уполномоченный инспектор

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI  
Osoite Address: PL 93, P.O Box 93  
FIN-02101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
+358 20 5911

Telakopio Tlefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7


65

**RUUKKI**

ANALYYSITODISTUS ANALYSIS CERTIFICATE  
ANALYSEBESCHEINIGUNG COMPOSITIO CHIMIQUE CERTIFICAT  
СЕРТИФИКАТ АНАЛИЗА

10/10  
A 27492 -001  
30.10.2012

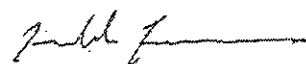
Sulatus nro Cast No Schmelzen Nr. No de coulée № Плавки	Koe nro Test No Prüf Nr. Essai No. № Пробки	Positio Item Pos. Poste Поз.	Cekv Ceq Câq Câq Ceqv	Analyysi % Chemical composition % Chemisch Zusammensetzung % Composition Chimique % Анализ плавки %	(*=ppm)															Päivämäärä Date Datum Data Дата	LV
				C	SI	MN	P	S	AL	NB	V	TI	CU	CR	NI	MO	B	ZR			
57746		011	.41	.204	.38	1.14	.013	.003	.047	.016	.008	.004	.011	0.05	0.04	.004	.0003	.001			
56889		012	.41	.209	.37	1.14	.012	.001	.040	.016	.012	.005	.010	0.04	0.04	.003	.0003	.001			
58352		013	.43	.218	.36	1.14	.012	.001	.037	.015	.014	.004	.011	0.05	0.04	.004	.0003	.001			
58529		014	.41	.208	.35	1.12	.011	.002	.038	.016	.009	.005	.012	0.05	0.04	.008	.0003	.000			
58141		015	.40	.208	.36	1.10	.008	.001	.039	.015	.011	.005	.014	0.04	0.04	.003	.0003	.000			

LESENA QUALITY CONTROL  
JOB: 12-32  
ITEM: # 65  
ACCEPTED DATE: 05/24/13  
SIGNATURE: 

CEQ=C+MN/6+(CR+MO+V)/5+(NI+CU)/15

**Raahe Steel Works**

Testaus ja tarkastus Testing and Inspection Испытание и контроль качества  
Prüfung und Kontrolle Essais et Contrôle



**JAAKKO JUUSO**

Valtuutettu tarkastaja Authorized inspection representative Уполномоченный инспектор  
Sachverständiger Inspector autorisé

Yhtiön nimi Company Name: RUUKKI METALS OY  
Kotipaikka Registered Office: HELSINKI

Osoite Address: PL 93, P.O. Box 93  
FIN-92101 RAAHE, FINLAND

Puhelin Telephone: 020 5911  
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Telekopio Tefax: 020 592 2736  
+358 20 592 2736

Y-tunnus Business ID: 2389445-7

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Производимая на металлургическом комбинате «Rautaruukki» и поставляемая  
заказчику сталь не излучает радиации.

65

I-288285



WILTON STEEL MILL  
1500-2500 WEST 3RD STREET  
WILTON IA 52778 USA

## Chemical and Physical Test Report

MADE IN UNITED STATES

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
F5/16 X 5	44W	CSA G40.21-04 44W		31010
HEAT ID.	C	Mn P S Si Cu Ni Cr Mo V Nb B Sn Al Ti C Eqv		
1043033	.18	.58 .009 .040 .19 .25 .11 .11 .030 .001 .001 .0004 .013 .000 .00100 .326		

Mechanical Test: Yield 45620 PSI, 314.54 MPA Tensile: 67671 PSI, 468.58 MPA %El: 32.5/8in, 32.5/203.2mm Red R 19 Idl Diam: .487

Customer Requirements CASTING: STRAND CAST

Mechanical Test: Yield 44953 PSI, 309.94 MPA Tensile: 67199 PSI, 463.32 MPA %El: 32.5/8in, 32.5/203.2mm Red R 19 Idl Diam: .487

Customer Requirements CASTING: STRAND CAST

SHAPE + SIZE	GRADE	SPECIFICATION	SALES ORDER	CUST P.O. NUMBER
F1/4 X 1	44W	CSA G40.21-04 44W		31010
HEAT ID.	C	Mn P S Si Cu Ni Cr Mo V Nb B Sn Al Ti C Eqv		
1044099	.17	.56 .005 .037 .18 .25 .11 .11 .023 .001 .001 .0002 .011 .000 .00000 .314		

Mechanical Test: Yield 48600 PSI, 335.09 MPA Tensile: 68800 PSI, 474.36 MPA %El: 25.0/8in, 25.0/203.2mm Red R 121 Idl Diam: .446

Customer Requirements CASTING: STRAND CAST

Mechanical Test: Yield 49400 PSI, 340.6 MPA Tensile: 69600 PSI, 479.88 MPA %El: 26.3/8in, 26.3/203.2mm Red R 121 Idl Diam: .446

Customer Requirements CASTING: STRAND CAST

This material, including the billets, was melted and manufactured in the United States of America

*Bhaskar*

Bhaskar Yamamanchili  
Quality Director  
Gerda

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

*[Signature]*

Metallurgical Services Manager  
WILTON STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER, AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller.

Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.

## LESENA QUALITY CONTROL

JOB: 12-32

ITEM: 66 Rolled Bar

ACCEPTED DATE: 05/09/13

SIGNATURE: *[Signature]*

66



WILTON STEEL MILL  
1500-2500 WEST 3RD STREET  
WILTON IA 52778 USA

Chemical and Physical Test Report

MADE IN UNITED STATES

SHAPE + SIZE		GRADE		SPECIFICATION													SALES ORDER				CUST P.O. NUMBER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Mechanical Test: Yield 45620 PSI, 314.54 MPA Tensile: 67671 PSI, 466.58 MPA %El: 32.5/8in, 32.5/203.2mm Red R 19 Idl Diam: .487  
Customer Requirements CASTING: STRAND CAST  
Mechanical Test: Yield 44953 PSI, 309.94 MPA Tensile: 67199 PSI, 463.32 MPA %El: 32.5/8in, 32.5/203.2mm Red R 19 Idl Diam: .487  
Customer Requirements CASTING: STRAND CAST

20'

SHAPE + SIZE		GRADE		SPECIFICATION													SALES ORDER		CUST P.O. NUMBER																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Mechanical Test: Yield 48600 PSI, 335.09 MPA Tensile: 68800 PSI, 474.36 MPA %El: 25.0/8in, 25.0/203.2mm Red R 121 Idl Diam: .446  
Customer Requirements CASTING: STRAND CAST  
Mechanical Test: Yield 49400 PSI, 340.6 MPA Tensile: 69600 PSI, 479.88 MPA %El: 26.3/8in, 26.3/203.2mm Red R 121 Idl Diam: .446  
Customer Requirements CASTING: STRAND CAST

20'

This material, including the billets, was melted and manufactured in the United States of America

*Bhaskar*

Bhaskar Yalamanchili  
Quality Director  
Gerda

THE ABOVE FIGURES ARE CERTIFIED CHEMICAL AND PHYSICAL TEST RECORDS AS CONTAINED IN THE PERMANENT RECORDS OF COMPANY.

*[Signature]*

Metallurgical Services Manager  
WILTON STEEL MILL

Seller warrants that all material furnished shall comply with specifications subject to standard published manufacturing variations. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARE MADE BY THE SELLER. AND SPECIFICALLY EXCLUDED ARE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. In no event shall seller be liable for indirect, consequential or punitive damages arising out of or related to the materials furnished by seller. Any claim for damages for materials that do not conform to specifications must be made from buyer to seller immediately after delivery of same in order to allow the seller the opportunity to inspect the material in question.

LESENA QUALITY CONTROL  
JOB: ~~12-32~~ 12-32  
ITEM: 1/4" X 1" Flat #67  
ACCEPTED DATE: 4/19/13  
SIGNATURE: *[Signature]*

(67)


**GERDAU**

CA-ML-CAMBRIDGE  
160 ORION PLACE  
CAMBRIDGE, ON N1T 1R9  
Canada

**CERTIFIED MATERIAL TEST REPORT**

Page 1/1

<b>CUSTOMER SHIP TO</b> RUSSEL METALS LEROUX 15 CHERRY BLOSSOM RD CAMBRIDGE, ON N3H 4R7 Canada	<b>CUSTOMER BILL TO</b> RUSSEL METALS INC 1900 MINNESOTA CRT MISSISSAUGA, ON L5N 3C9 Canada	<b>GRADE</b> 44W	<b>SHAPE / SIZE</b> Round Bar / 5/8"	
<b>SALES ORDER</b> 196604/000020		<b>LENGTH</b> 20'00"	<b>WEIGHT</b> 9,866 LB	<b>HEAT / BATCH</b> 51124958/02
<b>CUSTOMER PURCHASE ORDER NUMBER</b> 34025917-MB4		<b>BILL OF LADING</b> 1301-0000002398	<b>DATE</b> 03/01/2013	

**CHEMICAL COMPOSITION**

C %	Mn %	P %	S %	Si %	Cu %	Ni %	Cr %	Mo %	V %	Nb %	Al %	B %
0.20	0.61	0.009	0.036	0.19	0.36	0.12	0.09	0.040	0.003	0.002	0.001	0.0002

**CHEMICAL COMPOSITION**

Zn %	Zr %
0.004	0.002

**MECHANICAL PROPERTIES**

Elong. %	G/L Inch	G/L mm	UTS PSI	UTS MPa	YS PSI
23.00	8.000	200.0	73141	504	51368
22.50	8.000	200.0	73485	507	50686

**MECHANICAL PROPERTIES**

YS MPa
354
350

**TEST CERT. #**

**C63633**
**COMMENTS / NOTES**
**LESENA QUALITY CONTROL**

JOB: 12-32  
 ITEM: 68 7/8" Ø  
 ACCEPTED DATE: 05/09/13  
 SIGNATURE: *[Signature]*

68  
1-2

The above figures are certified chemical and physical test records as contained in the permanent records of Company. This material, including the billets was melted and manufactured in Canada. We certify that these data are correct and in compliance with specified requirements. CMTR complies with EN 10204 3.1.

*[Signature]*

BHASKAR YALAMANCHILI  
QUALITY DIRECTOR

MARYAM CHAMANEH  
QUALITY ASSURANCE MGR.

**Laurel-LEC Steel**

P.O. Box 910  
84 Shaver Street  
Brantford, On N3T 5S1  
Canada

519 759 2300 Fax: 519 759 1570

**TEST CERT. #****C64724****CERTIFICATE OF COMPLIANCE****Sold to**

Russel/Leroux (Cambridge) Inc  
Division of Russel Metals Inc  
15 Cherry Blossom Road  
Cambridge ON N3H 4R7  
Canada

**Ship to**

Russel/Leroux (Cambridge) Inc  
15 Cherry Blossom Road  
Cambridge ON N3H 4R7  
Canada

Ship Date	Pkg. Slip No.	Customer P.O. No.	BOL No.	Weight Shipped	No. of Pkgs.
04/16/2013	00029519	34027123	00029519	0.00	0

Item	Description	Quantity Shipped									
1	7/16x20' Commodity Bar Heat# A10786	4000.00									
2	3/8x20' Commodity Bar Heat# A10626	4000.00									

Item	Heat No.	C	Mn	P	S	Si	Pb	Ni	Cr	Mo	Tensiles
1	A10786	0.060	0.400	0.017	0.018	0.110		0.080	0.150	0.027	61.45
2	A10626	0.080	0.380	0.010	0.014	0.120		0.070	0.100	0.022	60.01

We certify the chemical results and/or attached physical tests were determined by standard methods and are correct as contained in the records of the Corporation.

*Janette Daley*  
Authorized Representative

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	68 7/8" Q
ACCEPTED DATE:	05/09/13
SIGNATURE:	<i>h</i>

68  
2-2



CA-ML-CAMBRIDGE  
160 ORION PLACE  
CAMBRIDGE, ON N1R 1R9  
Canada

## CERTIFIED MATERIAL TEST REPORT

Page 1/1

CUSTOMER SHIP TO RUSSEL METALS LEROUX 15 CHERRY BLOSSOM RD CAMBRIDGE, ON N3H 4R7 Canada		CUSTOMER BILL TO RUSSEL METALS INC 1900 MINNESOTA CRT MISSISSAUGA, ON L5N 3C9 Canada		GRADE 44W	SHAPE / SIZE Round Bar / 5/8"	
SALES ORDER 196604/000020		SPECIFICATION / DATE or REVISION 1-ASTM A6/A6M-11, A36/A36M-08 2-A709/A709M-11 GR36 3-CSA G40.21-04(R2009) 44W		LENGTH 20'00"	WEIGHT 9,866 LB	HEAT / BATCH 51124958/02
CUSTOMER PURCHASE ORDER NUMBER 34025917-MB4	BILL OF LADING 1301-0000002398	DATE 03/01/2013				

CHEMICAL COMPOSITION											
C %	Mn %	P %	S %	Si %	Cu %	Ni %	Cr %	Mo %	V %	Nb %	Al %
0.20	0.61	0.009	0.036	0.19	0.36	0.12	0.09	0.040	0.003	0.002	0.001

CHEMICAL COMPOSITION	
Zn %	Zr %
0.004	0.002

MECHANICAL PROPERTIES					
Elong. %	G/L Inch	G/L mm	UTS PSI	UTS MPa	YS PSI
23.00	8.000	200.0	73141	504	51368
22.50	8.000	200.0	73485	507	50686

MECHANICAL PROPERTIES	
YS MPa	
354	
350	

TEST CERT. #



C63633

COMMENTS / NOTES	JOB: 12-32 ITEM: # 69 ACCEPTED DATE: 05/16/13 SIGNATURE: <i>[Signature]</i>
------------------	--

The above figures are certified chemical and physical test records as contained in the permanent records of Company. This material, including the billets was melted and manufactured in Canada. We certify that these data are correct and in compliance with specified requirements. CMTR complies with EN 10204 3.1.

*Maskary*

BHASKAR YALAMANCHILI  
QUALITY DIRECTOR

*[Signature]*

MARYAM CHAMANER  
QUALITY ASSURANCE MGR.

69



**ALLIED  
THREADED  
PRODUCTS  
INC.**

23 French Drive,  
Orangeville, ON  
L9W 2Z2  
Direct: (519) 940-8632  
Toll Free: 1-866-225-9331  
Fax: (519) 943-0801  
www.atpstuds.com

## Certified Material Test Report

### Specification Notes:

Name	Revision	Grade	Description	Revision Year
ASTM A193	10a	B7	<=2-1/2" Diam	2010
ASME SA193-04 SECTION II				

### Product Information:

Item #	Product Code	Description	Starting Material	Heat #	Lot #	Country of Origin
1	B7CST1.257	1 1/4-8 X 7 A193 B7 FT STUDS		2102710	BOLT372-027	CHINA

### Chemical Information:

Item #	C	Mn	P	S	Si	Cr	Mo	Ni	Co	V	Al
Min	0.37	0.65			0.15	0.75	0.15				
Max	0.49	1.1	0.035	0.04	0.35	1.2	0.25				
1	0.4	0.83	0.015	0.005	0.25	0.97	0.18	0.02	0.02		

### Physical Information:

Item #	Tempering Temp. Min (°F)	Tensile Strength Min (psi)	Yield Strength Min (psi)	Elongation Min %	Reduction of Area Min %	Hardness HB	Hardness HRC	Macro Etch Test
Min	1100	125000	105000	16	50			
Max						321	35	
1	1173	142700	113300	18	55		29.7	PASS

### Additional Notes:

Physical Information Notes:  
1. MACRO ETCH S2/R2/C2

QUALITY CONTROL

JOB: 12-32

ITEM: 70

ACCEPTED DATE: 05/22/13

SIGNATURE: \_\_\_\_\_

We certify that the material or fasteners supplied were manufactured, sampled, tested, and inspected in accordance with the specification and other requirements designated in the purchase order and was found to meet those requirements listed above.

Material is quenched and tempered.

QUALITY ASSURANCE COORDINATOR

Revision Dec-14-2012

MTR Certificate Produced By MTRCreator.  
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70





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L9W 2Z2  
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Fax: (519) 943-0801  
www.atpstuds.com

## Certified Material Test Report

### Specification Notes:

Name	Revision	Grade	Description	Revision Year
ASTM A194	11	2H	1 1/4" Diam	2011

### Product Information:

Item #	Product Code	Description	Starting Material	Heat #	Lot #	Country of Origin
1	2H125	1-1/4-8 A194 2H HEAVY HEX NUT		1107-04318	F2P1786901	KOREA

### Chemical Information:

Item #	C	Mn	P	S	Si	Cr	Mo	Ni	Cu	V	Al
Min	0.4										
Max		1	0.04	0.05	0.4						
1	0.46	0.74	0.023	0.004	0.27	0.04		0.01	0.03		

### Physical Information:

Item #	Tempering Temp. Min (°F)	Proof Load Min (lbf)(Value)	Proof Load Min (lbf)(Pass/Fail)	Hardness HRC	Hardness BHN	Hardness 24hr Heat Treat HRC	Hardness 24hr Heat Treat BHN	Hardness 24hr Heat Treat HRB	Macro Etch Test
Min	850	175000		24	248		179	89	
Max				35	327				
1	932	175000	Pass	31		27			PASS

### Additional Notes:

**Physical Information Notes:**  
1. MACRO ETCH S1/R1/C1

12-32  
# 71  
05/22/13  
JH

We certify that the material or fasteners supplied were manufactured, sampled, tested, and inspected in accordance with the specification and other requirements designated in the purchase order and was found to meet those requirements listed above.

Material is quenched and tempered.

QUALITY ASSURANCE COORDINATOR

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Revision Jul-27-2012

MTR Certificate Produced By MTRCreator.  
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Orangeville, ON  
L9W 2Z2  
Direct: (519) 940-8632  
Toll Free: 1-866-225-9331  
Fax: (519) 943-0801  
www.atpstuds.com

## Certified Material Test Report

### Specification Notes:

Name	Revision	Grade	Description	Revision Year
ASTM A193	10a	B7M	ALL	2010
ASME SA193-04 SECTION II				

### Product Information:

Item #	Product Code	Description	Starting Material	Heat #	Lot #	Country of Origin
1	B7MST.6253.75	5/8-11 X 3 3/4 A193 B7M FT STUDS		R11105493XX	2W1208172	CHINA

### Chemical Information:

Item #	C	Mn	P	S	Si	Cr	Mo	Ni	Cu	V	Al
Min	0.37	0.65			0.15	0.75	0.15				
Max	0.49	1.1	0.035	0.04	0.35	1.2	0.25				
1	0.39	0.86	0.012	0.012	0.26	1.01	0.19	0.05	0.10		

### Physical Information:

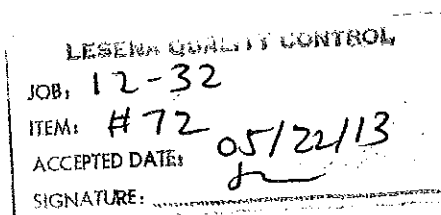
Item #	Tempering Temp. Min (°F)	Tensile Strength Min (psi)	Yield Strength Min (psi)	Elongation Min %	Reduction of Area Min %	Hardness HB	Hardness HRC	Hardness HRB	Macro Etch Test
Min	1150	100000	80000	18	50	200		98	
Max						235	20	99	
1	1184	108000	103000	23	63.5			96.5	PASS

### Additional Notes:

**WE CERTIFY THAT THE PARTS HAVE BEEN 100% HARDNESS TESTED**

#### Physical Information Notes:

1. MACRO ETCH S2/R2/C2



We certify that the material or fasteners supplied were manufactured, sampled, tested, and inspected in accordance with the specification and other requirements designated in the purchase order and was found to meet those requirements listed above.

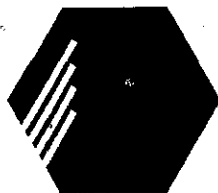
Material is quenched and tempered.

QUALITY ASSURANCE COORDINATOR

Revision Nov-02-2012

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**ALLIED  
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L9W 2Z2

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Fax: (519) 943-0801  
www.atpstuds.com

## Certified Material Test Report

### Specification Notes:

Name	Revision	Grade	Description	Revision Year
ASTM A194	08	2H	5/8" Diam	2008

### Product Information:

Item #	Product Code	Description	Starting Material	Heat #	Lot #	Country of Origin
1	2H.625	5/8-11 A194 2H HEAVY HEX NUT		11107906-4	1N11B0438	CHINA

### Chemical Information:

Item #	C	Mn	P	S	Si	Cr	Mo	Ni	Cu	V	Al
Min	0.4										
Max		1	0.04	0.05	0.4						
1	0.4300	0.7400	0.0180	0.0050	0.1900						

### Physical Information:

Item #	Tempering Temp. Min (°F)	Proof Load Min (lbf) (Value)	Proof Load Min (lbf) (Pass/Fail)	Hardness HRC	Hardness BHN	Hardness 24hr Heat Treat HRC	Hardness 24hr Heat Treat BHN	Hardness 24hr Heat Treat HRB	Macro Etch Test
Min	850	39550		24	248		179	89	
Max				35	327				
1	850	39720	Pass	28				91	Pass

### Additional Notes:

#### Physical Information Notes:

1. MACROETCH RESULTS S1/R1/C1

We certify that the material or fasteners supplied were manufactured, sampled, tested, and inspected in accordance with the specification and other requirements designated in the purchase order and was found to meet those requirements listed above.

\*\*Material is quenched and tempered.

12-32  
#73  
TESTED DATE: 05/24/13  
SIGNATURE: *[Signature]*

*[Signature]*  
QUALITY ASSURANCE COORDINATOR

Revision May-11-2012

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Trace Applications Inc. www.TraceApps.com toll-free: 1.866.429.7007

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**ALLIED  
THREADED  
PRODUCTS  
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23 French Drive,  
Orangeville, ON  
L9W 2Z2

Direct: (519) 940-8632

Toll Free: 1-866-225-9331

Fax: (519) 943-0801

www.atpstuds.com

## Certified Material Test Report

### Specification Notes:

Name	Revision	Grade	Description	Revision Year
ASTM A193	10a	B7	<=2-1/2" Diam	2010
ASME SA193-04 SECTION II				

### Product Information:

Item #	Product Code	Description	Starting Material	Heat #	Lot #	Country of Origin
1	B7CST.53.5	1/2-13 X 3-1/2 A193 B7 FULL THREAD STUD		6612090072	2W1210018	CHINA

### Chemical Information:

Item #	C	Mn	P	S	Si	Cr	Mo	Ni	Cu	V	Al
Min	0.37	0.65			0.15	0.75	0.15				
Max	0.49	1.1	0.035	0.04	0.35	1.2	0.25				
1	0.40	0.77	0.009	0.008	0.19	0.93	0.19	0.04	0.10		

### Physical Information:

Item #	Tempering Temp. Min (°F)	Tensile Strength Min (psi)	Yield Strength Min (psi)	Elongation Min %	Reduction of Area Min %	Hardness HB	Hardness HRC	Macro Etch Test
	1100	125000	105000	16	50			
Max						321	35	
1	1184	134000	129000	17	56		29	PASS

### Additional Notes:

Physical Information Notes:  
1. MACRO ETCH S2/R2/C2

LEADING QUALITY CONTROL  
JOB: 12-32  
ITEM: H74  
ACCEPTED DATE: 05/22/13  
SIGNATURE:

We certify that the material or fasteners supplied were manufactured, sampled, tested, and inspected in accordance with the specification and other requirements designated in the purchase order and was found to meet those requirements listed above.

\*Material is quenched and tempered.

QUALITY ASSURANCE COORDINATOR

Revision Dec-28-2012

MTR Certificate Produced By MTRCreator.  
Trace Applications Inc. www.TraceApps.com toll-free: 1.866.429.7007

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**ALLIED  
THREADED  
PRODUCTS  
INC.**

23 French Drive,  
Orangeville, ON  
L9W 2Z2  
Direct: (519) 940-8632  
Toll Free: 1-866-225-9331  
Fax: (519) 943-0801  
www.atpstuds.com

## Certified Material Test Report

### Specification Notes:

Name	Revision	Grade	Description	Revision Year
ASTM A194 06a	2H	1/2" Diam	06	
ASME SA194 SECTION II				

### Product Information:

Item #	Product Code	Description	Starting Material	Heat #	Lot #	Country of Origin
1	2H.5	1/2-13 A194 2H HEAVY HEX NUT		S00036	336787	KOREA

### Chemical Information:

Item #	C	Mn	P	S	Si	Cr	Mo	Ni	Cu	V	Al
Min	0.4										
Max		1	0.04	0.05	0.4						
1											

### Physical Information:

Item #	Tempering Temp. Min (°F)	Proof Load Min (lbf)(Value)	Proof Load Min (lbf)(Pass/Fail)	Hardness HRC	Hardness BHN	Hardness 24hr Heat Treat BHN	Hardness 24hr Heat Treat HRB	Macro Etch Test
	850	24830		24	248	179	89	
Max				35	327			
1	950	24830	Pass	32			104	Pass

### Additional Notes:

Physical Information Notes:  
1. S2-R2-C2

We certify that the material or fasteners supplied were manufactured, sampled, tested, and inspected in accordance with the specification and other requirements designated in the purchase order and was found to meet those requirements listed above.

\*Material is quenched and tempered.

12-32  
#75  
TESTED DATE: 05/22/13  
SIGNATURE: [Signature]

[Signature]  
QUALITY ASSURANCE COORDINATOR

Revision Apr-18-2013

MTR Certificate Produced By MTRCreator.  
Trace Applications Inc. www.TraceApps.com toll-free: 1.866.429.7007

75



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000010 2013/01/02		Shipment No. & Date.: 1000022942 2013/01/02		TC No., Date & Time : ESA-38035 2013/01/02 - 21:58:56											
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6		Customer PO NO./Item: 19025-STK / 1 BOL NO.: 1000022942 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 606REV 104											
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 12 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair															
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370															
Insp T/R : Test Report As Per Spec				Cust Use : PVQ											
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.															
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM															
ALL HEATS FULLY KILLED. HEATS INDICATED WITH (*) FINE GRAINED HEATS INDICATED WITH (+) MADE IN CANADA WITH DOMESTIC AND NORTH AMERICAN MATERIALS															
Dimensions (T x W x L) 0.3750" x 96.000" x 480.00"		Batch No. AB6143	Heat No-MS 2138P3-03	Quantity 9,802	Pcs 2										
CHEMICAL PROPERTIES															
Heat No. (wt%)	C	Mn	P	S	Si	Cr	Ni	Cu	Mo	Al	Nb	V	B	Ti	DO
2138P3*	0.19	1.08	0.012	0.004	0.320	0.02	0.15	0.03	0.00	0.026	0.000	0.014	0.0003	0.002	0.3900
MECHANICAL PROPERTIES															
Hardness Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	LOC	MTHD	HARDNESS							
2138P3	AB6143	166"	ALG	0.3750	NORM	B	HBW	158							
Impact Tests															
Heat No.	Batch No.	SRCE	LAB	GAUGE	COND	METH	DIR	LOC	SIZE	TEMP(°F)	ENERGY(ft-lbf)	ENERGY AVG(ft-lbf)			
2138P3	AB6143	166"	ALG	0.3750	NORM	CVN	L	B	3/4	-50	104 88 93	95			

JOB: 12-32  
ITEM: # 76  
ACCEPTED DATE: 05/24/13  
SIGNATURE: \_\_\_\_\_

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

76

**\*\*WARNING\*\*** THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATION) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.



ESSAR STEEL ALGOMA INC., 105 West Street, Sault Ste. Marie, Ontario, Canada P6A 7B4

SO No., Item & Date.: 8006091 000010 2013/01/02	Shipment No. & Date.: 1000022942 2013/01/02	TC No., Date & Time : ESA-38035 2013/01/02 - 21:58:56
Sold to Customer Name and Address : CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Ship to Customer Name and Address: CANADIAN PLATE AND PROFILES IN KAMATO ROAD 920 MISSISSAUGA, Ontario, Canada L4W 2R6	Customer PO NO./Item: 19025-STK / 1 BOL NO.: 1000022942 Cust. Part No.: Carrier : NATIONAL TRANSPORTATION - 606REV 104
Customer Specification : HR STEEL PLATE Carbon Multi Cert ASTM A516 GR 70 (10) / ASME SA516 GR 70 (11A) Meets NACE MR 0103 latest Ed., NACE MR 0175 latest Ed., BHN < 200, Calcium Treated for Sulphide Shape Control Normalized Normalized Temp 1670 °F 12 min CVNL Req. 15 / 12 FT-LBF at 0 -50.0 F Std Thickness Tol PVQ Top and Bottom Standard Surface Flatness 1/2 A20 Fine Grain Fully Killed No Weld Repair		
Supplementary Instructions : Test Cert 1: drafting@canadianplate.com Test Cert 2: 905-206-1370		
Insp T/R : Test Report As Per Spec		Cust Use : PVQ
ESSAR STEEL ALGOMA INC. HEREBY CERTIFIES THAT THE MATERIAL HEREIN DESCRIBED WAS MADE AND TESTED IN ACCORDANCE WITH THE RULES OF THE SPECIFICATION SHOWN. ALL RESULTS ARE RETAINED IN ACCORDANCE WITH THE COMPANY'S STANDARD RECORD KEEPING PRACTICES. THIS MILL TEST REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL WITHOUT WRITTEN APPROVAL OF ESSAR STEEL ALGOMA INC. IF YOU RECEIVE THIS DOCUMENT AND ARE NOT THE INTENDED RECEIVER, PLEASE CALL (705)945-4095 FOR INSTRUCTIONS ON METHOD OF DISPOSAL OF DOCUMENT.		
MEETS EN 10204:2004 TYPE 3.1 ISO QUALITY AND ENVIRONMENTAL CERTIFICATES AVAILABLE AT WWW.ESSARSTEELALGOMA.COM		
***** MECHANICAL PROPERTIES *****		
Tensile Tests /		
Heat No.	Batch No.	SRCE LAB GAUGE COND METH DIR LOC YIELD(KSI) TENSILE(KSI) EL SCALE ELONG(%)
2138P3	AB6143	166" ALG 0.3750 NORM 2 T B 54.0 76.0 8" 26

LESENA QUALITY CONTROL	
JOB:	12-32
ITEM:	# 76
ACCEPTED DATE:	05/24/13
SIGNATURE:	

K. UGHADPAGA  
MANAGER METALLURGICAL SERVICES

\*\*\*WARNING\*\*\* THE TEST RESULTS AND VALUES REPORTED HEREIN INDICATE ONLY THAT (1) THE PARTICULAR STEEL FOR WHICH THIS CERTIFICATE IS ISSUED MEETS THE MINIMUM SPECIFIED YIELD STRENGTH AND (2) THE ANALYSIS AND PHYSICAL PROPERTIES OF SUCH STEEL ARE IN CONFORMANCE WITH THE REQUIREMENTS OF THE SPECIFICATION INDICATED. THE RESULTS OR VALUES REPORTED HEREIN CAN NOT BE USED TO QUALIFY THE STEEL FOR ANY SPECIFICATION OTHER THAN THE ONE INDICATED AND CAN NOT BE RELIED UPON FOR ANY PURPOSE (INCLUDING DESIGN OR CALCULATIONS) AS REPRESENTING THE ACTUAL STRENGTH OF SUCH STEEL.

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PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Positive Material Identification Report

**Not Applicable**



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Charpy Impact Test Report

**Not Applicable**



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Welder Qualification Records

# LESENA STEEL Ltd.

## WELDER MAP

**CUSTOMER.**

**JOB NO:12-32 A**

SEAM	PROCESS	WPS	WELDER'S ID
Longitudinal Seams	SAW	45	L8
Circumferential Seams	SAW	45	L8
Manway Flange to Pipe, (M1)	SAW/SMAW	45/16	L8/L9
Manway Flange to Pipe, (M2)	SAW/SMAW	45/16	L8/L9
Flange to Pipe (N1)	FCAW	40	L7
Flange to Pipe (N2)	FCAW	40	L5
To Head or Shell & Repad			
N1	FCAW	40	L5
N2	FCAW	40	L1
N3A & N3B	SMAW	16.2	L2
N4	SMAW	16.2	L5
SG1A & SG1B	FCAW	40	L7
M1 MANWAY	FCAW	40	L5
M2 MANWAY	FCAW	40	L5
LEGS/ LUGS/SADDLES	FCAW/SMAW	40/16	L2/L5
N1: Internal Flange To Pipe	FCAW	40	L2
STRAINER PLATE to HEAD(TOP)	FCAW	40	L1/L2/L7/L9
STRAINER PLATE to HEAD (BTM)	FCAW	40	L1/L2/L7/L9



# LESENA STEEL Ltd.

## WELDER MAP

CUSTOMER: **MOORE & BROWN**

JOB NO:12-32 B

SEAM	PROCESS	WPS	WELDER'S ID
Longitudinal Seams	SAW	45	L8
Circumferential Seams	SAW	45	L8
Manway Flange to Pipe, (M1)	SAW/SMAW	45/16	L8/L9
Manway Flange to Pipe, (M2)	SAW/SMAW	45/16	L8/L9
Flange to Pipe (N1)	FCAW	40	L7
Flange to Pipe (N2)	FCAW	40	L5
To Head or Shell & Repad			
N1	FCAW	40	L8
N2	FCAW	40	L9
N3A & N3B	SMAW	16.2	L5
N4	SMAW	16.2	L8
SG1A & SG1B	FCAW	40	L5
M1 MANWAY	FCAW	40	L5
M2 MANWAY	FCAW	40	L5
LEGS/ LUGS/SADDLES	FCAW/SMAW	40/16	L2/L5
N1: Internal Flange To Pipe	FCAW	40	L2
STRAINER PLATE to HEAD(TOP)	FCAW	40	L1/L2/L7/L9
STRAINER PLATE to HEAD (BTM)	FCAW	40	L1/L2/L7/L9

# LESENA STEEL Ltd.

## WELDER MAP

JOB NO:12-32 C

SEAM	PROCESS	WPS	WELDER'S ID
Longitudinal Seams	SAW	45	L8
Circumferential Seams	SAW	45	L8
Manway Flange to Pipe, (M1)	SAW/SMAW	45/16	L8/L9
Manway Flange to Pipe, (M2)	SAW/SMAW	45/16	L8/L9
Flange to Pipe (N1)	FCAW	40	L7
Flange to Pipe (N2)	FCAW	40	L1/5
To Head or Shell & Repad			
N1	FCAW	40	L7
N2	FCAW	40	L1
N3A & N3B	SMAW	16.2	L1
N4	SMAW	16.2	L7
SG1A & SG1B	FCAW	40	L7
M1 MANWAY	FCAW	40	L7
M2 MANWAY	FCAW	40	L2
LEGS/ LUGS/SADDLES	FCAW/SMAW	40/16	L1/L5
N1: Internal Flange To Pipe	FCAW	40	L7
STRAINER PLATE to HEAD(TOP)	FCAW	40	L1/L2/L7/L9/5
STRAINER PLATE to HEAD (BTM)	FCAW	40	L1/L2/L7/L9/5

# LESENA STEEL Ltd.

## WELDER MAP

CUSTOMER:

JOB NO:12-32 D

SEAM	PROCESS	WPS	WELDER'S ID
Longitudinal Seams	SAW	45	L8
Circumferential Seams	SAW	45	L8
Manway Flange to Pipe, (M1)	SAW/SMAW	45/16	L8/L9
Manway Flange to Pipe, (M2)	SAW/SMAW	45/16	L8/L9
Flange to Pipe (N1)	FCAW	40	L1
Flange to Pipe (N2)	FCAW	40	L1/5
To Head or Shell & Repad			
N1	FCAW	40	L1
N2	FCAW	40	L1
N3A & N3B	SMAW	16.2	L1
N4	SMAW	16.2	L1
SG1A & SG1B	FCAW	40	L1
M1 MANWAY	FCAW	40	L1
M2 MANWAY	FCAW	40	L1
LEGS/ LUGS/SADDLES	FCAW/SMAW	40/16	L7/L5
N1: Internal Flange To Pipe	FCAW	40	L1
STRAINER PLATE to HEAD(TOP)	FCAW	40	L1/L2/L7/L5
STRAINER PLATE to HEAD (BTM)	FCAW	40	L1/L2/L7/L5

# LESENA STEEL Ltd.

## WELDER MAP

**CUSTOMER:**

**JOB NO:12-32 E**

SEAM	PROCESS	WPS	WELDER'S ID
Longitudinal Seams	SAW	45	L8
Circumferential Seams	SAW	45	L8
Manway Flange to Pipe, (M1)	SAW/SMAW	45/16	L8/L9
Manway Flange to Pipe, (M2)	SAW/SMAW	45/16	L8/L9
Flange to Pipe (N1)	FCAW	40	L5
Flange to Pipe (N2)	FCAW	40	L1
To Head or Shell & Repad			
N1	FCAW	40	L2
N2	FCAW	40	L2
N3A & N3B	SMAW	16.2	L1/5
N4	SMAW	16.2	L2
SG1A & SG1B	FCAW	40	L5
M1 MANWAY	FCAW	40	L7
M2 MANWAY	FCAW	40	L5
LEGS/ LUGS/SADDLES	FCAW/SMAW	40/16	L1/2/5/7
N1: Internal Flange To Pipe	FCAW	40	L2
STRAINER PLATE to HEAD(TOP)	FCAW	40	L1/L2/L7/L5
STRAINER PLATE to HEAD (BTM)	FCAW	40	L1/L2/L7/L5

# LESENA STEEL Ltd.

## WELDER MAP

CUSTOMER:

JOB NO:12-32 F

SEAM	PROCESS	WPS	WELDER'S ID
Longitudinal Seams	SAW	45	L8
Circumferential Seams	SAW	45	L8
Manway Flange to Pipe, (M1)	SAW/SMAW	45/16	L8/L6
Manway Flange to Pipe, (M2)	SAW/SMAW	45/16	L8/L6
Flange to Pipe (N1)	FCAW	40	L5
Flange to Pipe (N2)	FCAW	40	L5
To Head or Shell & Repad			
N1	FCAW	40	L5
N2	FCAW	40	L5
N3A & N3B	SMAW	16.2	L5
N4	SMAW	16.2	L2/5
SG1A & SG1B	FCAW	40	L5
M1 MANWAY	FCAW	40	L8
M2 MANWAY	FCAW	40	L5
LEGS/ LUGS/SADDLES	FCAW/SMAW	40/16	L1/2/4/5/7
N1: Internal Flange To Pipe	FCAW	40	L7
STRAINER PLATE to HEAD(TOP)	FCAW	40	L1/L2/4/5/7
STRAINER PLATE to HEAD (BTM)	FCAW	40	L1/L2/4/5/7

# LESENA STEEL Ltd.

## WELDER MAP

**CUSTOMER:**

**JOB NO:12-32 G**

SEAM	PROCESS	WPS	WELDER'S ID
Longitudinal Seams	SAW	45	L8
Circumferential Seams	SAW	45	L8
Manway Flange to Pipe, (M1)	SAW/SMAW	45/16	L8/L9
Manway Flange to Pipe, (M2)	SAW/SMAW	45/16	L8/L9
Flange to Pipe (N1)	FCAW	40	L7
Flange to Pipe (N2)	FCAW	40	L5
To Head or Shell & Repad			
N1	FCAW	40	L7
N2	FCAW	40	L5
N3A & N3B	SMAW	16.2	L1
N4	SMAW	16.2	L7
SG1A & SG1B	FCAW	40	L1
M1 MANWAY	FCAW	40	L2
M2 MANWAY	FCAW	40	L5
LEGS/ LUGS/SADDLES	FCAW/SMAW	40/16	L1/2/4/5/8
N1: Internal Flange To Pipe	FCAW	40	L7
STRAINER PLATE to HEAD(TOP)	FCAW	40	L1/L2/4/5/7
STRAINER PLATE to HEAD (BTM)	FCAW	40	L1/L2/4/5/7



Technical  
Standards and  
Safety Authority

14th Floor - Centre Tower  
3300 Bloor Street West  
Toronto, Ontario M8X 2X4  
Web site: www.tssa.org

# Welder/Welding Operator Identification Card Technical Standards and Safety Act Bollers and Pressure Vessels Regulation

No. 177332

Welder's Last Name <b>STYPKA</b>		Initial First Name <b>JANUSZ</b>		Signature <i>Stypka</i>		Stamp No. <b>L1</b>	
Address <b>97 MAYWOOD PARK, SCARBOROUGH, M1T 1K1</b>				Postal Code <b>M1T 1K1</b>			
Company Name <b>LESENA STEEL LTD.</b>				Provincial Registration No. <b>WP 1A, D 423.5</b>			
Street Address <b>1060 BIRCHMOUNT RD.</b>				Company PQR No. <b>1A</b>			
City <b>SCARBOROUGH, ONT.</b>				Company WPS No. used <b>1A</b>			
Welding Process(es) Used <b>SMW</b>				Type(s) <input checked="" type="checkbox"/> manual <input type="checkbox"/> machine <input type="checkbox"/> semi-automatic <input type="checkbox"/> automatic			
Base Material(s) <b>SA 516-70 TO SA 516-70</b>				Thickness(es) <b>1/2"</b>			
Variables for All Processes				Actual Values Range Qualified			
Backing material (metal, weld metal, welded from both sides, flux, etc.)				<b>METAL BACKING WITH BACKING</b>			
ASME P or S No. to ASME P or S No.				<b>P1 P1 P1 THRU P1, P3A, P4 THRU P4</b>			
<input checked="" type="checkbox"/> Plate <input type="checkbox"/> Pipe (enter diameter if pipe)				<b>5.4 (E 309L-16)</b>			
Filler Metal Specification (SFA) Class (QW-404) (Informational Only)				<b>F.V. + ALL FILLETS</b>			
Consumable Insert for GTAW or PAW (QW-404)				<b>3G, PLATE AND PIPE 2" &amp; UP</b>			
Welding Position (1G, 5G, etc.) (QW-405)				<b>3G</b>			
Manual or Semi-automatic Variables (QW-360)				Actual Values Range Qualified			
Filler Metal F-No. (QW-404)				<b>5 F1 &amp; F5</b>			
Filler Metal Product Form for GTAW, PAW (QW-404)				<b>1/2"</b>			
Weld deposit thickness for each welding process (QW-404)				<b>UPHILL 1" MAX</b>			
Progression (uphill/downhill) (QW-406)				<b>UPHILL</b>			
GTAW, PAW or GMAW backing gas; or OFW fuel gas (QW-408)				<b>UPHILL</b>			
GMAW transfer mode (QW-409)				<b>UPHILL</b>			
GTAW welding current type & polarity (QW-409)				<b>UPHILL</b>			
Machine Welding Variables (QW-361-2)				Actual Values Range Qualified			
Direct or remote visual control				<b>UPHILL</b>			
Automatic voltage control (GTAW)				<b>UPHILL</b>			
Automatic joint tracking				<b>UPHILL</b>			
Multiple or single pass per side				<b>UPHILL</b>			
Automatic Welding Variables (QW-361-1)				Actual Values Range Qualified			
Filler metal (EBW or LBW)				<b>UPHILL</b>			
User type for LBW (CO <sub>2</sub> to YAG etc.)				<b>UPHILL</b>			
Continuous drive or inertia welding (FW)				<b>UPHILL</b>			
Vacuum or out of vacuum (EBW)				<b>UPHILL</b>			

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

## RESULTS

Visual Examination of Completed Weld (QW-302.4) **ACCEPTABLE**

- ☐ Bend test; ☐ Transverse root and face (QW-462.3(a)); ☐ Longitudinal root and face (QW-462.3(b)); ☐ Side (QW-462.2);  
☐ Pipe bend specimen, corrosion-resistant overlay (QW-462.5(a)); ☐ Plate bend specimen, corrosion-resistant overlay (QW-462.5(d));  
☐ Macro test for fusion (QW-462.5(b)); ☐ Macro test for fusion (QW-462.5(e))

Type	Result	Type	Result	Type	Result

Alternative radiographic examination results (QW-191) **PASS**

Fillet weld -- fracture test (QW-180) \_\_\_\_\_ Length and percent of defects \_\_\_\_\_

Macro examination (QW-184) \_\_\_\_\_ Fillet size (in.) \_\_\_\_\_ x \_\_\_\_\_ Concavity/convexity (in.) \_\_\_\_\_

Other tests \_\_\_\_\_

Film or specimens evaluated by **C. VEENEMAN** Company **KV INSPECTION LTD.**

Mechanical tests conducted by \_\_\_\_\_ Laboratory test no. \_\_\_\_\_

Welding supervised by **TOM PATRZALEK / DENNIS RAMBROSE**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code

Organization **LESENA STEEL LTD.** Signature \_\_\_\_\_ Date **APR. 17/06**



Issued under Ontario's Technical Standards and Safety Act  
Bollers and Pressure Vessels Regulation

Expiry Date: **PER ASME CODE**

Welder **JANUSZ STYPKA** Symbol **L1**

Has passed the welding test required under Ontario's Technical Standards and Safety Act, Bollers and Pressure Vessels Regulation and is hereby authorized to weld for:

**LESENA STEEL LTD**

Subject to the conditions of this certificate

Authorized Examiner \_\_\_\_\_ Director

## Office Use Only

Test Requested By **TOM PATRZALEK**  
(Print Person's Name)

Tested At **1060 BIRCHMOUNT RD. SCARB.**  
(Print Address)

District # **13** Inspector # **ONT. 037** Fee **105,-**

PV0397 (09/04)



Standards and  
Safety Authority

3300 Bloor Street West  
Toronto ON M8X 2X4

Pressure Vessels Act

No. 88176

Welder's Last Name <b>STYPKA</b>		Initial <b>JANUSZ</b>	First Name <b>STYPKA</b>	Signature <i>[Signature]</i>	Stamp No. <b>LI</b>
Res. Address <b>97 MAYWOOD PARK SCARBOROUGH, ONT.</b>		Postal Code <b>M1V 1K1</b>		Provincial Registration No. <b>DB70.5</b>	
Company Name <b>LESENA STEEL</b>		Street Address <b>1060 BIRCHMOUNT RD. SCARBOROUGH, ONTARIO</b>		Company PQR No. <b>16</b>	
Welding Process(es) Used <b>SAW</b>		Type(s) (manual, machine, etc.) <b>MANUAL</b>		Company WPS No. Used <b>16A</b>	
Base Material(s) <b>SA-105, SA-106</b>		Thickness(es) <b>0.218"</b>			
Manual or Semi-automatic Variables for each Process (QW-350)					
Backing material (metal, weld metal, welded from both sides, flux, etc.)		Actual Values <b>ONE SIDE</b>		Range Qualified <b>NO BACKING</b>	
ASME P-No. to ASME P.No.		<b>PI to PI</b>		<b>PI THRU P11 + P4X</b>	
( ) Plate (X) Pipe (enter diameter if pipe)		<b>2"</b>		<b>PIPE 1" AND UP</b>	
Filler Metal Specification (SFA) Class (QW-404) <b>5.1</b>		<b>E-7018</b>		<b>F1 THRU F4</b>	
Filler Metal F-No. (QW-404) <b>EA</b>		<b>EA</b>			
Filler Metal Product Form for GTAW, PAW (QW-404) <b>NONE</b>		<b>NONE</b>			
Consumable Insert for GTAW or PAW (QW-404) <b>NONE</b>		<b>NONE</b>			
Weld deposit thickness for each welding process (QW-404) <b>0.218"</b>		<b>0.218"</b>		<b>0.236" MAX</b>	
Welding Position (1G, 5G, etc.) (QW-405) <b>2G</b>		<b>2G</b>		<b>F, H</b>	
Progression (uphill/downhill) (QW-405) <b>-</b>		<b>-</b>			
GTAW, PAW or GMAW backing gas; or GFW fuel gas (QW-408) <b>-</b>		<b>-</b>			
GMAW transfer mode (QW-409) <b>-</b>		<b>-</b>			
GTAW welding current type & polarity (QW-409) <b>-</b>		<b>-</b>			
Machine Welding Variables for Process used (QW-350)					
Direct/remote visual control		Actual Values <b>-</b>		Range Qualified <b>-</b>	
Automatic voltage control (GTAW)		<b>-</b>		<b>-</b>	
Automatic joint tracking		<b>-</b>		<b>-</b>	
Welding position (1G, 5G etc.)		<b>-</b>		<b>-</b>	
Consumable insert		<b>-</b>		<b>-</b>	
Backing material (metal, weld metal, welded from both sides, flux, etc.)		<b>-</b>		<b>-</b>	
Multiple or single pass per side		<b>-</b>		<b>-</b>	
Change from automatic to machine		<b>-</b>		<b>-</b>	
Filler for EBW or LBW		<b>-</b>		<b>-</b>	
Laser type		<b>-</b>		<b>-</b>	
Drive type for FRW		<b>-</b>		<b>-</b>	
Vacuum type for EBW		<b>-</b>		<b>-</b>	

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

Guided Bend or Radiographic Results (QW-462.2, 462.3 & QW-304 & 305)					Comments
Specimen No.	Band	Radiography	Para. (QW-4)	Results	
03-11-B		YES	191.2.2	ACCEPTABLE	KV INSPECTION REPORT

All Other Tests

Visual examination results (QW-302.4) **ACCEPTABLE**

Fillet Weld Fracture Test Length and percentage of defects \_\_\_\_\_ in.

Macro Test Fusion \_\_\_\_\_ Fillet Leg Size \_\_\_\_\_ in. x \_\_\_\_\_ in. Concavity/Convexity \_\_\_\_\_ in.

Welding Test conducted by (person name) **TOM PATRZALEK** Date **MAY 13/03**

Mechanical Tests conducted by \_\_\_\_\_ Laboratory Test No. \_\_\_\_\_

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code

Organization **LESENA STEEL** Signature *[Signature]* Date **MAY 15/03**



Issued under Ontario's Boilers & Pressure Vessels Act

Expiry Date: **PER AIME**

Welder **JANUSZ STYPKA** Symbol **LI**

Has passed the welding test required under Ontario's Boilers and Pressure Vessels Act and is hereby authorized to weld for:

**LESENA STEEL**

Subject to the conditions of this certificate

Authorized Examiner

Director

Office Use Only

Test Requested By **MR. TOM PAT**  
(Print Person's Name)

Tested At **1060 BIRCHMOUNT, SCARBOROUGH**  
(Print Address)

District # **50** Inspector # **66** Fee **95.00**





Technical  
Standards and  
Safety Authority

4th Floor - West Tower  
3300 Bloor Street West  
Toronto ON M8X 2X4

Boilers and  
Pressure Vessels Act

# Welder/Welding Operator Identification Card

No. 88173

Welder's Last Name <b>STYPKA</b>		Initial <b>JANUSZ</b>	First Name <b>STYPKA</b>	Signature <i>[Signature]</i>	Stamp No. <b>LI</b>
Res. Address <b>97 MAYWOOD PARK SCARBOROUGH</b>		Postal Code <b>M1T 1X1</b>		Provincial Registration No. <b>WP-R5042.5</b>	
Company Name <b>LESENA STEEL</b>		Company POR No. <b>43</b>		Company WPS No. used <b>43</b>	
Street Address <b>1060 BIRCHMOUNT RD.</b>		Postal Code <b>M1T 1X1</b>		Type(s) (manual, machine, etc.) <b>SEMI-AUTO</b>	
City <b>SCARBOROUGH, ONTARIO</b>		Thickness(es) <b>3/4"</b>		Range Qualified <b>3/4"</b>	
Welding Process(es) Used <b>GMAW</b>		Manual or Semi-automatic Variables for each Process (QW-350) <b>YES, WELD</b>		Range Qualified <b>BACKING ONLY.</b>	
Base Material(s) <b>SA-516-70</b>		Actual Values <b>P1 to P1</b>		Range Qualified <b>P1 THRU P11 &amp; P1A</b>	
Backing material (metal, weld metal, welded from both sides, flux, etc.) <b>PI</b>		Actual Values <b>3/4"</b>		Range Qualified <b>PI THRU P11 &amp; P1A</b>	
ASME P-No. to ASME P-No. <b>(X) Plate</b>		Actual Values <b>5.18</b>		Range Qualified <b>PI THRU P11 &amp; P1A</b>	
Filler Metal Specification (SFA) Class (QW-404) <b>5.18</b>		Actual Values <b>FG</b>		Range Qualified <b>E1 TO E6</b>	
Filler Metal F-No. (QW-404) <b>FG</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Filler Metal Product Form for GTAW, PAW (QW-404) <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Consumable Insert for GTAW or PAW (QW-404) <b>3A</b>		Actual Values <b>2G</b>		Range Qualified <b>3/4" MAX</b>	
Weld deposit thickness for each welding process (QW-404) <b>2G</b>		Actual Values <b>ARG 95% CO<sub>2</sub> 3% O<sub>2</sub> 2L</b>		Range Qualified <b>GROOVE AND FILLER</b>	
Welding Position (1G, 5G, etc.) (QW-405) <b>2G</b>		Actual Values <b>SPRAY</b>		Range Qualified <b>SPRAY</b>	
Progression (uphill/downhill) (QW-405) <b>SPRAY</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
GTAW, PAW or GMAW backing gas; or OFW fuel gas (QW-408) <b>SPRAY</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
GMAW transfer mode (QW-409) <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
GTAW welding current type & polarity (QW-409) <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Machine Welding Variables for Process used (QW-350) <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Direct/remote visual control <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Automatic voltage control (GTAW) <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Automatic joint tracking <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Welding position (1G, 5G, etc.) <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Consumable insert <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Backing material (metal, weld metal, welded from both sides, flux, etc.) <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Multiple or single pass per side <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Change from automatic to machine <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Filler for EBW or LBW <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Laser type <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Drive type for PAW <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	
Vacuum type for EBW <b>NONE</b>		Actual Values <b>NONE</b>		Range Qualified <b>-</b>	

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

Guided Bend or Radiographic Results (QW-462.2, 462.3 & QW-304 & 305)					Comments
Specimen No.	Bend	Radiography	Para. (QW-4)	Results	
EQUPOL		YES	19.1	ACCEPT	KV INSPECTION

## All Other Tests

Visual examination results (QW-302.4) **ACCEPTABLE**

Filler Weld Fracture Test Length and percentage of defects \_\_\_\_\_ in.

Macro Test Fusion Filler Leg Size \_\_\_\_\_ in. x \_\_\_\_\_ in. Concavity/Convexity \_\_\_\_\_ in.

Welding Test conducted by (person name) **TOM PATRZALEK** Date **OCT 15/01**

Mechanical Tests conducted by \_\_\_\_\_ Laboratory Test No. \_\_\_\_\_

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code

Organization **LESENA STEEL** Signature *[Signature]* Date **OCT 15/01**



Issued under Ontario's Boilers & Pressure Vessels Act

Expiry Date: **PER ASME CODE**

**STYPKA JANUSZ**

Welder  
Has passed the welding test required under Ontario's Boilers and Pressure Vessels Act and is hereby authorized to weld for:

**LESENA STEEL**

Subject to regulations of this certificate

Director

## Office Use Only

Test Requested By **MR. T. PATRZALEK**  
(Print Person's Name)

Tested At **1060 BIRCHMOUNT, SCARBOROUGH**  
(Print Address)

District # **50**

Inspector # **66**

Fee **95.1**



Standards and  
Safety Authority

Toronto, Ontario M8X 2X4  
Web site: www.tssa.org

Technical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273610

Welder's Last Name <b>PASHKOVSKY</b>	Initial <b>LEONID</b>	First Name <b>GENNADIY</b>	Signature <i>[Signature]</i>	Stamp No. <b>L2</b>
Res. Address <b>106 GOODWOOD PARK, TORONTO, ONTARIO</b>			Postal Code <b>M 4 C 2 H 1</b>	Provincial Registration No. <b>0678.5</b>
Employer Name <b>LESENA STEEL LTD.</b>			Company PQR No. <b>16</b>	
Street Address <b>1080 BIRCHMOUNT ROAD</b>			Company WPS No. used <b>16</b>	
SCARBOROUGH, ONTARIO			Postal Code <b>M 1 R 1 S 4</b>	

Welding Process(es) Used **SMAW** Type(s) ☒ manual ☐ machine ☐ semi-automatic ☐ automatic

Base Material(s) **SA 516-70** Thickness(es) **5/8"** ☒ Test Coupon ☐ Production Weld

Variables for All Processes Actual Values Range Qualified

Baking material (with/without) WITHOUT WITH OR WITHOUT

Base Metal P-Number to P-Number P1 to P1 P1 THRU P15F, P34, P41 THRU P49

( X ) Plate ( ) Pipe (enter diameter if pipe) 5/8" MAX TO BE WELDED

Filler Metal Specification (SFA) Class (QW-404) (Informational Only) S1

Consumable Insert for GTAW or PAW (QW-404) N/A N/A

Welding Position (1G, 5G, etc.) (QW-405) 3G FLAT, HORIZ. & VERTICAL, PIPE OVER 2 7/8" AND ALL FILLETS

Manual or Semi-automatic Variables (QW-350) Actual Values Range Qualified

Filler Metal F- No. (QW-404) F4 F1 TO F4

Filler Metal Product Form for GTAW, PAW (QW-404) N/A N/A

Weld deposit thickness for each welding process (QW-404) N/A N/A

Process 1: SHAW 3 layers minimum ☒ Yes ☐ No 5/8" MAX TO BE WELDED

Process 2: 3 layers minimum ☐ Yes ☐ No N/A N/A

Vertical progression (uphill/downhill) (QW-405) N/A N/A

GTAW, PAW or GMAW backing gas: or OFW fuel gas (QW-409) N/A N/A

GMAW transfer mode (spray/globular or pulse to short circuit) (QW-409) N/A N/A

GTAW welding current type & polarity (AC, DCEP, DCEN) (QW-409) N/A N/A

Machine Welding Variables (QW-361.2) Actual Values Range Qualified

Direct or remote visual control N/A N/A

Automatic arc voltage control (GTAW) N/A N/A

Automatic joint tracking N/A N/A

Multiple or single pass per side N/A N/A

Automatic Welding Variables (QW-361.1) Actual Values Range Qualified

Filler Metal (EBW or LBW) N/A N/A

Laser type for LBW (CO<sub>2</sub> to YAG etc.) N/A N/A

Continuous drive or inertia welding (FW) N/A N/A

Vacuum or out of vacuum (EBW) N/A N/A

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.  
RESULTS

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

☐ Transverse root and face [QW-462.3(a)]; ☐ Longitudinal root and face [QW-462.3(b)]; ☒ Side [QW-462.2];

☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; ☐ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];

☐ Pipe specimen, macro test for fusion [QW-462.5(b)]; ☐ Plate specimen, macro test for fusion [QW-462.5(a)];

Type	Result	Type	Result	Type	Result	Type	Result
SIDE	PASS						
SIDE	PASS						

Alternative radiographic examination results (QW-191) **N/A**

Fillet weld — fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

☐ Fillet welds in plate [QW-462.4(b)] ☐ Fillet welds in pipe [QW-462.4(c)]

Macro examination (QW-184) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by **TOM PATRZALEK** Company **LESENA STEEL LTD**

Mechanical tests conducted by **N/A** Laboratory test no. **N/A**

Welding supervised by (Print name) **FARZAN CALIPH**

Test requested by (Print name) **VLADIMIR JURUKOV** Tested at (Print address) **1080 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code

Organization **LESENA STEEL LTD** Signature *[Signature]* Date **01-16-2012**  
(mm-dd-yyyy)

#### FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's *Technical Standards and Safety Act*, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below:

☒ To weld for the Employer named above only.

☐ For seeking employment only

This Certificate expires: **Per ASME IX**  
(mm-dd-yyyy)

*[Signature]* **ONTARIO**  
Inspector Name and Number (Print)

Inspector Signature and Date

Welder's Last Name <b>PASHKOVSKYY</b>		Initial First Name <b>LEONID GENNADIY</b>		Signature <i>[Signature]</i>		Stamp No. <b>12</b>	
Res. Address <b>105 GOODWOOD PARK, TORONTO, ONTARIO</b>				Postal Code <b>M 4 C 2 H 1</b>		Provincial Registration No. <b>D4215</b>	
Employer Name <b>LESENA STEEL LTD.</b>				Company PQR No. <b>14</b>		Company WPS No. used <b>14</b>	
Street Address <b>1050 BIRCHMOUNT ROAD</b>				Postal Code <b>M 1 K 1 S 4</b>			
SCARBOROUGH, ONTARIO							
Welding Process(es) Used <b>SAW</b>				Type(s) <input checked="" type="checkbox"/> manual <input type="checkbox"/> machine <input type="checkbox"/> semi-automatic <input type="checkbox"/> automatic			
Base Material(s) <b>SA 516-70</b>				Thickness(es) <b>1/2"</b>		<input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld	
Variables for All Processes				Actual Values		Range Qualified	
Backing material (with/without)				WITH BACKING		WITH BACKING	
Base Metal P-Number to P-Number				P1 to P1		P1 THRU P1SE, P34, P41 THRU P49	
<input checked="" type="checkbox"/> Pipe (enter diameter if pipe)				1/2"		1"	
Filler Metal Specification (EFA) Class (QW-404) (International only)				5A			
Consumable (insert for GTAW or PAW (QW-404))				N/A		N/A	
Welding Position (1G, 5G, etc.) (QW-405)				2G		FLAT, HORIZ. PLATE & PIPE OVER 2 7/8" AND F&H FILLETS	
Manual or Semi-automatic Variables (QW-350)				Actual Values		Range Qualified	
Filler Metal F- No. (QW-404)				F5		F5	
Filler Metal Product Form for GTAW, PAW (QW-404)				N/A		N/A	
Weld deposit thickness for each welding process (QW-404)				N/A		N/A	
Process 1, <b>SAW</b> 3 layers maximum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				1/2"		1"	
Process 2, 3 layers minimum <input type="checkbox"/> Yes <input type="checkbox"/> No				N/A		N/A	
Vertical progression (uphill/downhill) (QW-405)				N/A		N/A	
GTAW, PAW or GMAW backing gas; or OFW fuel gas (QW-408)				N/A		N/A	
GTAW transfer mode (spray/globular or pulse to short circuit) (QW-409)				N/A		N/A	
GTAW welding current type & polarity (AC, DCEP, DCEN) (QW-409)				N/A		N/A	
Machine Welding Variables (QW-361.2)				Actual Values		Range Qualified	
Direct or remote visual control				N/A		N/A	
Automatic arc voltage control (GTAW)				N/A		N/A	
Automatic joint tracking				N/A		N/A	
Multiple or single pass per side				N/A		N/A	
Automatic Welding Variables (QW-361.1)				Actual Values		Range Qualified	
Filler Metal (EBW or LBW)				N/A		N/A	
Laser type for LBW (CO <sub>2</sub> to YAG etc.)				N/A		N/A	
Continuous direct or indirect welding (FW)				N/A		N/A	
Vacuum or out of vacuum (EDW)				N/A		N/A	

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

**RESULTS**

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☐ Transverse root and face (QW-462.3(a)); ☐ Longitudinal root and face (QW-462.3(b)); ☒ Side (QW-462.2);  
☐ Pipe bend specimen, corrosion-resistant overlay (QW-462.5(c)); ☐ Plate bend specimen, corrosion-resistant overlay (QW-462.5(d));  
☐ Pipe specimen, macro test for fusion (QW-462.5(b)); ☐ Plate specimen, macro test for fusion (QW-462.5(e))

Type	Result	Type	Result	Type	Result	Type	Result
SIDE	PASS						
SIDE	PASS						

Alternative radiographic examination results (QW-191) **N/A**

Fillet weld — fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

- ☐ Fillet welds in plate (QW-462.4(b)) ☐ Fillet welds in pipe (QW-462.4(c))

Macro examination (QW-184) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Firm or specimens evaluated by **TOM PATRZALEK**

Company **LESENA STEEL LTD**

Mechanical tests conducted by **N/A**

Laboratory test no. **N/A**

Welding supervised by (Print name) **FARZAN CALIPH**

Test requested by (Print name) **ARIE**

Tested at (Print address) **1050 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization **LESENA STEEL LTD**

Signature *[Signature]*

Date **01-28-2013**

(mm-dd-yyyy)

**FOR TSSA INSPECTOR USE ONLY**

The Welder named above has passed the welding test required under Ontario's *Technical Standards and Safety Act*, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check ☒ applicable box below.

- ☒ To weld for the Employer named above only.  
☐ For seeking employment only.

**LOSTICA BORU ONTARIO**  
Inspector Name and Number (Print)

This Certificate expires **PER ASME IX**

(mm-dd-yyyy)

*[Signature]* **28 JAN 2013**  
Inspector Signature and Date



Standards and  
Safety Authority

Toronto, Ontario M9X 2X4  
Web site: www.tssa.org

Technical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273609

Welder's Last Name <b>PASHKOVSKYY</b>		Initial <b>LEONID</b>	First Name <b>GERNADY</b>	Signature <i>[Signature]</i>	Stamp No. <b>L2</b>
Res. Address <b>166 GOODWOOD PARK, TORONTO, ONTARIO</b>				Postal Code <b>M 4 C 2 H 1</b>	Provincial Registration No. <b>G788.5</b>
Employer Name <b>LESENA STEEL LTD.</b>				Company PQR No. <b>40</b>	
Street Address <b>1060 BIRCHMOUNT ROAD</b>				Company WPS No. used <b>40</b>	
SCARBOROUGH, ONTARIO				Postal Code <b>M 1 K 1 S 4</b>	
Welding Process(es) Used <b>FCAW</b>				Type(s) <input type="checkbox"/> manual <input type="checkbox"/> machine <input checked="" type="checkbox"/> semi-automatic <input type="checkbox"/> automatic	
Base Material(s) <b>SA 516-70</b>				Thickness(es) <b>5/8"</b> <input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld	
Variables for All Processes				Actual Values Range Qualified	
Backing material (with/without)				<b>WTR</b> <b>BACKING ONLY</b>	
Base Metal P-Number to P-Number				<b>P1 to P1</b> <b>P1 THRU P16F, P34, P41 THRU P49</b>	
( <input checked="" type="checkbox"/> ) Plate ( <input type="checkbox"/> ) Pipe (enter diameter if pipe)				<b>5/8"</b> <b>MAX TO BE WELDED</b>	
Filler Metal Specification (SFA) Class (QW-404) (Informational Only)				<b>5/16</b>	
Consumable Insert for GTAW or PAW (QW-404)				<b>N/A</b>	
Welding Position (1G, 5G, etc.) (QW-405)				<b>2G</b> <b>FLAT &amp; HORIZONTAL, PIPE OVER 2 7/8" AND ALL FILLETS</b>	
Manual or Semi-automatic Variables (QW-350)				Actual Values Range Qualified	
Filler Metal F-No. (QW-404)				<b>F6</b> <b>ALL F-No F6</b>	
Filler Metal Product Form for GTAW, PAW (QW-404)				<b>N/A</b> <b>N/A</b>	
Weld deposit thickness for each welding process (QW-404)				<b>N/A</b> <b>N/A</b>	
Process 1: <b>FCAW</b> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				<b>5/8"</b> <b>MAX TO BE WELDED</b>	
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				<b>N/A</b> <b>N/A</b>	
Vertical progression (uphill/downhill) (QW-405)				<b>N/A</b> <b>N/A</b>	
GTAW, PAW or GMAW backing gas, or OFW fuel gas (QW-408)				<b>ARG, 95%, CO2 5%, O2 2%</b> <b>SAME</b>	
GMAW transfer mode (spray/globular or pulse to short circuit) (QW-409)				<b>SPRAY</b> <b>SPRAY</b>	
GTAW wetting current type & polarity (AC, DCEP, DCEN) (QW-400)				<b>N/A</b> <b>N/A</b>	
Machine Welding Variables (QW-361.2)				Actual Values Range Qualified	
Direct or remote visual control				<b>N/A</b> <b>N/A</b>	
Automatic arc voltage control (GTAW)				<b>N/A</b> <b>N/A</b>	
Automatic joint tracking				<b>N/A</b> <b>N/A</b>	
Multiple or single pass per side				<b>N/A</b> <b>N/A</b>	
Automatic Welding Variables (QW-361.1)				Actual Values Range Qualified	
Filler Metal (EBW or LBW)				<b>N/A</b> <b>N/A</b>	
Laser type for LBW (CO <sub>2</sub> to YAG etc.)				<b>N/A</b> <b>N/A</b>	
Continuous drive or inertia welding (FW)				<b>N/A</b> <b>N/A</b>	
Vacuum or out of vacuum (EBW)				<b>N/A</b> <b>N/A</b>	

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.  
RESULTS

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☐ Transverse root and face [QW-462.3(a)]; ☐ Longitudinal root and face [QW-462.3(b)]; ☒ Side [QW-462.2];  
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; ☐ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];  
☐ Pipe specimen, macro test for fusion [QW-462.5(b)]; ☐ Plate specimen, macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result	Type	Result
SIDE	PASS						
SIDE	PASS						

Alternative radiographic examination results (QW-191) **N/A**

Fillet weld — fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

- ☐ Fillet welds in plate [QW-462.4(b)] ☐ Fillet welds in pipe [QW-462.4(c)]

Macro examination (QW-184) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by **TOM PATRZALEK**

Company **LESENA STEEL LTD**

Mechanical tests conducted by **N/A**

Laboratory test no. **N/A**

Welding supervised by (Print name) **FARZAN CALIPH**

Test requested by (Print name) **VLADIMIR JURUKOV**

Tested at (Print address) **1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization **LESENA STEEL LTD**

Signature *[Signature]*

Date **01-16-2012**  
(mm-dd-yyyy)

#### FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's Technical Standards and Safety Act, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below:

- ☒ To weld for the Employer named above only.  
☐ For seeking employment only.

This Certificate expires:

**PER ASME IX**  
(mm-dd-yyyy)

**MINOR SONI 011270982**  
Inspector Name and Number (Print)

*[Signature]*  
Inspector Signature and Date



Standards and  
Safety Authority

Toronto, Ontario M9X 2X4  
Web site: www.tssa.org

Technical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273617

Welder's Last Name <b>SCORAS</b>		Initial <b>KEITH</b>	First Name <b>KEITH</b>	Signature <i>[Signature]</i>	Stamp No. <b>L4</b>
Res. Address <b>43 ILES ST., AJAX, ONTARIO</b>		Postal Code <b>L1T3V1</b>		Provincial Registration No. <b>6785.5</b>	
Employer Name <b>LESENA STEEL LTD.</b>		Company PQR No. <b>40</b>		Company WPS No used <b>40</b>	
Street Address <b>1060 BIRCHMOUNT ROAD</b>		Postal Code <b>M1K1S4</b>		City <b>SCARBOROUGH, ONTARIO</b>	
Welding Process(es) Used <b>FCAW</b>		Type(s) <input type="checkbox"/> manual <input type="checkbox"/> machine <input checked="" type="checkbox"/> semi-automatic <input type="checkbox"/> automatic			
Base Material(s) <b>SA 516 - 70</b>		Thickness(es) <b>1/2"</b>		<input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld	
Variables for All Processes		Actual Values		Range Qualified	
Backing material (with/without)		WITH		WITH BACKING	
Base Metal P-Number to P-Number		P1 to P1		P1 THRU P15, F	
<input checked="" type="checkbox"/> Plate <input type="checkbox"/> Pipe (enter diameter if pipe)		1/2"		MAX. TO BE WELDED	
Filler Metal Specification (SFA) Class (QW-404) (Informational Only)		E20		N/A	
Consumable Insert for GTAW or PAW (QW-404)		N/A		N/A	
Welding Position (1G, 5G, etc.) (QW-405)		1G		FLAT, PIPE OVER 2 7/8" OD AND FLAT PIPE & PLATE FILLETS	
Manual or Semi-automatic Variables (QW-350)		Actual Values		Range Qualified	
Filler Metal F-No. (QW-404)		F6		ALL F6	
Filler Metal Product Form for GTAW, PAW (QW-404)		N/A		N/A	
Weld deposit thickness for each welding process (QW-404)		N/A		N/A	
Process 1: <b>FCAW</b> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		1/2"		MAX. TO BE WELDED	
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		N/A		N/A	
Vertical progression (uphill/downhill) (QW-405)		N/A		N/A	
GTAW, PAW or GMAW backing gas; or OFW fuel gas (QW-406)		N/A		N/A	
GMAW transfer mode (spray/globular or pulse to short circuit) (QW-409)		SPRAY		SPRAY	
GTAW welding current type & polarity (AC, DCEP, DCEN) (QW-409)		N/A		N/A	
Machine Welding Variables (QW-361.2)		Actual Values		Range Qualified	
Direct or remote visual control		N/A		N/A	
Automatic arc voltage control (GTAW)		N/A		N/A	
Automatic joint tracking		N/A		N/A	
Multiple or single pass per side		N/A		N/A	
Automatic Welding Variables (QW-361.1)		Actual Values		Range Qualified	
Filler Metal (F-BW or L-BW)		N/A		N/A	
Laser type for LBW (CO <sub>2</sub> to YAG etc.)		N/A		N/A	
Continuous drive or inertia welding (F-W)		N/A		N/A	
Vacuum or out of vacuum (F-W)		N/A		N/A	

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.  
**RESULTS**

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☐ Transverse root and face (QW-462.3(a)); ☐ Longitudinal root and face (QW-462.3(b)); ☒ Side (QW-462.2);  
☐ Pipe bend specimen, corrosion-resistant overlay (QW-462.5(d)); ☐ Plate bend specimen, corrosion-resistant overlay (QW-462.5(d));  
☐ Pipe specimen, macro test for fusion (QW-462.5(b)); ☐ Plate specimen, macro test for fusion (QW-462.5(e))

Type	Result	Type	Result	Type	Result	Type	Result
SIDE BEND	PASS						
SIDE BEND	PASS						

Alternative radiographic examination results (QW-191) **N/A**

Fillet weld — fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

☐ Fillet welds in plate (QW-462.4(b)) ☐ Fillet welds in pipe (QW-462.4(c))

Macro examination (QW-184) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by **TOM PATRZALEK**

Company **LESENA STEEL LTD**

Mechanical tests conducted by **FARZAN CALIPH**

Laboratory test no.

Welding supervised by (Print name) **FARZAN CALIPH**

Test requested by (Print name) **TOM PATRZALEK**

Tested at (Print address) **1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization **LESENA STEEL LTD**

Signature *[Signature]*

Date **02-22-2013**

(mm-dd-yyyy)

### FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's *Technical Standards and Safety Act*, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below:

- ☒ To weld for the Employer named above only  
☐ For seeking employment only.

This Certificate expires: **PER ASME IX**

(mm-dd-yyyy)

**M. HIR Sam ONT00932**

Inspector Name and Number (Print)

PRO/257 (2010)

Inspector Signature and Date



Technical  
Standards and  
Safety Authority

14th Floor - Centre Tower  
3300 Bloor Street West  
Toronto, Ontario M8X 2X4  
Web site: www.tssa.org

# Welder/Welding Operator Certificate

Technical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273618

Welder's Last Name <b>REID</b>		First Name <b>ALBERT</b>	Signature <i>Albert Reid</i>	Stamp No. <b>L5</b>
Res. Address <b>44 FALBY CT. #611, AJAX, ONTARIO</b>		Postal Code <b>L1S 3L1</b>	Provincial Registration No. <b>WP-140725</b>	
Employer Name <b>LESENA STEEL LTD.</b>		Company PQR No. <b>18-2</b>		
Street Address <b>1050 BIRCHMOUNT ROAD</b>		Postal Code <b>M1K 1S4</b>	Company WPS No. used <b>18-2</b>	
City <b>SCARBOROUGH, ONTARIO</b>		Type(s) <input checked="" type="checkbox"/> manual <input type="checkbox"/> machine <input type="checkbox"/> semi-automatic <input type="checkbox"/> automatic		
Welding Process(es) Used <b>SAW</b>		Base Material(s) <b>SA 106B</b> Thickness(es) <b>0.436"</b> <input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld		
Variables for All Processes				
Backing material (with/without)		Actual Values <b>F3 WITHOUT &amp; F4 WITH</b>		Range Qualified <b>F3 WITH OR WITHOUT &amp; F1, F2 and F4 WITH</b>
Base Metal P-Number to P-Number		P1 to P1		P1 THRU P15F, P34, P41 THRU P49
( ) Plate ( x ) Pipe (enter diameter if pipe)		2"		PIPE 1" to UNLIMITED
Filler Metal Specification (SFA) Class (QW-404) (informational Only)		E1		
Consumable Insert for GTAW or PAW (QW-404)		N/A		N/A
Welding Position (1G, 5G, etc.) (QW-405)		6G		ALL POSITIONS OVER DIA. 1" AND ALL GROOVE AND FILLET
Manual or Semi-automatic Variables (QW-350)				
Filler Metal F-No. (QW-404)		F3 & F4		F1 TO F4
Filler Metal Product Form for GTAW, PAW (QW-404)		N/A		N/A
Weld deposit thickness for each welding process (QW-404)		N/A		N/A
Process 1: SMAW 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		F3 0.125" & F4 0.311"		F3 0.250" & F4 0.622"
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input type="checkbox"/> No		N/A		N/A
Vertical progression (uphill/downhill) (QW-405)		N/A		N/A
GTAW, PAW or GMAW backing gas, or GFW fuel gas (QW-408)		N/A		N/A
GMAW transfer mode (spray/globular or pulse to short circuit) (QW-409)		N/A		N/A
GTAW welding current type & polarity (AC, DCEP, DCEN) (QW-409)		N/A		N/A
Machine Welding Variables (QW-361.2)				
Direct or remote visual control		N/A		N/A
Automatic arc voltage control (GTAW)		N/A		N/A
Automatic joint tracking		N/A		N/A
Multiple or single pass per side		N/A		N/A
Automatic Welding Variables (QW-361.1)				
Filler Metal (EBW or LBW)		N/A		N/A
Laser type for LBW (CO <sub>2</sub> or YAG etc.)		N/A		N/A
Continuous drive or inertia welding (FVW)		N/A		N/A
Vacuum or out of vacuum (EBW)		N/A		N/A

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

## RESULTS

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☒ Transverse root and face [QW-462.3(a)]; ☐ Longitudinal root and face [QW-462.3(b)]; ☐ Side [QW-462.2];  
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; ☐ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];  
☐ Pipe specimen, macro test for fusion [QW-462.5(b)]; ☐ Plate specimen, macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result	Type	Result
FACE	PASS	ROOT	PASS				
FACE	PASS	ROOT	PASS				

Alternative radiographic examination results (QW-191) **N/A**

Fillet weld - fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

☐ Fillet welds in plate [QW-462.4(b)]; ☐ Fillet welds in pipe [QW-462.4(c)]

Macro examination (QW-181) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by \_\_\_\_\_ Company \_\_\_\_\_

Mechanical tests conducted by \_\_\_\_\_ Laboratory test no. \_\_\_\_\_

Welding supervised by (Print name) **FARZAN CALIPH**

Test requested by (Print name) **TOM PATRZALEX** Tested at (Print address) **1050 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization **LESENA STEEL LTD**

Signature \_\_\_\_\_ Date **04-01-2013**  
(mm-dd-yyyy)

## FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's Technical Standards and Safety Act, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below:

- ☒ To weld for the Employer named above only.  
☐ For seeking employment only.

This Certificate expires: **PER ASME IX**

(mm-dd-yyyy)

**LOSIKA BOBOW** **ONTARIO**  
Inspector Name and Number (Print)

**JUNE 27, 2013**  
Inspector Signature and Date

Welder's Last Name <b>REID</b>		Initial <b>ALBERT</b>	First Name <b>James H. Reid</b>	Stamp No <b>LS</b>
Res. Address <b>44 FALBY CT., #611, AJAX, ONTARIO</b>		Postal Code <b>L1S1L1</b>		Provincial Registration No. <b>G7855</b>
Employer Name <b>LESENA STEEL LTD.</b>		Company PDR No. <b>40</b>		
Street Address <b>1090 BIRCHMOUNT ROAD</b>		Company WPS No. used <b>40</b>		
SCARBOROUGH, ONTARIO		Postal Code <b>M1K1S4</b>		
Welding Process(es) Used <b>FCAW</b>		Type(s) <input type="checkbox"/> manual <input type="checkbox"/> machine <input checked="" type="checkbox"/> semi-automatic <input type="checkbox"/> automatic		
Base Material(s) <b>SA 516 - 70</b>		Thickness(es) <b>1/2"</b>		<input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld
Variables for All Processes		Actual Values Range Qualified		
Backing material (with/without)		<b>WITH</b>		
Base Metal P-Number to P-Number		<b>P1 (a P1)</b>		
<input checked="" type="checkbox"/> Plate <input type="checkbox"/> Pipe (enter diameter if pipe)		<b>1/2"</b>		
Filler Metal Specification (SFA) Class (QW-404) (Indimensional Only)		<b>E20</b>		
Consumable (used for GTAW or PAW (QW-404))		<b>N/A</b>		
Welding Position (1G, 5G, etc.) (QW-405)		<b>1G</b>		
Manual or Semi-automatic Variables (QW-350)		Actual Values Range Qualified		
Filler Metal P-Num. (QW-404)		<b>F8</b>		
Filler Metal Product Form for GTAW, PAW (QW-404)		<b>N/A</b>		
Weld deposit thickness for each welding process (QW-404)		<b>N/A</b>		
Process 1: <b>FCAW</b> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<b>1/2"</b>		
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input type="checkbox"/> No		<b>N/A</b>		
Vertical progression (uphill/downhill) (QW-405)		<b>N/A</b>		
GTAW, PAW or CMAW backing gas, or OFW fuel gas (QW-408)		<b>N/A</b>		
GMAW transfer mode (spray/globular or pulse to short circuit) (QW-409)		<b>SPRAY</b>		
GTAW welding current type & polarity (AC, DCEP, DCEN) (QW-410)		<b>N/A</b>		
Machine Welding Variables (QW-361.2)		Actual Values Range Qualified		
Direct or remote visual control		<b>N/A</b>		
Automatic arc voltage control (GTAW)		<b>N/A</b>		
Automatic joint tracking		<b>N/A</b>		
Multiple or single pass per side		<b>N/A</b>		
Automatic Welding Variables (QW-361.1)		Actual Values Range Qualified		
Filler Metal (EBW or LBW)		<b>N/A</b>		
Laser type for LBW (CO <sub>2</sub> to YAG etc.)		<b>N/A</b>		
Continuous drive or inertia welding (FW)		<b>N/A</b>		
Vacuum or out of vacuum (EBW)		<b>N/A</b>		

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

**RESULTS**

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☐ Transverse root and face (QW-462.3(a)); ☐ Longitudinal root and face (QW-462.3(b)); ☒ Side (QW-462.2);  
☐ Pipe bend specimen, corrosion-resistant overlay (QW-462.5(c)); ☐ Plate bend specimen, corrosion-resistant overlay (QW-462.5(d));  
☐ Pipe specimen, macro test for fusion (QW-462.5(b)); ☐ Plate specimen, macro test for fusion (QW-462.5(e))

Type	Result	Type	Result	Type	Result	Type	Result
SIDE BEND	PASS						
SIDE BEND	PASS						

Alternative radiographic examination results (QW-191) **N/A**

Fillet weld — fracture test (QW-191.2) **N/A** Length and percent of defects **N/A**

☐ Fillet welds in plate (QW-462.4(b)) ☐ Fillet welds in pipe (QW-462.4(c))

Macro examination (QW-194) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by **TOM PATRZALEK**

Company **LESENA STEEL LTD**

Mechanical tests conducted by **FARZAN CALIPH**

Laboratory test no.

Welding supervised by (Print name) **FARZAN CALIPH**

Test requested by (Print name) **TOM PATRZALEK**

Tested at (Print address) **1090 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization **LESENA STEEL LTD**

Signature

Date **02-12-2013**

**FOR TSSA INSPECTOR USE ONLY**

The Welder named above has passed the welding test required under Ontario's Technical Standards and Safety Act, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below:

- ☒ To weld for the Employer named above only  
☐ For seeking employment only.

This Certificate expires **PER ASME IX**  
(mm-dd-yyyy)

**Muhammad Saim** **ONT00952**  
 Inspector Name and Number (Print)

Inspector Signature and Date



Standards and  
Safety Authority

Toronto, Ontario M8X 2X4  
Web site: www.tssa.org

Technical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273614

Welder's Last Name <b>SAJDAK</b>	Initial <b>MINAJLO</b>	First Name <b>MINAJLO</b>	Stamp No. <b>L7</b>
Res. Address <b>8 KINGS POINT DR., #3, ETOBICOKE, ONTARIO</b>		Provincial Registration No. <b>04215</b>	
Employer Name <b>LESENA STEEL LTD.</b>		Company PQR No. <b>14</b>	
Street Address <b>1080 BIRCHMOUNT ROAD</b>		Company WPS No. used <b>14</b>	
SCARBOROUGH, ONTARIO			

Welding Process(es) Used <b>SMAW</b>	Type(s) <input checked="" type="checkbox"/> manual <input type="checkbox"/> machine <input type="checkbox"/> semi-automatic <input type="checkbox"/> automatic
Base Material(s) <b>SA 516-70</b>	Thickness(es) <b>1/2"</b>
<input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld	
Variables for All Processes	Actual Values
Backing material (with/without)	WITH BACKING
Base Metal P-Number to P-Number	P1 to P1
( <input checked="" type="checkbox"/> ) Plate ( ) Pipe (enter diameter if pipe)	1/2"
Filter Metal Specification (SFA) Class (QW-404) (Informational Only)	5.4
Consumable Insert for GTAW or PAW (QW-404)	N/A
Welding Position (1G, 6G, etc.) (QW-405)	2G
Manual or Semi-automatic Variables (QW-350)	Range Qualified
Filter Metal P-Number (QW-404)	F5
Filter Metal Product Form for GTAW, PAW (QW-404)	N/A
Weld deposit thickness for each welding process (QW-404)	N/A
Process 1: <b>SMAW</b> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1/2"
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	1"
Vertical progression (uphill/downhill) (QW-405)	N/A
GTAW, PAW or GMAW backing gas; or OFW fuel gas (QW-405)	N/A
GMAW transfer mode (spray/lobular or pulse to short circuit) (QW-405)	N/A
GTAW welding current type & polarity (AC, DCEP, DCEN) (QW-405)	N/A
Machine Welding Variables (QW-361.2)	Range Qualified
Direct or remote visual control	N/A
Automatic arc voltage control (GTAW)	N/A
Automatic joint tracking	N/A
Multiple or single passes per side	N/A
Automatic Welding Variables (QW-361.1)	Range Qualified
Filter Metal (EBW or LBW)	N/A
Laser type for LBW (CO <sub>2</sub> to YAG etc.)	N/A
Continuous drive or orbital welding (FW)	N/A
Vacuum or out of vacuum (EBW)	N/A

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

### RESULTS

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☐ Transverse root and face [QW-462.3(a)]; ☐ Longitudinal root and face [QW-462.3(b)]; ☒ Side [QW-462.2];  
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; ☐ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];  
☐ Pipe specimen, macro test for fusion [QW-462.5(b)]; ☐ Plate specimen, macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result	Type	Result
SIDE	PASS						
SIDE	PASS						

Alternative radiographic examination results (QW-191) **N/A**

Fillet weld -- fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

- ☐ Fillet welds in plate [QW-462.4(b)]; ☐ Fillet welds in pipe [QW-462.4(c)]

Macro examination (QW-184) **N/A** Fillet size (in) **N/A** x **N/A** Concavity/convexity (in) **N/A**

Other tests

Film or specimens evaluated by **TOM PAIRZALEK**

Company **LESENA STEEL LTD**

Mechanical tests conducted by **N/A**

Laboratory test no. **N/A**

Welding supervised by (Print name) **FARZAN**

Test requested by (Print name) **ARIE**

Tested at (Print address) **1080 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization **LESENA STEEL LTD**

Signature

Date **1-29-2013**

(mm-dd-yyyy)

### FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's *Technical Standards and Safety Act*, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below

- ☒ To weld for the Employer named above only.  
☐ For seeking employment only.

This Certificate expires **PER ASME IX**

(mm-dd-yyyy)

**COSTICA ROSU** **ONTARIO**

Inspector Name and Number (Print)

**2013**

Inspector Signature and Date



Standards and  
Safety AuthorityToronto, Ontario M8X 2X4  
Web site: www.tssa.orgTechnical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273607

Welder's Last Name <b>SAJDAK</b>	First Name <b>MIHAJLO</b>	Signature <i>[Signature]</i>	Stamp No. <b>L7</b>
Res. Address <b>6 KINGS POINT DR., #3, ETOBICOKE, ONTARIO</b>		Postal Code <b>M 8 Y 1 Z 4</b>	Provincial Registration No. <b>WP-T4072.5</b>
Employer Name <b>LESENA STEEL LTD.</b>		Company PQR No. <b>16-2</b>	
Street Address <b>1060 BIRCHMOUNT ROAD</b>		Company WPS No. used <b>16-2</b>	
SCARBOROUGH, ONTARIO		Postal Code <b>M 1 K 1 S 4</b>	
Welding Process(es) Used <b>SAW</b>		Type(s) <input checked="" type="checkbox"/> manual <input type="checkbox"/> machine <input type="checkbox"/> semi-automatic <input type="checkbox"/> automatic	

Base Material(s) <b>SA 1060</b>	Thickness(es) <b>0.415"</b>	<input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld
Variables for All Processes		Range Qualified
Backing material (with/without)		F3 WITHOUT & F4 WITH
Base Metal P-Number to P-Number		F3 WITH OR WITHOUT & F1, F2 and F4 WITH
{ } Plate { x } Pipe (enter diameter if pipe)		P1 THRU P15F, P34, P41 THRU P49
Filler Metal Specification (SFA) Class (QW-404) (Informational Only)		PIPE 1" to UNLIMITED
Consumable Insert for GTAW or PAW (QW-404)		N/A
Welding Position (1G, 5G, etc.) (QW-405)		ALL POSITIONS OVER DIA. 1" AND ALL GROOVE AND FILLET
Manual or Semi-automatic Variables (QW-350)		Range Qualified
Filler Metal F-No. (QW-404)		F3 & F4
Filler Metal Product Form for GTAW, PAW (QW-404)		F1 TO F4
Weld deposit thickness for each welding process (QW-404)		N/A
Process 1: <b>SAW</b> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		F3 0.125" & F4 0.311"
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input type="checkbox"/> No		F3 0.250" & F4 0.822"
Vertical progression (uphill/downhill) (QW-405)		N/A
GTAW, PAW or GMAW backing gas; or OFW fuel gas (QW-408)		N/A
GMAW transfer mode (spray/globular or pulse to short circuit) (QW-409)		N/A
GTAW working current type & polarity (AC, DCEP, UGEN) (QW-409)		N/A
Machine Welding Variables (QW-361.2)		Range Qualified
Direct or remote visual control		N/A
Automatic arc voltage control (GTAW)		N/A
Automatic joint tracking		N/A
Multiple or single pass per side		N/A
Automatic Welding Variables (QW-361.1)		Range Qualified
Filler Metal (EBW or LBW)		N/A
Laser type for LBW (CO <sub>2</sub> to YAG etc.)		N/A
Continuous drive or inertia welding (FW)		N/A
Vacuum or out of vacuum (EBW)		N/A

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.  
RESULTSVisual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☐ Transverse root and face [QW-462.3(a)]; ☐ Longitudinal root and face [QW-462.3(b)]; ☒ Side [QW-462.3];  
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; ☐ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];  
☐ Pipe specimen, macro test for fusion [QW-462.5(b)]; ☐ Plate specimen, macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result	Type	Result
SIDE	PASS						
SIDE	PASS						

Alternative radiographic examination results (QW-191) **N/A**Fillet weld — fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

- ☐ Fillet welds in plate [QW-462.4(b)] ☐ Fillet welds in pipe [QW-462.4(c)]

Macro examination (QW-184) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by **TOM PATRZALEK** Company **LESENA STEEL LTD.**Mechanical tests conducted by **N/A** Laboratory test no. **N/A**Welding supervised by (Print name) **FARZAN CALIPH**Test requested by (Print name) **VLADIMIR JURUKOV** Tested at (Print address) **1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization **LESENA STEEL LTD**Signature *[Signature]*Date **01-16-2012**  
(mm-dd-yyyy)

## FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's Technical Standards and Safety Act, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below.

- ☒ To weld for the Employer named above only.  
☐ For seeking employment only.

**MIR SONI ONTARIO**

Inspector Name and Number (Print)

This Certificate expires:

**PCE ASME 12**  
(mm-dd-yyyy)

Inspector Signature and Date

Standards and  
Safety AuthorityToronto, Ontario M9X 2X4  
Web site: www.ssa.orgTechnical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273607

Welder's Last Name <b>SAJDAK</b>	Initial <b>SA</b>	First Name <b>MHAJLO</b>	Signature 	Stamp No. <b>17</b>
Res. Address <b>6 KINGS POINT DR., #3, ETOBICOKE, ONTARIO</b>			Postal Code <b>M 8 Y 1 Z 4</b>	Provincial Registration No. <b>VP-140725</b>
Employer Name <b>LESENA STEEL LTD.</b>			Company PQR No. <b>18-2</b>	
Street Address <b>1060 BIRCHMOUNT ROAD</b>			Company WPS No. used <b>18-2</b>	
SCARBOROUGH, ONTARIO			Postal Code <b>M 1 K 1 S 4</b>	

Welding Process(es) Used <b>SAW</b>	Type(s) <input checked="" type="checkbox"/> manual <input type="checkbox"/> machine <input type="checkbox"/> semi-automatic <input type="checkbox"/> automatic
Base Material(s) <b>SA 105B</b>	Thickness(es) <b>0.436"</b>
<input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld	
Variables for All Processes	
Backing material (with/without)	<b>F3 WITHOUT &amp; F4 WITH</b>
Base Metal P-Number to P-Number	<b>P1 to P1</b>
( ) Plate ( x ) Pipe (enter diameter if pipe)	<b>P1 THRU P15F, P34, P41 THRU P49</b>
Filler Metal Specification (SFA) Class (QW-404) (Informational Only)	<b>E1</b>
Consumable Insert for GTAW or PAW (QW-404)	<b>N/A</b>
Welding Position (1G, 5G, etc.) (QW-405)	<b>6G</b>
Manual or Semi-automatic Variables (QW-350)	
Filler Metal F- No. (QW-404)	<b>F3 &amp; F4</b>
Filler Metal Product Form for GTAW, PAW (QW-404)	<b>N/A</b>
Weld deposit thickness for each welding process (QW-404)	<b>N/A</b>
Process 1: <b>SAW</b> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>F3 0.125" &amp; F4 0.311"</b>
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input type="checkbox"/> No	<b>F3 0.250" &amp; F4 0.622"</b>
Vertical progression (uphill/downhill) (QW-405)	<b>N/A</b>
GTAW, PAW or GMAW backing gas; or OFW fuel gas (QW-408)	<b>N/A</b>
GMAW transfer mode (spray/globular or pulse to short circuit) (QW-409)	<b>N/A</b>
GTAW welding current type & polarity (AC, DCEP, DCEN) (QW-409)	<b>N/A</b>
Machine Welding Variables (QW-361.2)	
Direct or remote visual control	<b>N/A</b>
Automatic arc voltage control (GTAW)	<b>N/A</b>
Automatic joint tracking	<b>N/A</b>
Multiple or single pass per side	<b>N/A</b>
Automatic Welding Variables (QW-361.1)	
Filler Metal (EBW or LBW)	<b>N/A</b>
Laser type for LBW (CO <sub>2</sub> to YAG etc.)	<b>N/A</b>
Continuous drive or inertia welding (FW)	<b>N/A</b>
Vacuum or out of vacuum (EBW)	<b>N/A</b>

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

## RESULTS

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☐ Transverse root and face [QW-462.3(a)]; ☐ Longitudinal root and face [QW-462.3(b)]; ☒ Side [QW-462.2];  
☐ Pipe bend specimen, corrosion-resistant overlay [QW-462.5(c)]; ☐ Plate bend specimen, corrosion-resistant overlay [QW-462.5(d)];  
☐ Pipe specimen, macro test for fusion [QW-462.5(b)]; ☐ Plate specimen, macro test for fusion [QW-462.5(e)]

Type	Result	Type	Result	Type	Result	Type	Result
SIDE	PASS						
SIDE	PASS						

Alternative radiographic examination results (QW-191) **N/A**Fillet weld — fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

- ☐ Fillet welds in plate [QW-462.4(b)] ☐ Fillet welds in pipe [QW-462.4(c)]

Macro examination (QW-164) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by **TOM PATRZALEK** Company **LESENA STEEL LTD.**Mechanical tests conducted by **N/A** Laboratory test no. **N/A**Welding supervised by (Print name) **FARZAN CALIPH**Test requested by (Print name) **VLADIMIR JURUKOV** Tested at (Print address) **1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization **LESENA STEEL LTD**

Signature

Date **01-18-2012**  
(mm-dd-yyyy)

## FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's Technical Standards and Safety Act, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below:

- ☒ To weld for the Employer named above only.  
☐ For seeking employment only.

This Certificate expires

**PQR ASME IX**  
(mm-dd-yyyy)**MHAJLO SONI 01/18/12**

Inspector Name and Number (Print)

Inspector Signature and Date



Standards and  
Safety Authority

Toronto, Ontario M2X 2X4  
Web site: www.tssa.org

Technical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273605

Welder's Last Name <b>SAJDAK</b>	Initial <b>MIHAJLO</b>	Signature <i>[Signature]</i>	Stamp No. <b>L7</b>
Res. Address <b>8 KINGS POINT DR., #3, ETOBICOKE, ONTARIO</b>		Postal Code <b>M 8 Y 1 Z 4</b>	Provincial Registration No. <b>G7585</b>
Employer Name <b>LESENA STEEL LTD.</b>		Company PCR No. <b>49</b>	
Street Address <b>1060 BIRCHMOUNT ROAD</b>		Company WPS No. used <b>49</b>	
SCARBOROUGH, ONTARIO		Postal Code <b>M 1 K 1 S 4</b>	
Welding Process(es) Used <b>FCAW</b>		Type(s) <input type="checkbox"/> manual <input type="checkbox"/> machine <input checked="" type="checkbox"/> semi-automatic <input type="checkbox"/> automatic	
Base Material(s) <b>SA 516-70</b>		Thickness(es) <b>5/8"</b> <input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld	
Variables for All Processes		Actual Values	
Backing material (with/without)		WITH	
Base Metal P-Number to P-Number		P1 to P1	
<input checked="" type="checkbox"/> Plate <input type="checkbox"/> Pipe (enter diameter if pipe)		5/8"	
Filler Metal Specification (SFA) Class (QW-404) (informational only)		E18	
Consumable Insert for GTAW or PAW (QW-404)		N/A	
Welding Position (1G, 5G, etc.) (QW-405)		2G	
Manual or Semi-automatic Variables (QW-350)		Range Qualified	
Filler Metal F-No. (QW-404)		F6	
Filler Metal Product Form for GTAW, PAW (QW-404)		N/A	
Weld deposit thickness for each welding process (QW-404)		N/A	
Process 1: <b>FCAW</b> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		5/8"	
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input type="checkbox"/> No		N/A	
Vertical progression (uphill/downhill) (QW-405)		N/A	
GTAW, PAW or GMAW backing gas, or OFW fuel gas (QW-408)		ARG. 95% CO2 5% O2 2%	
GMAW transfer mode (spray/globular or pulse to short circuit) (QW-409)		SPRAY	
GTAW welding current type & polarity (AC, DCEP, DCEN) (QW-400)		N/A	
Machine Welding Variables (QW-361.2)		Range Qualified	
Direct or remote visual control		N/A	
Automatic arc voltage control (GTAW)		N/A	
Automatic joint tracking		N/A	
Multiple or single pass per side		N/A	
Automatic Welding Variables (QW-361.1)		Range Qualified	
Filler Metal (EBW or LBW)		N/A	
Laser type for LBW (CO2 to YAG etc.)		N/A	
Continuous drive or inertia welding (FW)		N/A	
Vacuum or out of vacuum (EBW)		N/A	

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.  
RESULTS

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☐ Transverse root and face (QW-462.3(a)) ☐ Longitudinal root and face (QW-462.3(b)); ☒ Side (QW-462.2);  
☐ Pipe bend specimen, corrosion-resistant overlay (QW-462.5(c)); ☐ Plate bend specimen, corrosion-resistant overlay (QW-462.5(d));  
☐ Pipe specimen, macro test for fusion (QW-462.5(b)); ☐ Plate specimen, macro test for fusion (QW-462.5(e))

Type	Result	Type	Result	Type	Result	Type	Result
SIDE	PASS						
SIDE	PASS						

Alternative radiographic examination results (QW-191) **N/A**

Fillet weld — fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

☐ Fillet welds in plate (QW-462.4(b)) ☐ Fillet welds in pipe (QW-462.4(c))

Macro examination (QW-184) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by **TOM PATRZALEK**

Company **LESENA STEEL LTD**

Mechanical tests conducted by **N/A**

Laboratory test no. **N/A**

Welding supervised by (Print name) **DEHNIS RAMBROSE**

Test requested by (Print name) **VLADIMIR JURUKOV**

Tested at (Print address) **1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code

Organization **LESENA STEEL LTD**

Signature *[Signature]*

Date **10-19-2011**  
(mm-dd-yyyy)

#### FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's Technical Standards and Safety Act, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below:

- ☒ To weld for the Employer named above only.  
☐ For seeking employment only

This Certificate expires

**Per ASME IX**  
(mm-dd-yyyy)

**MIHAJLO SONY ONT00952**  
Inspector Name and Number (Print)

*[Signature]*  
Inspector Signature and Date



Ministry of  
Consumer and  
Commercial Relations

Ministère de  
la Consommation  
et du Commerce

Pressure  
Vessels  
Safety Program

Programme de  
la sécurité des  
appareils sous pression

# Welder / Welding Operator Performance Test Essai de soudage

No. 70507

Welder's Last Name / Nom du soudeur (euse)		Initials / Initiales	First Name / Prénom	Signature / Signature	Stamp No. / N° de sceau
THEVADURAI		J	JEYANTHAN	<i>Jeyanthan</i>	L8
Address / Adresse				Postal Code / Code postal	Provincial Registration No. / N° d'enregistrement provincial
23 ASPENDALE DRIVE, SCARBOROUGH ONT				M 1 P 4 J 7	D870-5
Company Name / Nom de l'entreprise				Company PQR No. / N° PQR de l'entreprise	Company WPS No. / N° WPS de l'entreprise
LESENA STEEL				PQR-16-1	16-A
Direct Address / Adresse				Postal Code / Code postal	
1060 BIRCHMOUNT ROAD				M 1 K 1 S 4	
SCARBOROUGH, ONTARIO					
Process(es) / Procédé(s)		SMAW		Type(s) / Type(s)	MAN.
Base Material(s) / Matériau(s) de base		SA-516-70/SA-516-70		Thickness(es) / Épaisseur	0.750"
Manual or Semi-automatic Variable for each Process / Variables à commande manuelle ou semi-automatique pour chaque procédé				Actual Values / Valeurs réelles	Range Qualified / Gamme qualifiée
Backing & Type / Soutien et type				YES, WRLD	WITH OR WITHOUT BACKING
ASME P-No. to Du n° P.				P1 to P1	P1 thru P11 + P4X
( X ) Plate / Plaque ( ) Pipe Dia. / Diamètre du tuyau				0.750" PLATE	8" PLATE & 2 7/8" PIPE MIN. DIA.
Filler Metal Specification (SFA) / Métal d'apport - spécification (SFA)		5.1	Class / Classe	E-7018	
Filler Metal F-No. / Métal d'apport - n° F.				F4	F4 WITHOUT BACKING F1 thru F4 WITH BACKING
Consumable Insert (GTAW or PAW) / Pôce insérée consommable (TIG ou plasma)				NONE	
Weld deposit thickness for each process / Épaisseur du dépôt de soudure pour chaque procédé				3/4"	8"
Welding Position (1G, 5G, etc.) / Position du soudeur (1G, 5G, etc.)				3G	GROOVE & FILLET F&V
Orientation (uphill/downhill) / Orientation (montant/descendant)				UPHILL	UPHILL
GTAW, PAW or GTAW backing gas; or OPW fuel gas / Gaz de soutien TIG, plasma ou SAGFE, ou gaz combustible pour soudage aux gaz				NONE	
GTAW transfer mode / Mode de transfert SAGFE				NONE	
GTAW welding current type & polarity / Type et polarité du courant de soudage TIG				NONE	
Machine welding Variables for Process Used / Variables liées au soudage mécanisé pour le procédé utilisé				Actual Values / Valeurs réelles	Range Qualified / Gamme qualifiée
Direct/remote visual control / Contrôle visuel direct ou à distance				NONE	
Automatic voltage control (GTAW) / Régulation de tension automatique (TIG)				NONE	
Automatic joint tracking / Suivi de joint automatique				NONE	
Welding position (1G, 5G, etc.) / Position du soudeur (1G, 5G, etc.)				NONE	
Consumable Insert / Pôce insérée consommable				NONE	
Backing & Type / Soutien et type				NONE	

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.  
Remarque: Les valeurs dans "Gamme qualifiée" sont acceptables seulement quand elles sont utilisées avec un procédé de soudage qualifié.

Guided Bend or Radiography Results / Résultats d'essai de pliage guidé ou radiographie				Comments / Commentaires	
Specimen No. / N° de spécimen	Bend / Pliage	Radiography / Radiographie	Para. (GW -) / Par. (GW -)	Results / Résultats	
S-11	-	YES	OW-191-1	R.T. ACCEPTABLE	

All Other Tests / Toutes autres épreuves

Visual examination results (OW-302.4) / Résultats d'examen visuel

V.T. ACCEPTABLE

Fillet Weld Fracture Test / Soudure d'angle / Essai de rupture

Length and percentage of defects / Longueur et pourcentage de défauts

Macro Test Fusion / Macroscopie-fusion

Fillet Leg Size / Dimension du côté

Concavity/Convexity / Concavité/convexité

Welding Test conducted by / Essai effectué par

Date / Date

Laboratory Test No. / Essai de laboratoire n°

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code.  
Nous certifions que les renseignements concernant les présents résultats sont exacts et que les essais de soudage ont été préparés, exécutés et exécutés conformément aux exigences de l'article IX du Code de l'ASME.

Organization / Organisation

Signature

Date



IDENTIFICATION OF WELDER  
Pursuant to the Boilers & Pressure Vessels Act  
CARTÉ DE SOUDEUR

Conforme à la Loi sur les chaudières et appareils sous pression

Expiry Date / Date d'expiration

per code section IX

THEVADURAI, JEYANTHAN

L8

Welder / Soudeur (euse)

Symbol / Symbole

Has passed the welding test required under section 36 of the Boilers and Pressure Vessels Act, and is hereby authorized to weld for:

A réussi l'examen de soudage exigé aux termes de l'article 36 de la Loi sur les chaudières et appareils sous pression, et est autorisé(e) par la présente à souder pour:

LESENA STEEL

subject to the limitations of this certificate / sous réserve des limitations de présent certificat

Chief Inspector / Inspecteur (euse) en chef

Authorized Examiner / Examineur (euse) autorisé(e)

Ministry Use / Réservé au ministère

Test Requested By / Essai demandé par

MR. C. VIDINHA

(Print Name) (Nom en lettres imprimées)

Tested At / Essai mené à

1060 BIRCHMOUNT

(Print Address) (Adresse en lettres imprimées)

District # / N° du district d'inspection

50

Inspector # / N° d'inspecteur

66

Fee / Droits

95.-



Ministry of  
Consumer and  
Commercial Relations

Ministère de  
la Consommation  
et du Commerce

Pressure  
Vessels  
Safety Program

Programme de  
la sécurité des  
appareils sous pression

Welder / Welding Operator Performance Test  
Essai de soudage

No. 70506

Welder's Last Name/Nom du soudeur (euse)		Initials/Initiales	First Name/Prénom	Signature	Stamp No./N° de sceau
THEVADURAI, JEYANTHAN				<i>Jeyanthan</i>	L8
Res. Address/Adresse		Postal Code/Code postal		Provincial Registration No. N° d'enregistrement provincial	
23 ASPENDALE DRIVE, SCARBOROUGH, ONT.		M1P1J1		D872-5	
Company Name Nom de l'entreprise		Postal Code/Code postal		Company WPS No. N° RAS de l'entreprise	
LESENA STEEL		M1K1S1		18-1	
Street Address Adresse		Postal Code/Code postal		Company WPS No. N° RAS de l'entreprise	
1060 BIRCHMOUNT ROAD,		M1K1S1		18	
SCARBOROUGH, ONTARIO					
Process(es)/Procédé(s)		Type(s)/Type(s)			
SAW		SEMI AUTOMATIC			
Base Material(s)/Matériau(s) de base		Thickness(es)/Épaisseur			
SA 516-70		3/4"			
Manual or Semi-automatic Variables for each Process Variables à commande manuelle ou semi-automatique pour chaque procédé		Actual Values Valeurs réelles		Range Qualified Gamme qualifiée	
Backing & Type Soutien et type		YES, BASE & WELD METAL WITH OR WITHOUT			
ASME P-No. to Du n° P.		P1 TO P1		P1 thru P11 + P4X BACKING	
(X) Plate Plaque		0.750" PLATE		MAX. PLATE + 2 7/8" PIPE	
( ) Pipe Dia. Diamètre du tuyau				MIN. DIA.	
Filler Metal Specification (SFA) Métal d'apport - spécification (SFA)		L60 WIRE + 780 FLUX			
Filler Metal F. No. Métal d'apport - n° F.		F6		F6	
Consumable Insert (GTAW or PAW) Pièce insérée consommable (TIG ou plasma)		N/A		-	
Weld deposit thickness for each process Épaisseur du dépôt de soudure pour chaque procédé		3/4"		MAX. TO BE WELDED	
Welding Position (IG, 5G, etc.) Position du soudeur (IG, 5G, etc.)		1G		FLAT ONLY	
Progression (uphill/downhill) Progression (montant/descendant)		N/A		-	
GTAW, PAW or GMAW backing gas or OPW fuel gas Gaz de soutien TIG, plasma ou SAGFE, ou gaz combustible pour soudage aux gaz		N/A		-	
GMAW transfer mode Mode de transfert SAGFE		N/A		-	
GTAW welding current type & polarity Type et polarité du courant de soudage TIG		N/A		-	
Machine welding Variables for Process used Variables liées au soudage mécanisé pour le procédé utilisé		Actual Values Valeurs réelles		Range Qualified Gamme qualifiée	
Direct/remote visual control Contrôle visuel direct ou à distance		N/A		-	
Automatic voltage control (GTAW) Régulation de tension automatique (TIG)		N/A		-	
Automatic joint tracking Suivi de joint automatique		N/A		-	
Welding position (IG, 5G, etc.) Position du soudeur (IG, 5G, etc.)		N/A		-	
Consumable Insert Pièce insérée consommable		N/A		-	
Backing & Type Soutien et type		N/A		-	

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure. Remarque: Les valeurs dans "Gamme qualifiée" sont acceptables seulement quand elles sont utilisées avec un procédé de soudage qualifié.				
Guided Bend or Radiography Results/Résultats d'essai de pliage guidé ou radiographie				
Specimen No. N° de spécimen	Bend Pliage	Radiography Radiographie	Para. (GW -) Par. (GW -)	Results/Résultats
S10	YES	YES	GW 191-1	R.T. ACCEPTABLE
All Other Tests/Toutes autres épreuves				

Visual examination results (GW-302.4) Résultats d'examen visuel		V.T. ACCEPTABLE	
Fillet Weld Fracture Test Soudure d'angle/Essai de rupture		Length and percentage of defects Longueur et pourcentage de défauts	
Macro Test Fusion Macroscopie-fusion		Fillet Leg Size Dimension du côté	
Welding Test conducted by Essai effectué par		Date Date	
We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Code. Nous certifions que les renseignements concernant les présents résultats sont exacts et que les essais de soudage ont été préparés, soudés et exécutés conformément aux exigences de l'article IX du Code de l'ASME.		Laboratory Test No. Essai de laboratoire n°	
Organization Organisation		Signature Signature	
LESENA STEEL		C.H. VIDINHA	
		Date Date	
		MARCH 10/97	



IDENTIFICATION OF WELDER  
Pursuant to the Boilers & Pressure Vessels Act  
CARTE DE SOUDEUR  
Conforme à la Loi sur les chaudières et appareils sous pression

Entry Date  
Date d'expiration

THEVADURAI, JEYANTHAN L8

Has passed the welding test required under section 36 of the Boilers and Pressure Vessels Act, and is hereby authorized to weld for.  
A réussi l'examen de soudage exigé aux termes de l'article 36 de la Loi sur les chaudières et appareils sous pression, et est autorisé(e) par le présent à souder pour.

LESENA STEEL

Subject to the provisions of the Act and the regulations.  
Sous réserve des restrictions du présent certificat.

Authorized Examiner  
Examineur (n°) 400494(4)

Chief Inspector  
Inspecteur (n°) en chef

Ministry Use/Réserve au ministère

Test Requested By Essai demandé par		
T. SIDDICQUI		
Tested At Essai (montré à)		
1060 BIRCHMOUNT RD.		
District # N° du district d'inspection	Inspector # N° d'inspecteur	Fee Droits
57	80	85



**All Other Tests/Toutes autres épreuves**

ACCEPTABLE

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Standards and  
Safety AuthorityToronto, Ontario M5X 2X4  
Web site: www.tssa.orgTechnical Standards and Safety Act  
Boilers and Pressure Vessels Regulation

No. 273611

Welder's Last Name <b>STUPECKI</b>	Initial <b>DAVID</b>	First Name <b>DAVID</b>	Signature 	Stamp No. <b>L9</b>
Res. Address <b>102 NEWPORT AVE., TORONTO, ONTARIO</b>		Postal Code <b>M 1 L 1 J 3</b>	Provincial Registration No. <b>WP-T45590.5</b>	
Employer Name <b>LESENA STEEL LTD.</b>		Company PQR No. <b>48</b>		
Street Address <b>1060 BIRCHMOUNT ROAD</b>		Company WPS No. used <b>48</b>		

SCARBOROUGH, ONTARIO	Postal Code <b>M 1 K 1 S 4</b>
----------------------	-----------------------------------

Welding Process(es) Used <b>FCAW</b>	Type(s) <input type="checkbox"/> manual <input type="checkbox"/> machine <input checked="" type="checkbox"/> semi-automatic <input type="checkbox"/> automatic
--------------------------------------	--

Base Material(s) <b>SA 240 316L</b>	Thickness(es) <b>5/16"</b>	<input checked="" type="checkbox"/> Test Coupon <input type="checkbox"/> Production Weld
-------------------------------------	----------------------------	--

Variables for All Processes	Actual Values	Range Qualified
-----------------------------	---------------	-----------------

Backing material (with/without)	<b>WITHOUT</b>	<b>WITH OR WITHOUT</b>
---------------------------------	----------------	------------------------

Base Metal P-Number to P-Number	<b>P8 to P8</b>	<b>P1 THRU P15F, P34, and P-41 THRU P-49</b>
---------------------------------	-----------------	--

( <input checked="" type="checkbox"/> ) Plate ( ) Pipe (enter diameter if pipe)	<b>5/16"</b>	<b>5/8"</b>
---	--------------	-------------

Fillet Metal Specification (SFA) Class (QW-404) (Informational Only)	<b>5/22 (316 L)</b>	
--	---------------------	--

Consumable Insert for GTAW or PAW (QW-404)	<b>N/A</b>	<b>N/A</b>
--	------------	------------

Welding Position (1G, 5G, etc.) (QW-405)	<b>2G</b>	<b>FLAT, HORIZ. PIPE OVER 2 7/8" OD AND F. &amp; H. FILLETS</b>
--	-----------	---

Manual or Semi-automatic Variables (QW-350)	Actual Values	Range Qualified
---	---------------	-----------------

Filler Metal P-No. (QW-404)	<b>F8</b>	<b>ALL F8</b>
-----------------------------	-----------	---------------

Filler Metal Product Form for GTAW, PAW (QW-404)	<b>N/A</b>	<b>N/A</b>
--	------------	------------

Weld deposit thickness for each welding process (QW-404)	<b>N/A</b>	<b>N/A</b>
--	------------	------------

Process 1: <b>FCAW</b> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<b>5/16"</b>	<b>5/8"</b>
---	--------------	-------------

Process 2: 3 layers minimum <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<b>N/A</b>	<b>N/A</b>
---	------------	------------

Vertical progression (uphill/downhill) (QW-405)	<b>N/A</b>	<b>N/A</b>
---	------------	------------

GTAW, PAW or GMAW backing gas, or OFW fuel gas (QW-406)	<b>N/A</b>	<b>N/A</b>
---	------------	------------

GMAW transfer mode (spray/globular or pulse to short circuit) (QW-406)	<b>SPRAY</b>	<b>SPRAY</b>
--	--------------	--------------

GTAW welding current type & polarity (AC, OCEP, DCEN) (QW-406)	<b>N/A</b>	<b>N/A</b>
--	------------	------------

Machine Welding Variables (QW-361.2)	Actual Values	Range Qualified
--------------------------------------	---------------	-----------------

Direct or remote visual control	<b>N/A</b>	<b>N/A</b>
---------------------------------	------------	------------

Automatic arc voltage control (GTAW)	<b>N/A</b>	<b>N/A</b>
--------------------------------------	------------	------------

Automatic joint tracking	<b>N/A</b>	<b>N/A</b>
--------------------------	------------	------------

Multiple or single pass per side	<b>N/A</b>	<b>N/A</b>
----------------------------------	------------	------------

Automatic Welding Variables (QW-361.1)	Actual Values	Range Qualified
--	---------------	-----------------

Filler Metal (EBW or LBW)	<b>N/A</b>	<b>N/A</b>
---------------------------	------------	------------

Laser type for LBW (CO <sub>2</sub> to YAG etc.)	<b>N/A</b>	<b>N/A</b>
--	------------	------------

Continuous drive or inertia welding (FW)	<b>N/A</b>	<b>N/A</b>
--	------------	------------

Vacuum or out of vacuum (EBW)	<b>N/A</b>	<b>N/A</b>
-------------------------------	------------	------------

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

## RESULTS

Visual Examination of Completed Weld (QW-302.4) **SATISFACTORY**

- ☒ Transverse root and face (QW-462.3(a)); ☐ Longitudinal root and face (QW-462.3(b)); ☐ Side (QW-462.2);  
☐ Pipe bend specimen, corrosion-resistant overlay (QW-462.5(c)); ☐ Plate bend specimen, corrosion-resistant overlay (QW-462.5(d)).  
☐ Pipe specimen, macro test for fusion (QW-462.5(b)); ☐ Plate specimen, macro test for fusion (QW-462.5(e))

Type	Result	Type	Result	Type	Result	Type	Result
FACE BEND	PASS			ROOT BEND	PASS		
FACE BEND	PASS			ROOT BEND	PASS		

Alternative radiographic examination results (QW-101) **N/A**Fillet weld -- fracture test (QW-181.2) **N/A** Length and percent of defects **N/A**

- ☐ Fillet welds in plate (QW-462.4(b)) ☐ Fillet welds in pipe (QW-462.4(c))

Macro examination (QW-184) **N/A** Fillet size (in.) **N/A** x **N/A** Concavity/convexity (in.) **N/A**

Other tests

Film or specimens evaluated by **TOM PATRZALEK**Company **LESENA STEEL LTD**Mechanical tests conducted by **CAMBRIDGE MATERIAL TESTING**Laboratory test no. **626016-2-2012**Welding supervised by (Print name) **FARZAN CAUPH**Test requested by (Print name) **TOM PATRZALEK**Tested at (Print address) **1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO**

We certify that the statements in this record are correct and that the test coupons were prepared, welded and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code

Organization **LESENA STEEL LTD**

Signature

Date **01-30-2013**

(mm-dd-yyyy)

## FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's Technical Standards and Safety Act, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate

Check (✓) applicable box below.

- ☒ To weld for the Employer named above only  
☐ For seeking employment only

This Certificate expires **PER ASME IX**

(mm-dd-yyyy)

**MIHIR SOMI ONT00952**  
 Inspector Name and Number (Print)

Inspector Signature and Date **02/26/2013**

Welder's Last Name STUPECKI Initial DAVID Signature [Signature] Stamp No. L9

Res. Address 102 NEWPORT AVE, TORONTO M1L 1J3 Provincial Registration No. WP-T4520-5

Employer Name LESENA STEEL LTD Company PQR No. 16-3

Street Address 1060 BIRCHMOUNT RD Company WPS No. used 16-3

SCARBOROUGH, ONT. Postal Code M1K 1S4

Welding Process(es) Used SMAW Type(s) ☒ manual ☐ machine ☐ semi-automatic ☐ automatic

Base Material(s) SA-516-70 TO SA-516-74 Thickness(es) 1" ☒ Test Coupon ☐ Production Weld

Variables for All Processes

	Actual Values	Range Qualified
Backing material (with/without)	<u>WITH BACKING</u>	<u>WITH BACKING</u>
Base Metal P-Number to P-Number	<u>P1 to P1</u>	<u>P1 THRU P3A, P4 THRU P42</u>
( <input checked="" type="checkbox"/> ) Plate ( ) Pipe (enter diameter if pipe)	<u>1"</u>	<u>MAX. TO BE WELDED. PIPE 2'8" MIN</u>
Filler Metal Specification (SFA) Class (QW-404) (Informational Only)	<u>E-7018-1</u>	<u>ALL FILLETS</u>
Consumable Insert for GTAW or PAW (QW-404)		
Welding Position (1G, 2G, etc.) (QW-405)	<u>2G</u>	<u>F.H. PIPE 2'8" O.D.</u>
Manual or Semi-automatic Variables (QW-350)		
Filler Metal F- No. (QW-404)	<u>F4</u>	<u>F1 THRU F4</u>
Filler Metal Product Form for GTAW, PAW (QW-404)		
Weld deposit thickness for each welding process (QW-404)	<u>1"</u>	<u>MAX. TO BE WELDED</u>
Process 1: <u>SMAW</u> 3 layers minimum <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Process 2: 3 layers minimum <input type="checkbox"/> Yes <input type="checkbox"/> No		
Vertical progression (uphill/downhill) (QW-405)		
GTAW, PAW or GMAW backing gas, or OFW fuel gas (QW-406)		
GMAW transfer mode (spray/globular or pulse to short circuit) (QW-406)		
GTAW welding current type & polarity (AC, DCEP, DCEP) (QW-406)		
Machine Welding Variables (QW-361.2)		
Direct or remote visual control		
Automatic arc voltage control (GTAW)		
Automatic joint tracking		
Multiple or single pass per side	<u>MULTIPLE</u>	<u>MULTIPLE</u>
Automatic Welding Variables (QW-361.1)		
Filler Metal (EBW or LBW)		
Laser type for LBW (CO <sub>2</sub> to YAG etc.)		
Continuous drive or inertia welding (FW)		
Vacuum or out of vacuum (EBW)		

Note: Values in "Range Qualified" are valid only when used with a Qualified Welding Procedure.

#### RESULTS

Visual Examination of Completed Weld (QW-302.1)

ACCEPTABLE

- ☐ Transverse root and face (QW-462.3(a)); ☐ Longitudinal root and face (QW-462.3(b)); ☒ Side (QW-462.2);
- ☐ Pipe bend specimen, corrosion-resistant overlay (QW-462.5(c)); ☐ Plate bend specimen, corrosion-resistant overlay (QW-462.5(d));
- ☐ Pipe specimen, macro test for fusion (QW-462.5(b)); ☐ Plate specimen, macro test for fusion (QW-462.5(e))

Type	Result	Type	Result	Type	Result	Type	Result
<u>SIDE</u>	<u>O.K.</u>	<u>SIDE</u>	<u>O.K.</u>				
<u>SIDE</u>	<u>O.K.</u>	<u>SIDE</u>	<u>O.K.</u>				

Alternative radiographic examination results (QW-181)

Filler weld -- fracture test (QW-181.2) \_\_\_\_\_ Length and percent of defects \_\_\_\_\_

☐ Fillet welds in plate (QW-462.4(b)) ☐ Fillet welds in pipe (QW-462.4(c))

Macro examination (QW-184) \_\_\_\_\_ Fillet size (in.) \_\_\_\_\_ x \_\_\_\_\_ Concavity/convexity (in.) \_\_\_\_\_

Other tests \_\_\_\_\_

Film or specimens evaluated by \_\_\_\_\_ Company \_\_\_\_\_

Mechanical tests conducted by CAMBRIDGE MATERIAL TESTING Laboratory test no. 629196-2012

Welding supervised by FARZAN

Test requested by (Print name) TOM PATRZALEK Tested at (Print address) 1060 BIRCHMOUNT SCAR.

We certify that the statements in this record are correct and that the test coupons were prepared, welded, and tested in accordance with the requirements of Section IX of the ASME Boiler and Pressure Vessel Code.

Organization LESENA STEEL LTD

Signature [Signature]

Date DEC. 17/12

#### FOR TSSA INSPECTOR USE ONLY

The Welder named above has passed the welding test required under Ontario's Technical Standards and Safety Act, Boilers and Pressure Vessels Regulation and is hereby authorized, subject to the limitations of this certificate.

Check (✓) applicable box below:

- ☒ To weld for the Employer named above only.
- ☐ For seeking employment only.

This Certificate expires

ASME SECT IX  
(QW-302.1)

COSTICA ROSU ONT 915

Inspector Name and Number (Print)

Inspector Signature





PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **Non-Destructive Examiner Qualification Records**

# KV INSPECTION SERVICES LTD

Established 1980

1486 Wallace Road, Oakville, Ontario L6L 2Y2

Office: (905) 844-9448 Fax: (905) 844-6697

www.kvinspection.com

Email: kvinsp1@aol.com

## EDWIN DUTSCHAEVER



Natural Resources  
Canada

Ressources naturelles  
Canada



Name: **Edwin Dutschaever**  
Nom:  
Reg. No.: **515**  
No. matricule:  
Issue Date: **2011/11/28**  
Date d'émission:

This card does not identify the stated individual as an employee or representative of Natural Resources Canada, Government of Canada.  
Cette carte n'identifie pas l'individu d'être un employé ou un représentant de Ressources naturelles Canada, Gouvernement du Canada.

Corrective lenses for [X] near [ ] far vision.  
Verres correctifs pour la vision de [X] près [ ] distance.

Signature:

Edwin D.



*Edwin Dutschaever*



Natural Resources  
Canada

Ressources naturelles  
Canada

Certified to / Certifié selon: CAN CGSB-48 9712

515

Method Méthode	Level Niveau	Sector Secteur	Cert. Date Date cert.	Date recert. Date recert.	Expires Expiration
MT	2	EMC	1978/06/01		2014/12/31
PT	2	EMC	1980/07/01		2014/12/31
RT	2	EMC	1978/06/01		2014/12/31

For verification of certification status, policies, and definitions, visit website:  
<http://ndi.ircan.gc.ca/> Pour la vérification de la certification, les politiques, et les définitions,  
visitez le site web: <http://ndi.ircan.gc.ca/>

Manager, Certifying Agency  
Gestionnaire, Organisme de certification

*[Signature]*

# KV INSPECTION SERVICES LTD

Established 1980

1486 Wallace Road, Oakville, Ontario L6L 2Y2

Office: (905) 844-9448 Fax: (905) 844-6697

www.kvinspection.com

Email: kvinsp1@aol.com

## MATHEW PERRON



Natural Resources  
Canada

Ressources naturelles  
Canada



Name/  
Nom: **Mathew Perron**  
Reg. No.: **12283**  
No. matricule:  
Issue Date:  
Date d'émission: **2012/05/23**

This card does not identify the stated individual to be an employee or representative of Natural Resources Canada, Government of Canada.  
Cette carte n'identifie pas l'individu d'être un employé ou un représentant de Ressources naturelles Canada, Gouvernement du Canada

Corrective lenses for [ ] near [ ] far vision.  
Verres correctifs pour la vision de [ ] près [ ] distance.

Signature [ ]



Natural Resources  
Canada

Ressources naturelles  
Canada

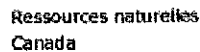
Certified to / Certifié selon: CAN CGSB 48 9711

12283

Method Méthode	Level Niveau	Sector Secteur	Cert. Date Date cert.	Date recert. Date recert.	Expires Expiration
MT	2	EMC	2011/05/11		2013/12/31
PY	2	EMC	2012/05/07		2013/12/31
RT	1	EMC	2009/02/11		2013/12/31

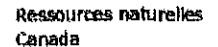
For verification of certification status, policies and definitions, visit website:  
<http://nrc.can.gc.ca/> pour la vérification de la certification, les politiques, et les définitions,  
visitez le site web: <http://nrc.can.gc.ca/>

Manager / Certifying Agency  
Gestionnaire / Organisme de certification



1056

Method Methode	Level Niveau	Sector Secteur	Act. Date Date act.	Date recuit Date recuit	Expires Expiration
ET	1	EMC	1993/03/05		2012/12/31
MT	2	EMC	1992/08/01		2012/12/31
PT	2	EMC	1992/08/01		2012/12/31
UY	2	EMC	1993/09/01		2012/12/31



## Discussion

Issue Date: 2009/12/14  
Date of rev/issue:

Correction lenses for [X] near | | far vision.  
 Ventes correctifs pour la vision de [X] près | | distance

**Sigvald**



**CANADIAN WELDING BUREAU**



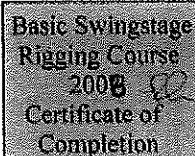
This card is the property of the Canadian Welding Bureau and can be recalled at any time. Fraudulent use may involve permanent cancellation.



Member No: 000103989 Section: IWS  
Expires: 8/31/2010 Type: RE2



Expiry Date



Peter Harkins  
Jan 11/08  
PH



550 N.W. LeJeune Road  
Miami, Florida 33126  
Ph (305) 443-5553 • (800) 443-5553 • Fax (305) 443-5547  
Visit our website at: <http://www.aws.org>

VALID  
THRU  
03/01/09

MEMBER

VALID UPON RECEIPT OF DUES

Gerald H. Hinkle  
AWS President



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Non-Destructive Examination Report

# LESENA STEEL LTD

## NDE MAP

CRN No: W1159.2

CUSTOMER: ECODYNE Ltd.

JOB No : 12-32 A - G

VESSEL TYPE: AFTER FILTER VESSEL

SERIAL No: 0411-0417

HEAD THK.: TOP: -18.22 mm MIN.\*  
BTM: -19.05 mm MIN.\* SHELLTHK.: 19.05 mm NOM.\*

DATE: Dec. 18, 2012

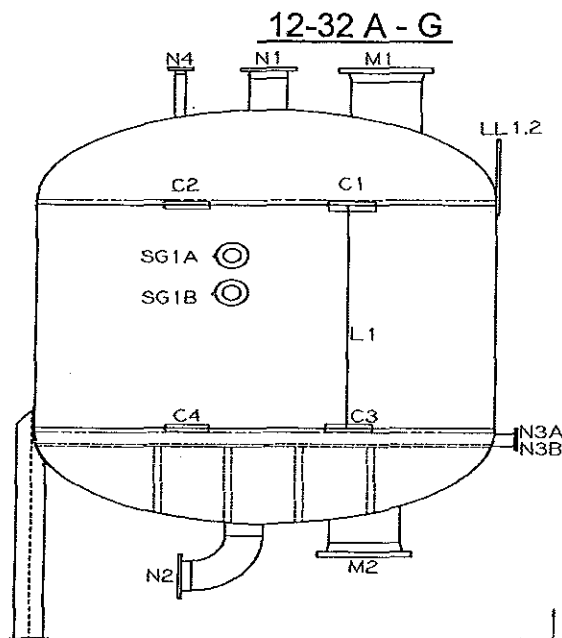
CODE ACCEPTANCE LEVEL: RT -2

CIRCUMFERENTIAL SEAMS: SPOT

LONGITUDINAL SEAM: FULL

FULL ON LONGITUDINAL SEAM & FOUR (4) SPOTS ON HEAD / SHELL CIRCUMFERENTIAL SEAM JOINTS AS SHOWN ON MAP.

\* THIS INFORMATION PLUS WELD I.D. MUST BE ON ALL FILMS.



12-32 A	L1	<u>4/18/13</u>	C1	<u>05/14/13</u>	C2	<u>05/14/13</u>	C3	<u>05/14/13</u>	C4	<u>05/14/13</u>
12-32 B	L1	<u>4/18/13</u>	C1	<u>05/01/13</u>	C2	<u>05/01/13</u>	C3	<u>05/01/13</u>	C4	<u>05/01/13</u>
12-32 C	L1	<u>05/01/13</u>	C1	<u>05/14/13</u>	C2	<u>05/14/13</u>	C3	<u>05/14/13</u>	C4	<u>05/14/13</u>
12-32 D	L1	<u>05/01/13</u>	C1	_____	C2	_____	C3	_____	C4	_____
12-32 E	L1	<u>05/01/13</u>	C1	_____	C2	_____	C3	_____	C4	_____
12-32 F	L1	<u>05/01/13</u>	C1	_____	C2	_____	C3	_____	C4	_____
12-32 G	L1	<u>05/14/13</u>	C1	_____	C2	_____	C3	_____	C4	_____

MPI : ALL AREAS WHERE TEMPORARY ATTACHMENTS HAVE BEEN REMOVED AND  
 ARC STRIKES HAVE OCCURRED

MPI : LIFTING LUGS



**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## RT

### Specification – Acceptance Criteria

ASME **UW-51** UW-52 B31.1 B31.3NS CSA Other

## General Data



Customer	Lesena Steel	Date	04/18/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32 A
Procedure	KV6 Rev'd	Worksheet #	36858
Technician	Imperson	CGSB Reg #	17783 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	.13	
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1	
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes	No
Reinforcement	1/8		Number of Exposures			7		
Film Mfg.	Kodak		Minimum Source to Object Distance			18"		
Film Type	AA		Maximum Distance from Source Side of Object to Film					7/8

[illegible]

ED DUTSCHAEVER  
CGSB LEVEL II, Reg# 515  
SNT-TC-1A, LEVEL III  
RT/MT/PT

KV Inspection Technician		Date	04/18/13
Customer Representative		Date	04/22/13

KV Inspection Services Ltd.

1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697

# Radiographic Examination Report

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

Case 1:14-cv-01014 Document 1-1 Filed 07/22/14 Page 1 of 1

General Data			
Customer	Lesena Steel	Date	05/14/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32-A
Procedure	KV6 Devr	Worksheet #	37015
Technician	M. McEwen	CGSB Reg #	12283 ASNT/SNT-TC-1A Level I



## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes (No)
Reinforcement	1/8		Number of Exposures			4	
Film Mfg.	Kodak		Minimum Source to Object Distance			18"	
Film Type	AA		Maximum Distance from Source Side of Object to Film			7/8	

UNIT No.	SIZE/LOC	SLAG	L.O.P.	L.O.F.	CRACK	POROSITY	U.G.	OTHERS	ACC	REJ
C1	0-6								/	
C2	0-6								/	
C3	0-6								/	
C4	0-6								/	
<p>Note - C1 covers LI 84-ENO LOCATION</p>										
<p>CHRIS VEENEMAN CGSB LEVEL II, REG. # 6651 MT/PT/RT/UT SNT-TC-1A LEVEL II MT/PT/RT/UT</p>										

Note - CI covers LI 84-ENO  
LOCATION

CHRIS VEENEMAN  
CGSB LEVEL II, REG. # 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

KV Inspection Technician		Date	05/14/13
Customer Representative		Date	05/15/13



NON DESTRUCTIVE INSPECTION  
AND CONSULTING INC.

BOX 82042, WATERDOWN, ONTARIO LOR 2MO  
BUS.: (905) 317-3313  
FAX: (905) 332-8225

Magnetic Particle Inspection Report - MT

Specification - Acceptance Criteria

As per ASME - Section VIII, Appendix 6

Customer: Lesena Steel	Date: May 16, 2013.
Location: Scarborough, Ontario	SN # 0411
Project: Ecodyne	SO # 12 - 32 A
Procedure: NDT #3 Rev. 02	M File: 13M-4971
Technician: P. Martin CET	CGSB - ASNT Level II 1696 CWB - AWS Level III 1154
Material type: Carbon Steel	Material thickness: Varies

Test Equipment - Dry Method

Yoke - source	Magnaflux Y-7	AC - continuous method
Indicators	825 R - Red	Dry powder
Background - (optional)	Chemetall oakite 9D1B	White
Light meter	Gould-Bass DLM-1000/1500	SN # 071097A
Light source	Trouble light - white light	

Report - results

Item - ID	Description	Technique	Defect	Results
12 - 32A				
Temporary attachments & arc strikes	ground areas	L&T		No detectable defects
Lifting lugs	welds & HAZ	L&T		No detectable defects
Tailing lugs	welds & HAZ	L&T		No detectable defects

Note: Sharp corners to be blended

Inspector:

P. Martin, CET  
CGSB/ASNT Level II 1696  
CWB/AWS Level III 1154



Peter N Martin  
CWI 07030017  
QC1 EXP. 12/1/2015

Customer Representative:

Date:

**Inspection Services Ltd.**

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

### Specification – Acceptance Criteria

ASME **UW-51** UW-52 B31.1 B31.3NS CSA Other

## General Data

Customer	Losena Steel	Date	04/18/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32 B
Procedure	KV6 Rev2	Worksheet #	36858
Technician	M Perron	CGSB Reg #	2283 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13	
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1	
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes	No
Reinforcement	1/8		Number of Exposures			7		
Film Mfg.	Kodak		Minimum Source to Object Distance			18"		
Film Type	AA		Maximum Distance from Source Side of Object to Film					7/8

[illegible]

ED DUTTSCHAEVER  
CGSB LEVEL II, Reg# 515  
RT/MT/PT  
SNT-TC-1A, LEVEL III  
RT/MT/PT

## KV Inspection Technician

Date \_\_\_\_\_

04/18/12

### Customer Representative

Date \_\_\_\_\_

04/22/13

### Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

Customer	Lesena Steel	Date	05/01/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32 B
Procedure	ILV6 Rev 2	Worksheet #	36944
Technician	MPerron	CGSB Reg #	12293 ASNT/SNT-TC-1A Level 1

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size		13
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette		1
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes	No
Reinforcement	1/8		Number of Exposures			4		
Film Mfg.	Kodak		Minimum Source to Object Distance				18"	
Film Type	AA		Maximum Distance from Source Side of Object to Film					7/8

**CHRIS VEENEMAN**  
CGSB LEVEL II, REG.# 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

## KV Inspection Technician

**Date**

MAY 1 / 13

**Customer Representative**

**Date**

05/03/13



NON DESTRUCTIVE INSPECTION  
AND CONSULTING INC.

BOX 82042, WATERDOWN, ONTARIO LOR 2MO  
BUS.: (905) 317-3313  
FAX: (905) 332-8225

Magnetic Particle Inspection Report - MT
Specification - Acceptance Criteria
As per ASME - Section VIII, Appendix 6

Customer: Lesena Steel	Date: May 16, 2013.
Location: Scarborough, Ontario	SN # 0412
Project: Ecodyne	SO # 12 - 32 B
Procedure: NDT #3 Rev. 02	M File: 13M-4971
Technician: P. Martin CET	CGSB - ASNT Level II 1696 CWB - AWS Level III 1154
Material type: Carbon Steel	Material thickness: Varies

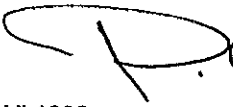


Test Equipment - Dry Method

Yoke - source	Magnaflux Y-7	AC - continuous method
Indicators	825 R - Red	Dry powder
Background - (optional)	Chemetall oakite 9D1B	White
Light meter	Gould-Bass DLM-1000/1500	SN # 071097A
Light source	Trouble light - white light	

Report - results

Item - ID	Description	Technique	Defect	Results
12 - 32B				
Temporary attachments & arc strikes	ground areas	L&T		No detectable defects
Lifting lugs	welds & HAZ	L&T		No detectable defects
Tailing lugs	welds & HAZ	L&T		No detectable defects

Note: Sharp corners to be blended

Inspector:			Peter N Martin CWI 07030017 QC1 EXP. 12/1/2015
P. Martin, CET CGSB/ASNT Level II 1696 CWB/AWS Level III 1154	Customer Representative: 	Date: 05-17-13	

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## RT

## Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data



General Data			
Customer	Lesena Steel	Date	05/14/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32C
Procedure	KV6 Rev 8	Worksheet #	37015
Technician	M. Perron	CGSB Reg #	12883 ASNT/SNT-TC-1A Level 1

## Technical Data

Technical Data			
Material Type	Carbon	Alloys	Isotope IR 192 Other
Base Material Thickness	3/4	Exposure	Single Wall Double Wall
Weld Thickness	3/4	View	Single Wall Double Wall
Reinforcement	1/8	Number of Exposures	4
Film Mfg.	Lodak	Minimum Source to Object Distance	18"
Film Type	AA	Maximum Distance from Source Side of Object to Film	7/8

[illegible]

**CHRIS VEENEMAN**  
CGSB - LEVEL II - REG.# 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

KV Inspection Technician		Date	05/14/13
Customer Representative		Date	05/17/13

**Inspection Services Ltd.**

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data



Customer	Lexena Steel	Date	05/01/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32C
Procedure	KV6 Rev2	Worksheet #	36944
Technician	Imperson	CGSB Reg #	12283 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	.13	
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1	
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes	No
Reinforcement	1/8		Number of Exposures			7		
Film Mfg.	Kodak		Minimum Source to Object Distance			18		
Film Type	A1A		Maximum Distance from Source Side of Object to Film					7/8

[illegible]

**CHRIS VEENEMAN**  
CGSB LEVEL II, REG.# 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

KV Inspection Technician		Date	05/01/13
Customer Representative		Date	05/03/13





NON DESTRUCTIVE INSPECTION  
AND CONSULTING INC.

BOX 82042, WATERDOWN, ONTARIO LOR 2M0  
BUS.: (905) 317-3313  
FAX: (905) 332-8225

Magnetic Particle Inspection Report - MT

Specification - Acceptance Criteria

As per ASME - Section VIII, Appendix 6

Customer: Lesena Steel	Date: May 27, 2013.
Location: Scarborough, Ontario	SN # 0413
Project: Ecodyne	SO # 12 - 32 C
Procedure: NDT #3 Rev. 02	M File: 13M-4971
Technician: P. Martin CET	CGSB - ASNT Level II 1696 CWB - AWS Level III 1154
Material type: Carbon Steel	Material thickness: Varies

Test Equipment - Dry Method

Yoke - source	Magnaflux Y-7	AC - continuous method
Indicators	825 R - Red	Dry powder
Background - (optional)	Chemetall oakite 9D1B	White
Light meter	Gould-Bass DLM-1000/1500	SN # 071097A
Light source	Trouble light - white light	

Report - results

Item - ID	Description	Technique	Defect	Results
12 - 32C				
Temporary attachments & arc strikes	ground areas	L&T		No detectable defects
Lifting lugs	welds & HAZ	L&T		No detectable defects
Tailing lugs	welds & HAZ	L&T		No detectable defects

Note: Sharp corners to be blended

Inspector:

P. Martin, CET  
CGSB/ASNT Level II 1696  
CWB/AWS Level III 1154



Peter N. Martin  
CWI, 07030017  
QC1 EXP. 12/1/2015

Customer Representative:

Date: 05-31-13

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

### Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

Customer	Lesena Steel	Date	05/01/13
Location	Toronto	P. O. #	
Project		Shop Order #	17-32D
Procedure	K16 Rev J	Worksheet #	36944
Technician	MPerran	CGSB Reg #	17883 ASNT/SNT-TC-1A Level 1

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	.13	
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1	
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes	No
Reinforcement	1/8		Number of Exposures			7		
Film Mfg.	Kodak		Minimum Source to Object Distance			18"		
Film Type	AA		Maximum Distance from Source Side of Object to Film					
			7/8					

**CHRIS VEENEMAN**  
CGSB LEVEL II, REG.# 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

*[Handwritten signature]*

05/01/13

*JKu*

05/03/13

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## RT

## Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data

Customer	Lesena Steel	Date	05/28/13
Location	Toronto	P. O. #	
Project	✓ excel	Shop Order #	12-32D
Procedure	KVB Rev2	Worksheet #	37075
Technician	Inferron	CGSB Reg #	12783 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13
Base Material Thickness	5/4		Exposure	Single Wall	Double Wall	Film per Cassette	1
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes (No)
Reinforcement	1/8		Number of Exposures			4	
Film Mfg.	Kodak		Minimum Source to Object Distance			18"	
Film Type	AA		Maximum Distance from Source Side of Object to Film			7/8	

[illegible]

## KV Inspection Technician

### Customer Representative

**Date****Date**

05/28/13

05/30/15

# Martin's

NON DESTRUCTIVE INSPECTION  
AND CONSULTING INC.

Magnetic Particle Inspection Report - MT

Specification - Acceptance Criteria

As per ASME - Section VIII, Appendix 6

BOX 82042, WATERDOWN, ONTARIO LOR 2MO  
BUS.: (905) 317-3313  
FAX: (905) 332-8225

Customer: Lesena Steel	Date: May 31, 2013.
Location: Scarborough, Ontario	SN # 0414
Project: Ecodyne	SO # 12 - 32 D
Procedure: NDT #3 Rev. 02	M File: 13M-4971
Technician: P. Martin CET	CGSB - ASNT Level II 1696 CWB - AWS Level III 1154
Material type: Carbon Steel	Material thickness: Varies

## Test Equipment - Dry Method

Yoke - source	Magnaflux Y-7	AC - continuous method
Indicators	825 R - Red	Dry powder
Background - (optional)	Chemetall oakite 9D1B	White
Light meter	Gould-Bass DLM-1000/1500	SN # 071097A
Light source	Trouble light - white light	

## Report - results

Item - ID	Description	Technique	Defect	Results
12 - 32D				
Temporary attachments & arc strikes	ground areas	L&T		No detectable defects
Lifting lugs	welds & HAZ	L&T		No detectable defects
Tailing lugs	welds & HAZ	L&T		No detectable defects

Note: Sharp corners to be blended

Inspector:

P. Martin, CET  
CGSB/ASNT Level II 1696  
CWB/AWS Level III 1154



Peter N Martin  
CWI 07030017  
QC1 EXP. 12/1/2015

Customer Representative:

Date: 06.03.13

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## RT

### Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data

Customer	Lesena Steel	Date	05/01/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32 E
Procedure	KLK Rev 2	Worksheet #	36944
Technician	MPerron	CGSB Reg #	12283 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes (No)
Reinforcement	1/8		Number of Exposures			7	
Film Mfg.	Kodak		Minimum Source to Object Distance			18"	
Film Type	D1A		Maximum Distance from Source Side of Object to Film			7/8	

[illegible]

**CHRIS VEENEMAN**  
CGSB LEVEL II, REG.# 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

## KV Inspection Technician

Date \_\_\_\_\_

05/01/13

**Customer Representative****Date**

05/03/13

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data

Customer	Lesoma Steel	Date	05/28/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32 E
Procedure	KV6 Rev 2	Worksheet #	37075
Technician	m Perron	CGSB Reg #	12283 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1
Weld Thickness	5/4		View	Single Wall	Double Wall	PWHT	Yes <input type="radio"/> No <input checked="" type="radio"/>
Reinforcement	1/8		Number of Exposures			2	
Film Mfg.	Kodak		Minimum Source to Object Distance			18"	
Film Type	AA		Maximum Distance from Source Side of Object to Film			1/8	

[illegible]

ED-DUITSCHAEVER  
CGSB LEVEL II, REG # 515  
RT/MT/PT  
SNT-TC-1A, LEVEL  
RT/MT/PT

## KV Inspection Technician

**Date**

05/28/13

**Customer Representative**

**Date**

05/30/13

**Inspection Services Ltd.**

1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697

# Radiographic Examination Report

### Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data

Customer	Lesena Steel	Date	06/06/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32E
Procedure	ICV6 Rev2	Worksheet #	36621
Technician	M. Penon	CGSB Reg #	12783 ASNT/SNT-TC-1A Level 1



## Technical Data

Material Type		Carbon		Alloys		Isotope		1R 192		Other		Physical/Focal Size		.13	
Base Material Thickness		3/4				Exposure		Single Wall		Double Wall		Film per Cassette		1	
Weld Thickness		3/4				View		Single Wall		Double Wall		PWHT		Yes (No)	
Reinforcement		1/8				Number of Exposures						2			
Film Mfg.		Kodak				Minimum Source to Object Distance						18"			
Film Type		AA				Maximum Distance from Source Side of Object to Film						7/8			
UNIT No.	SIZE/LOC	SLAG	L.O.P.	L.O.F.	CRACK	POROSITY	U.C.	OTHERS	ACC	REJ					

C3	O-6						/
C4	O-6						/

**CHRIS VEENEMAN**  
CGSB LEVEL II, REG.# 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

CHRIS VEENEMAN  
CGSB LEVEL II, REG.# 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

KV Inspection Technician		Date	JUNE 6/13
Customer Representative		Date	06-07-13



NON DESTRUCTIVE INSPECTION  
AND CONSULTING INC.

BOX 82042, WATERDOWN, ONTARIO LOR 2M0  
BUS.: (905) 317-3313  
FAX: (905) 332-8225

Magnetic Particle Inspection Report - MT

Specification - Acceptance Criteria

As per ASME - Section VIII, Appendix 6

Customer: Lesena Steel	Date: June 10, 2013.
Location: Scarborough, Ontario	SN # 0414
Project: Ecodyne	SO # 12 - 32 E
Procedure: NDT #3 Rev. 02	M File: 13M-4971
Technician: P. Martin CET	CGSB - ASNT Level II 1696 CWB - AWS Level III 1154
Material type: Carbon Steel	Material thickness: Varies

Test Equipment - Dry Method

Yoke - source	Magnaflux Y-7	AC - continuous method
Indicators	825 R - Red	Dry powder
Background - (optional)	Chemetall oakite 9D1B	White
Light meter	Gould-Bass DLM-1000/1500	SN # 071097A
Light source	Trouble light - white light	

Report - results

Item - ID	Description	Technique	Defect	Results
12 - 32E				
Temporary attachments & arc strikes	ground areas	L&T		No detectable defects
Lifting lugs	welds & HAZ	L&T		No detectable defects
Tailing lugs	welds & HAZ	L&T		No detectable defects

Note: Sharp corners to be blended

Inspector:

P. Martin, CET  
CGSB/ASNT Level II 1696  
CWB/AWS Level III 1154



Peter N Martin  
CWI 07030017  
QC1 EXP. 12/1/2015

Customer Representative:

Date:

06-11-13



**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

### Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data



Customer	Lesena Steel	Date	05/01/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-52 F
Procedure	KV6 Rev 2	Worksheet #	36944
Technician	M. Remon	CGSB Reg #	12283 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size		13
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette		1
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes	No
Reinforcement	1/8		Number of Exposures			7		
Film Mfg.	Kodak		Minimum Source to Object Distance					18"
Film Type	AA		Maximum Distance from Source Side of Object to Film					7/8

[illegible]

**CHRIS VEENEMAN**  
CGSB LEVEL II, REG.# 5651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

KV Inspection Technician		Date	05/01/13
Customer Representative		Date	05/04/13

**Inspection Services Ltd.**

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## RT

## Specification – Acceptance Criteria

ASME UW-51 **UW-52** B31.1 B31.3NS CSA Other

## General Data



Customer	Lesena Steel	Date	06/06/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32 F
Procedure	K16 Devt	Worksheet #	36621
Technician	MPerron	CGSB Reg #	12283 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13	
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1	
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes	No
Reinforcement	1/8		Number of Exposures			2		
Film Mfg.	Kodak		Minimum Source to Object Distance			18"		
Film Type	AA		Maximum Distance from Source Side of Object to Film					
			1/8					

[illegible]

CHRIS VEENEMAN	
CGSB LEVEL II, REG.# 6651	
MT/PT/RT/UT	
SNT-TC-1A LEVEL II	
MT/PT/RT/UT	

KV Inspection Technician		Date	JUNE 6 / 13
Customer Representative		Date	06-07-13

**Inspection Services Ltd.**

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## RT

## Specification – Acceptance Criteria

ASME UW-51 **UW-52** B31.1 B31.3NS CSA Other

## General Data

Customer	Lesena Steel	Date	06/18/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32F
Procedure	KV6 Rev'd	Worksheet #	37154
Technician	MPerson	CGSB Reg # 12283	ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13	
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1	
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes	No
Reinforcement	1/8		Number of Exposures			2		
Film Mfg.	Kodak		Minimum Source to Object Distance			18"		
Film Type	4A		Maximum Distance from Source Side of Object to Film					7/8

[illegible]

ED DUTSCHAEVER  
CGSB LEVEL II, Reg# 515  
RT/MT/PT  
SNT-TC-1A, LEVEL III  
RT/MT/PT

## KV Inspection Technician

Date

06/18/13

### Customer Representative

Date \_\_\_\_\_

06/18/13

**Martin's**NON DESTRUCTIVE INSPECTION  
AND CONSULTING INC.

Magnetic Particle Inspection Report - MT

Specification - Acceptance Criteria

As per ASME - Section VIII, Appendix 6

BOX 82042, WATERDOWN, ONTARIO LOR 2M0

BUS.: (905) 317-3313

FAX: (905) 332-8225

Customer: Lesena Steel	Date: June 24, 2013.
Location: Scarborough, Ontario	SN # 0416
Project: Ecodyne	SO # 12 - 32 F
Procedure: NDT #3 Rev. 02	M File: 13M-4971
Technician: P. Martin CET	CGSB - ASNT Level II 1696 CWB - AWS Level III 1154
Material type: Carbon Steel	Material thickness: Varies

## Test Equipment - Dry Method

Yoke - source	Magnaflux Y-7	AC - continuous method
Indicators	825 R - Red	Dry powder
Background - (optional)	Chemetall oakite 9D1B	White
Light meter	Gould-Bass DLM-1000/1500	SN # 071097A
Light source	Trouble light - white light	

## Report - results

Item - ID	Description	Technique	Defect	Results
12 - 32 F				
Temporary attachments & arc strikes	ground areas	L&T		No detectable defects
Lifting lugs	welds & HAZ	L&T		No detectable defects
Tailing lugs	welds & HAZ	L&T		No detectable defects

Note: Sharp corners to be blended

Inspector:

P. Martin, CET  
CGSB/ASNT Level II 1696  
CWB/AWS Level III 1154Peter N Martin  
CWI 07030017  
QC1 EXP. 12/1/2015

Customer Representative:

Date: 06.26.13

**1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697**

# Radiographic Examination Report

## RT

### Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data



Customer	Lesena Steel	Date	05/14/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-32 G
Procedure	K16 Rev 2	Worksheet #	37015
Technician	MPerron	CGSB Reg #	12283 ASNT/SNT-TC-1A Level 1

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes (No)
Reinforcement	1/8		Number of Exposures				7
Film Mfg.	Kodak		Minimum Source to Object Distance				18
Film Type	AA		Maximum Distance from Source Side of Object to Film				1/8

[illegible]

CHRIS VEENEMAN  
CGSB-LEVEL II, REG. # 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

KV Inspection Technician		Date	05/14/13
Customer Representative		Date	05/15/13

**Inspection Services Ltd.**

1486 Wallace Road  
Oakville, Ontario L6L 2Y2  
Phone: 905-844-9448  
Fax: 905-844-6697

# Radiographic Examination Report

### Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

## General Data



Customer	Lesena Steel	Date	06/06/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-326
Procedure	K16 Revt	Worksheet #	36621
Technician	M. Perron	CGSB Reg #	7783 ASNT/SNT-TC-1A Level

## Technical Data

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13
Base Material Thickness	5/4		Exposure	Single Wall	Double Wall	Film per Cassette	1
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes (No)
Reinforcement	1/8		Number of Exposures	2			
Film Mfg.	Kodak		Minimum Source to Object Distance	18"			
Film Type	AA		Maximum Distance from Source Side of Object to Film	7/8			

[illegible]

CHRIS VEENEMAN  
CGSB LEVEL II, REG.# 6651  
MT/PT/RT/UT  
SNT-TC-1A LEVEL II  
MT/PT/RT/UT

KV Inspection Technician		Date	JUNE 6/13
Customer Representative		Date	06-07-13

### Specification – Acceptance Criteria

ASME UW-51 UW-52 B31.1 B31.3NS CSA Other

General Data			
Customer	Lesena Steel	Date	06/18/13
Location	Toronto	P. O. #	
Project		Shop Order #	12-326
Procedure	ENB Rev 2	Worksheet #	37154
Technician	McMerran	CGSB Reg #	12283 ASNT/SNT-TC-1A Level

Material Type	Carbon	Alloys	Isotope	IR 192	Other	Physical/Focal Size	13
Base Material Thickness	3/4		Exposure	Single Wall	Double Wall	Film per Cassette	1
Weld Thickness	3/4		View	Single Wall	Double Wall	PWHT	Yes (No)
Reinforcement	1/8		Number of Exposures	2			
Film Mfg.	Kodak		Minimum Source to Object Distance	18"			
Film Type	AA		Maximum Distance from Source Side of Object to Film	7/8			

[illegible]

ED DUTSCHAEVER  
CGSB LEVEL II, Reg# 515  
RT/MT/PT  
SNT-TC-1A, LEVEL III  
RT/MT/PT

## KV Inspection Technician

**Customer Representative**

Date \_\_\_\_\_

**Date**



NON DESTRUCTIVE INSPECTION  
AND CONSULTING INC.

Magnetic Particle Inspection Report - MT
Specification - Acceptance Criteria
As per ASME - Section VIII, Appendix 6

BOX 82042, WATERDOWN, ONTARIO LOR 2MO  
BUS.: (905) 317-3313  
FAX: (905) 332-8225

Customer: Lesena Steel	Date: June 18, 2013.
Location: Scarborough, Ontario	SN # 0417
Project: Ecodyne	SO # 12 - 32 G
Procedure: NDT #3 Rev. 02	M File: 13M-4971
Technician: P. Martin CET	CGSB - ASNT Level II 1696 CWB - AWS Level III 1154
Material type: Carbon Steel	Material thickness: Varies

Test Equipment - Dry Method

Yoke - source	Magnaflux Y-7	AC - continuous method
Indicators	825 R - Red	Dry powder
Background - (optional)	Chemetall oakite 9D1B	White
Light meter.	Gould-Bass DLM-1000/1500	SN # 071097A
Light source	Trouble light - white light	

Report - results

Item - ID	Description	Technique	Defect	Results
12 - 32 G				
Temporary attachments & arc strikes	ground areas	L&T		No detectable defects
Lifting lugs	welds & HAZ	L&T		No detectable defects
Tailing lugs	welds & HAZ	L&T		No detectable defects

Note: Sharp corners to be blended

Inspector:		
P. Martin, CET CGSB/ASNT Level II 1696 CWB/AWS Level III 1154		
Customer Representative:		Date: 06.19.13





PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Production Test Results

**Not Applicable**



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Hydrostatic Test Report

# LESENA STEEL LTD

## HYDROSTATIC TEST CERTIFICATE

CUSTOMER: ECODYNE LTD. JOB No: 12-32 A

VESSEL TYPE: AFTER FILTER

SERIAL No: 0411 EQUIPMENT No: 3A-F-208 A

NATIONAL BOARD No: --- C.R.N. No: W1159.2

WORKING PRESSURE: 1041 kPa TEST PRESSURE: 1354 kPa (196.38 PSI.)

TEST MEDIUM: Water TEST DURATION: 1 HOUR

QC INSPECTOR: Jai Budhram TEST METAL TEMP.: MIN. 10° C

CUSTOMER INSP.: 23 MAY/13 GAUGE NUMBERS: T12, T17

WITNESS BY  
AUTHORIZED INSP.: [Signature] DATE: 05/23/2013

### TEST WAS PERFORMED IN HORIZONTAL POSITION

REMARKS: Hydrostatic testing shall be performed in accordance with Parag. UG - 99 of the A.S.M.E. Code Section VIII, Division 1.

The metal temperature during hydrostatic test shall be maintained at least 30° F above the minimum design metal temperature, to a maximum of 120° F.

QA - 23 A

# LESENA STEEL LTD

## REINFORCEMENT PAD AIR TEST CERTIFICATE

CUSTOMER: ECODYNE Ltd.

VESSEL TYPE: AFTER FILTER

JOB No: 12 - 32 A


SERIAL No: 0411

EQUIPMENT No: 3A-F-208

NATIONAL BOARD No: ----

C.R.N. No: W1159.2

TEST PRESSURE: 25 PSI / 172.3 KPa

QC INSPECTOR:   
JAI BUDHRAM

DATE: 05/21/2013

THIS IS TO CERTIFY THAT ALL REINFORCEMENT PADS WERE TESTED AND  
NO INDICATION OF LEAKS WERE FOUND.

# LESENA STEEL LTD

## HYDROSTATIC TEST CERTIFICATE

CUSTOMER: ECODYNE LTD. JOB No: 12-32 B

VESSEL TYPE: AFTER FILTER

SERIAL No: 0412 EQUIPMENT No: 3A-F-208 B

NATIONAL BOARD No: --- C.R.N. No: W1159.2

WORKING PRESSURE: 1041 kPa TEST PRESSURE: 1354 kPa (196.38 PSI)

TEST MEDIUM: Water

TEST DURATION: 1 HOUR

QC INSPECTOR:   
Jai Budhram

TEST METAL TEMP.: MIN. 10° C

CUSTOMER INSP.: 

GAUGE NUMBERS: T12,T17

WITNESS BY  
AUTHORIZED INSP.: 

DATE: 05/17/2013

### TEST WAS PERFORMED IN HORIZONTAL POSITION

REMARKS: Hydrostatic testing shall be performed in accordance with Parag. UG - 99 of the A.S.M.E. Code Section VIII, Division 1.

The metal temperature during hydrostatic test shall be maintained at least 30° F above the minimum design metal temperature, to a maximum of 120° F.

QA - 23 A

# LESENA STEEL LTD

## HYDROSTATIC TEST CERTIFICATE



# LESENA STEEL LTD

## REINFORCEMENT PAD AIR TEST CERTIFICATE

CUSTOMER: ECODYNE Ltd.

VESSEL TYPE: AFTER FILTER

JOB No: 12 - 32 B


SERIAL No: 0412

EQUIPMENT No: 3A-F-208

NATIONAL BOARD No: ----

C.R.N. No: W1159.2

TEST PRESSURE: 25 PSI / 172.3 KPa

QC INSPECTOR:   
JAI BUDHRAM

DATE: 05/16/2013

THIS IS TO CERTIFY THAT ALL REINFORCEMENT PADS WERE TESTED AND  
NO INDICATION OF LEAKS WERE FOUND.

**HYDROSTATIC TEST CERTIFICATE**

CUSTOMER: ECODYNE LTD. JOB No: 12-32 C

VESSEL TYPE: AFTER FILTER

SERIAL No: 0413 EQUIPMENT No: 3A-F-208 C

NATIONAL BOARD No: --- C.R.N. No: W1159.2

WORKING PRESSURE: 1041 kPa TEST PRESSURE: 1354 kPa (196.38 PSI.)

TEST MEDIUM: Water TEST DURATION: 1 HOUR

QC INSPECTOR: Jai Budhram TEST METAL TEMP.: MIN. 10° C

CUSTOMER INSP.: [Signature] GAUGE NUMBERS: T12 & T17

WITNESS BY  
AUTHORIZED INSP.: [Signature] DATE: 05/28/2013

**TEST WAS PERFORMED IN HORIZONTAL POSITION**

REMARKS: Hydrostatic testing shall be performed in accordance with Parag. UG - 99 of the A.S.M.E. Code Section VIII, Division 1.

The metal temperature during hydrostatic test shall be maintained at least 30° F above the minimum design metal temperature, to a maximum of 120° F.

QA - 23 A

# LESENA STEEL LTD

## REINFORCEMENT PAD AIR TEST CERTIFICATE

CUSTOMER: ECODYNE Ltd.

VESSEL TYPE: AFTER FILTER

JOB No: 12 - 32 C

SERIAL No: 0413

EQUIPMENT No: 3A-F-208

NATIONAL BOARD No: ----

C.R.N. No: W1159.2

TEST PRESSURE: 25 PSI / 172.3 KPa

QC INSPECTOR: 

JAI BUDHRAM

DATE: 05/23/2013

THIS IS TO CERTIFY THAT ALL REINFORCEMENT PADS WERE TESTED AND  
NO INDICATION OF LEAKS WERE FOUND.

# LESENA STEEL LTD

## HYDROSTATIC TEST CERTIFICATE

CUSTOMER: ECODYNE LTD. JOB No: 12-32 D

VESSEL TYPE: AFTER FILTER

SERIAL No: 0414 EQUIPMENT No: 3A-F-208 D

NATIONAL BOARD No: --- C.R.N. No: W1159.2

WORKING PRESSURE: 1041 kPa TEST PRESSURE: 1354 kPa (196.38 PSI.)

TEST MEDIUM: Water

TEST DURATION: 1 HOUR

QC INSPECTOR: 

TEST METAL TEMP.: MIN. 10° C

CUSTOMER INSP.: 

GAUGE NUMBERS: T12 & T17

WITNESS BY  
AUTHORIZED INSP.: 

DATE: 06/03/2013

### TEST WAS PERFORMED IN HORIZONTAL POSITION

REMARKS: Hydrostatic testing shall be performed in accordance with Parag. UG - 99 of the A.S.M.E. Code Section VIII, Division 1.

The metal temperature during hydrostatic test shall be maintained at least 30° F above the minimum design metal temperature, to a maximum of 120° F.

# LESENA STEEL LTD

## REINFORCEMENT PAD AIR TEST CERTIFICATE

CUSTOMER: ECODYNE Ltd.

VESSEL TYPE: AFTER FILTER

JOB No: 12 - 32 D

SERIAL No: 0414

EQUIPMENT No: 3A-F-208

NATIONAL BOARD No: ---

C.R.N. No: W1159.2

TEST PRESSURE: 25 PSI / 172.3 KPa

QC INSPECTOR: 

JAI BUDHRAM

DATE: 06/03/2013

THIS IS TO CERTIFY THAT ALL REINFORCEMENT PADS WERE TESTED AND  
NO INDICATION OF LEAKS WERE FOUND.

QA - 23 B

# LESENA STEEL LTD

## HYDROSTATIC TEST CERTIFICATE

CUSTOMER: ECODYNE LTD. JOB No: 12-32 E


VESSEL TYPE: AFTER FILTER

SERIAL No: 0415 EQUIPMENT No: 3A-F-208 E


NATIONAL BOARD No: --- C.R.N. No: W1159.2

WORKING PRESSURE: 1041 kPa TEST PRESSURE: 1354 kPa (196.38 PSI.)

TEST MEDIUM: Water TEST DURATION: 1 HOUR

QC INSPECTOR:  TEST METAL TEMP.: MIN. 10° C  
Jai Budhram

CUSTOMER INSP.:  12 JUNE/13 GAUGE NUMBERS: T12 & T17

WITNESS BY  
AUTHORIZED INSP.:  DATE: 06/12/2013

### TEST WAS PERFORMED IN HORIZONTAL POSITION

REMARKS: Hydrostatic testing shall be performed in accordance with Parag. UG - 99 of the A.S.M.E. Code Section VIII, Division 1.

The metal temperature during hydrostatic test shall be maintained at least 30° F above the minimum design metal temperature, to a maximum of 120° F.

# LESENA STEEL LTD

## REINFORCEMENT PAD AIR TEST CERTIFICATE

CUSTOMER: ECODYNE Ltd.

VESSEL TYPE: AFTER FILTER

JOB No: 12 - 32 E

SERIAL No: 0415

EQUIPMENT No: 3A-F-208

NATIONAL BOARD No: ----

C.R.N. No: W1159.2

TEST PRESSURE: 25 PSI / 172.3 KPa

QC INSPECTOR: J. Budhram

JAI BUDHRAM

DATE: 06/10/2013

THIS IS TO CERTIFY THAT ALL REINFORCEMENT PADS WERE TESTED AND  
NO INDICATION OF LEAKS WERE FOUND.

QA - 23 B

# LESENA STEEL LTD

## HYDROSTATIC TEST CERTIFICATE

CUSTOMER: ECODYNE LTD. JOB No: 12-32 F

VESSEL TYPE: AFTER FILTER

SERIAL No: 0416 EQUIPMENT No: 3A-F-208 F

NATIONAL BOARD No: --- C.R.N. No: W1159.2

WORKING PRESSURE: 1041 kPa TEST PRESSURE: 1354 kPa (196.38 PSI.)

TEST MEDIUM: Water TEST DURATION: 1 HOUR

QC INSPECTOR: J. Budhram 6/26/13 TEST METAL TEMP.: MIN. 10° C  
Jai Budhram

CUSTOMER INSP.: R. Mani 6/26/13 GAUGE NUMBERS: T12 & T17

WITNESS BY  
AUTHORIZED INSP.: [Signature] DATE: 06/27/2013

### TEST WAS PERFORMED IN HORIZONTAL POSITION

REMARKS: Hydrostatic testing shall be performed in accordance with Parag. UG - 99 of the A.S.M.E. Code Section VIII, Division 1.

The metal temperature during hydrostatic test shall be maintained at least 30° F above the minimum design metal temperature, to a maximum of 120° F.



# LESENA STEEL LTD

## REINFORCEMENT PAD AIR TEST CERTIFICATE


CUSTOMER: ECODYNE Ltd.

VESSEL TYPE: AFTER FILTER JOB No: 12 - 32 F

SERIAL No: 0416 EQUIPMENT No: 3A-F-208

NATIONAL BOARD No: ---- C.R.N. No: W1159.2

TEST PRESSURE: 25 PSI / 172.3 KPa

QC INSPECTOR:   
JAI BUDHRAM

DATE: 06/24/2013

THIS IS TO CERTIFY THAT ALL REINFORCEMENT PADS WERE TESTED AND  
NO INDICATION OF LEAKS WERE FOUND.

# LESENA STEEL LTD

## HYDROSTATIC TEST CERTIFICATE

CUSTOMER: ECODYNE LTD. JOB No: 12-32 G

VESSEL TYPE: AFTER FILTER

SERIAL No: 0417 EQUIPMENT No: 3A-F-208 G

NATIONAL BOARD No: --- C.R.N. No: W1159.2

WORKING PRESSURE: 1041 kPa TEST PRESSURE: 1354 kPa (196.38 PSI.)

TEST MEDIUM: Water TEST DURATION: 1 HOUR

QC INSPECTOR: J. Bud TEST METAL TEMP.: MIN. 10° C

Jai Budhram

CUSTOMER INSP.: J. Budhram. SNC/MEG. GAUGE NUMBERS: T12 & T17

WITNESS BY  
AUTHORIZED INSP.: [Signature] DATE: 06/20/2013

### TEST WAS PERFORMED IN HORIZONTAL POSITION

REMARKS: Hydrostatic testing shall be performed in accordance with Parag. UG - 99 of the A.S.M.E. Code Section VIII, Division 1.

The metal temperature during hydrostatic test shall be maintained at least 30° F above the minimum design metal temperature, to a maximum of 120° F.

# LESENA STEEL LTD

## REINFORCEMENT PAD AIR TEST CERTIFICATE

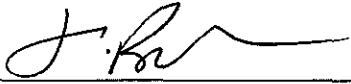
CUSTOMER: ECODYNE Ltd.

VESSEL TYPE: AFTER FILTER JOB No: 12 - 32 G

SERIAL No: 0417 EQUIPMENT No: 3A-F-208

NATIONAL BOARD No: ---- C.R.N. No: W1159.2

TEST PRESSURE: 25 PSI / 172.3 KPa

QC INSPECTOR:   
JAI BUDHRAM

DATE: 06/19/2013

THIS IS TO CERTIFY THAT ALL REINFORCEMENT PADS WERE TESTED AND  
NO INDICATION OF LEAKS WERE FOUND.



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Dimensional Check Report


# LESENA STEEL LTD

## DIMENSIONAL CHECK REPORT

VESSEL TYPE: AFTER FILTER  
CUSTOMER: ECODYNE Ltd.  
JOB No: 12 - 32 A  
SERIAL No: 0411  
NAT'L BOARD No: ----  
C.R.N. No: W1159.2

THE DIMENSIONAL CHECK WAS PERFORMED AND ACCEPTED BASED ON

DRAWING No. 32125-D-2202- 01, REV. E

QC INSPECTOR:   
JAI BUDHRAM

DATE: MAY 17, 2013

# LESENA STEEL LTD

## DIMENSIONAL CHECK REPORT

VESSEL TYPE: AFTER FILTER  
CUSTOMER: ECODYNE Ltd.  
JOB No: 12 - 32 B  
SERIAL No: 0412  
NAT'L BOARD No: -----  
C.R.N. No: W1159.2

THE DIMENSIONAL CHECK WAS PERFORMED AND ACCEPTED BASED ON

DRAWING No. 32125-D-2202- 01, REV. E

QC INSPECTOR:

  
JAI BUDHRAM

DATE: MAY 17, 2013

# LESENA STEEL LTD

## DIMENSIONAL CHECK REPORT

VESSEL TYPE: AFTER FILTER  
CUSTOMER: ECODYNE Ltd.  
JOB No: 12 - 32 C  
SERIAL No: 0413  
NAT'L BOARD No: -----  
C.R.N. No: W1159.2

THE DIMENSIONAL CHECK WAS PERFORMED AND ACCEPTED BASED ON

DRAWING No. 32125-D-2202- 01, REV. E

QC INSPECTOR:



JAI BUDHRAM

DATE: MAY 27 , 2013



# LESENA STEEL LTD

## DIMENSIONAL CHECK REPORT

VESSEL TYPE: AFTER FILTER  
CUSTOMER: ECODYNE Ltd.  
JOB No: 12 - 32 D  
SERIAL No: 0414  
NAT'L BOARD No:   
C.R.N. No: W1159.2

THE DIMENSIONAL CHECK WAS PERFORMED AND ACCEPTED BASED ON

DRAWING No. 32125-D-2202- 01, REV. E

QC INSPECTOR:

  
JAI BUDHRAM

DATE: MAY 30, 2013

# LESENA STEEL LTD

## DIMENSIONAL CHECK REPORT

VESSEL TYPE: AFTER FILTER  
CUSTOMER: ECODYNE Ltd.  
JOB No: 12 - 32 E  
SERIAL No: 0415  
NAT'L BOARD No: -----  
C.R.N. No: W1159.2

THE DIMENSIONAL CHECK WAS PERFORMED AND ACCEPTED BASED ON

DRAWING No. 32125-D-2202- 01, REV. E

QC INSPECTOR:

  
JAI BUDHRAM

DATE: JUNE 10, 2013


# LESENA STEEL LTD

## DIMENSIONAL CHECK REPORT

VESSEL TYPE: AFTER FILTER  
CUSTOMER: ECODYNE Ltd.  
JOB No: 12 – 32 F  
SERIAL No: 0416  
NAT'L BOARD No: ----  
C.R.N. No: W1159.2

THE DIMENSIONAL CHECK WAS PERFORMED AND ACCEPTED BASED ON

DRAWING No. 32125-D-2202- 01, REV. E

QC INSPECTOR:   
JAI BUDHRAM

DATE: JUNE 24 , 2013

# LESENA STEEL LTD

## DIMENSIONAL CHECK REPORT

VESSEL TYPE: AFTER FILTER  
CUSTOMER: ECODYNE Ltd.  
JOB No: 12 - 32 G  
SERIAL No: 0417  
NAT'L BOARD No: ----  
C.R.N. No: W1159.2

THE DIMENSIONAL CHECK WAS PERFORMED AND ACCEPTED BASED ON

DRAWING No. 32125-D-2202- 01, REV. E

QC INSPECTOR:

  
JAI BUDHRAM

DATE: JUNE 19, 2013



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Surface Preparation & Coating Report



## QUALITY ASSURANCE REPORT



CUSTOMER: ECODYNE LIMITED

BRANT JOB # 48491

CLIENT P.O. # 321253504

QA TECHNICIAN: JOHN BLUE

EQUIPMENT: 3962MM DIA x 2540MM AFTER FILTER VESSEL

SERIAL NO. 0411

DRAWING #: 32125-D-2202-01

TAG NO. 3A-F-208A

### ABRASIVE CLEANING

EXTERIOR : SSPC - SP10 (NACE 2) Near White Metal

3.00 MIL AVG.

BEGIN  
D/M/Y  
03/06/13

- SURFACE TESTED FOR CHLORIDES PRIOR TO BLAST RESULTS:  
KITAGAWA CHLORIDE DETECTOR TUBE < 3 PPM  
EM QUANT NITRATE TEST STRIP 0 PPM  
EM QUANT SULFATE TEST STRIP < 200 MG/L

### EXTERIOR COATING SYSTEM

PRIME: INTERTHERM 228 WHITE  
INTERMEDIATE:  
TOPCOAT: INTERTHERM 228 GREY

@ 4 - 6 MILS  
MILS  
@ 4 - 6 MILS

TOTAL D.F.T

8 - 12 MILS

(DATE)  
03/06/13

CUSTOMER APPROVAL: [Signature]

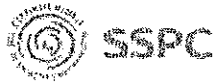
DATE: JUNE 7/13

THIRD PARTY APPROVAL: [Signature]

DATE: JUNE 7/13

BRANT Q.A.T APPROVAL: [Signature]

DATE: JUNE 05, 2013



## QUALITY ASSURANCE REPORT



CUSTOMER: ECODYNE LIMITED

BRANT JOB # 48481

CLIENT P.O. # 32125 - 3504

QA TECHNICIAN: PAUL MAJCHER

EQUIPMENT: 3962mm dia. x 2540mm After Filter

SERIAL NO. 0412

TAG NO. 3A - F - 208B

### ABRASIVE CLEANING

EXTERIOR : SSPC - SP10 (NACE 2) Near White Metal

3.00 MIL AVG.

BEGIN  
D/M/Y  
23/05/13

- Surfaces Checked For Presence Of Chlorides Prior To Blast

### RESULTS :

Kitagawa Chloride Detector Tube < 3 ppm  
EM Quant Nitrate Test Strips 0 ppm  
EM Quant Sulfate Test Strips < 200 mg/L

### INTERIOR LINING SYSTEM

Not Required

### EXTERIOR COATING SYSTEM

PRIME: INTERTHERM 228 WHITE  
INTERMEDIATE:  
TOPCOAT: INTERTHERM 228 GREY

@ 4 - 6 MILS  
MILS  
@ 4 - 6 MILS

TOTAL D.F.T

8 - 12 MILS

(DATE)  
24/05/13

CUSTOMER APPROVAL: \_\_\_\_\_

DATE: June 7/13

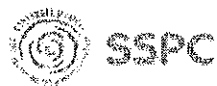
THIRD PARTY APPROVAL: \_\_\_\_\_

DATE: JUNE 7/13

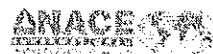
BRANT Q.A.T APPROVAL: \_\_\_\_\_

DATE: June 3<sup>rd</sup> 2013





## QUALITY ASSURANCE REPORT



CUSTOMER: ECODYNE LIMITED

BRANT JOB # 48492

CLIENT P.O. # 321253504

QA TECHNICIAN: JOHN BLUE

EQUIPMENT: 3862MM DIA x 2540MM AFTER FILTER VESSEL

SERIAL NO. 0413

DRAWING#: 32125-D-2202-01

TAG NO. 3A-F-208C

### ABRASIVE CLEANING

EXTERIOR : SSPC - SP10 (NACE 2) Near White Metal

3.00 MIL AVG.

BEGIN  
DATE

29/05/13

- SURFACE TESTED FOR CHLORIDES PRIOR TO BLAST  
RESULTS:  
KITAGAWA CHLORIDE DETECTOR TUBE <3PPM  
EM QUANT NITRATE TEST STRIP 0PPM  
EM QUANT SULFATE TEST STRIPS <200 MG/L

### EXTERIOR COATING SYSTEM

PRIME: INTERTHERM 228 WHITE  
INTERMEDIATE:  
TOPCOAT: INTERTHERM 228 GREY

@ 4 - 6 MILS  
MILS  
@ 4 - 6 MILS

TOTAL D.F.T

8 - 12 MILS

29/05/13

CUSTOMER APPROVAL: \_\_\_\_\_

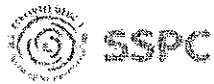
DATE: July 4/13

THIRD PARTY APPROVAL: \_\_\_\_\_

DATE: July 2/13

BRANT Q.A.T APPROVAL: \_\_\_\_\_

DATE: JUNE 10, 2013



## QUALITY ASSURANCE REPORT



CUSTOMER: ECODYNE LIMITED

BRANT JOB # 48493

CLIENT P.O. # 321253504

QA TECHNICIAN: JOHN BLUE

EQUIPMENT: 3862mm DIA x 2540mm AFTER FILTER VESSEL

SERIAL #: 0414

DRAWING#: 32125-D-2202-01

TAG#: 3A-F-208D

### ABRASIVE CLEANING

EXTERIOR : SSPC - SP10 (NACE 2) Near White Metal

3.00 MIL AVG.

- SURFACE TESTED FOR CHLORIDES PRIOR TO BLAST  
RESULTS:  
KITAGAWA CHLORIDE DETECTOR TUBE <3PPM  
EM QUANT NITRATE TEST STRIPS 0PPM  
EM QUANT SULFATE TEST STRIPS <200 MG/L

BEGIN  
(DATE)  
D/M/Y  
30/05/13

### EXTERIOR COATING SYSTEM

PRIME: INTERTHERM 228 WHITE  
INTERMEDIATE:  
TOPCOAT: INTERTHERM 228 GREY

@ 4 - 6 MILS  
MILS  
@ 4 - 6 MILS

TOTAL D.F.T

8 - 12 MILS

(DATE)  
30/05/13

CUSTOMER APPROVAL: [Signature]

DATE: JUNE 4/13

THIRD PARTY APPROVAL: [Signature]

DATE: JULY 2/13

BRANT Q.A.T APPROVAL: [Signature]

DATE: JUNE 17, 2013



## QUALITY ASSURANCE REPORT



CUSTOMER: ECODYNE LIMITED

BRANT JOB # 48494

CLIENT P.O. # 321253504

QA TECHNICIAN: JOHN BLUE

EQUIPMENT: 3862mm DIA x 2540mm AFTER FILTER VESSEL

SERIAL #: 0415

DRAWING#: 32125-D-2202-01

TAG#: 3A-F-208E

### ABRASIVE CLEANING

EXTERIOR : SSPC - SP10 (NACE 2) Near White Metal

3.00 MIL AVG.

- SURFACE TESTED FOR CHLORIDES PRIOR TO BLAST  
RESULTS:  
KITAGAWA CHLORIDE DETECTOR TUBE <3PPM  
EM QUANT NITRATE TEST STRIPS 0PPM  
EM QUANT SULFATE TEST STRIPS <200 MG/L

BEGIN  
(DATE)  
D/M/Y  
16/07/13

### EXTERIOR COATING SYSTEM

PRIME: INTERTHERM 228 WHITE  
INTERMEDIATE:  
TOPCOAT: INTERTHERM 228 GREY

@ 4 - 6 MILS  
MILS  
@ 4 - 6 MILS

TOTAL D.F.T

8 - 12 MILS

(DATE)  
16/07/13

CUSTOMER APPROVAL: \_\_\_\_\_

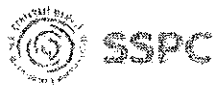
DATE: Aug. 1/13

THIRD PARTY APPROVAL: \_\_\_\_\_

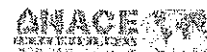
DATE: \_\_\_\_\_

BRANT Q.A.T APPROVAL: JB

DATE: JULY 22, 2013



## QUALITY ASSURANCE REPORT



CUSTOMER: ECODYNE LIMITED

BRANT JOB # 48495

CLIENT P.O. # 321253504

QA TECHNICIAN: John Blue

EQUIPMENT: 3962mm dia x 2450mm AFTER FILTER VESSEL

SERIAL NO: 0416

DRAWING#: 32125-D-2202-01

TAG NO: 3A-F-208F

### ABRASIVE CLEANING

EXTERIOR : SSPC - SP10 (NACE 2) Near White

3.00 MIL AVG.

(DATE)  
D/M/Y

22/07/13

\*SURFACE TESTED FOR CHLORIDES PRIOR TO BLAST

#### RESULTS:

KITAGAWA CHLORIDE DETECTOR TUBE <3PPM  
EM QUANT NITRATE TEST STRIPS 0PPM  
EM QUANT SULFATE TEST STRIPS <200MG/L

### EXTERIOR COATING SYSTEM

22/07/13

PRIMER: INTERTHERM 228 WHITE  
INTERMEDIATE:  
TOPCOAT: INTERTHERM 228 GREY

@ 4 - 6 MILS  
@ MILS  
@ 4 - 6 MILS

TOTAL DFT: 8 - 12 MILS

CUSTOMER APPROVAL: \_\_\_\_\_

DATE: \_\_\_\_\_

THIRD PARTY APPROVAL: \_\_\_\_\_

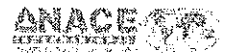
DATE: \_\_\_\_\_

BRANT Q.A.T APPROVAL: \_\_\_\_\_

DATE: Aug, 01, 2013



## QUALITY ASSURANCE REPORT



CUSTOMER: ECODYNE LIMITED

BRANT JOB # 48496

CLIENT P.O. # 321253504

QA TECHNICIAN: John Blue

EQUIPMENT: 3962mm dia x 2450mm AFTER FILTER VESSEL

TAG NO. 3A-F-208G

DRAWING#: 32125-D-2202-01

SERIAL #: 0417

### ABRASIVE CLEANING

EXTERIOR : SSPC - SP10(NACE 2) White Metal

- SURFACE TESTED FOR CHLORIDES PRIOR TO BLAST  
RESULTS:  
KITAGAWA CHLORIDE DETECTOR TUBE <3PPM  
EM QUANT NITRATE TEST STRIPS 0PPM  
EM QUANT SULFATE TEST STRIPS <200MG/L

BEGIN  
(DATE)  
D/M/Y

18/07/13

### EXTERIOR COATING SYSTEM

PRIME: INTERTHERM 228 WHITE  
INTERMEDIATE:  
TOPCOAT: INTERTHERM 228 GREY

@ 4 - 6 MILS

@

@ 4 - 6 MILS

8 - 12 MILS

18/07/13

CUSTOMER APPROVAL: [Signature]

DATE: Aug 1 / 13

THIRD PARTY APPROVAL: \_\_\_\_\_

DATE: \_\_\_\_\_

BRANT Q.A.T APPROVAL: [Signature]

DATE: July 24, 2013



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Dry Film Thickness Test Report



## CERTIFICATE OF COMPLIANCE

CUSTOMER: ECODYNE LIMITED  
CUSTOMER P.O.: 321253504  
SERIAL#: 0411  
TAG#: 3A-F-208A  
ITEM DESC. 3962MM DIA x 2540MM AFTER FILTER VESSEL  
BCC JOB #: 48491

BRANT CORROSION CONTROL INC. CERTIFIES THAT IT HAS COMPLIED WITH THE FOLLOWING  
SCOPE OF WORK; P.O.# 321253504

BLAST AND COAT EXTERIOR ONLY

BLAST TO SSPC SP10 (NACE2) NEAR WHITE

Prime With: INTERTHERM 228 WHITE

TopCoat With: INTERTHERM 228 GREY

@ 4 - 6 Mils

@ 4 - 6 Mils

TOTAL D.F.T 8 - 12 Mils

ALL INSTRUMENTATION IS CALIBRATED AND CERTIFIED. WORK HAS BEEN IN COMPLIANCE  
WITH THE FOLLOWING SPECIAL INSTRUCTIONS.

  
Q.A TECHNICIAN  
John Blue

DATE: June,05,2013



SSPC





Jun 05 2013

Readings - ECODYNE LIMITED P/O# 321253504

ReadingINTERTHERM 228 GREY

(mil)

1	11.3
2	11.2
3	11.9
4	11.4
5	11.2
6	11.4
7	11.5
8	11.3
9	11.7
10	11.0
11	11.9
12	11.7
13	11.1
14	12.0
15	12.2
16	12.1
17	11.3
18	11.6
19	11.4
20	14.9
21	9.2
22	9.2
23	11.2
24	11.1
25	10.9
26	11.0
27	10.9
28	12.0
29	11.7
30	11.9
31	11.3
32	11.2
33	11.4
34	12.0
35	11.6
36	11.1
37	11.0
38	11.2
39	9.9
40	9.5
41	9.8
42	10.9
43	11.4
44	12.3
45	12.1
46	13.8
47	11.6
48	14.0
49	11.4
50	10.7

Summary - ECODYNE LIMITED P/O# 321253504

ReadingINTERTHERM 228 GREY

(mil)

Jun 05 2013

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Max	14.90
Min	9.20
Mean	11.43
StdDev.	1.01

Annotations - ECODYNE LIMITED P/O# 321253504

Gage Model: 6000FS3

Gage S/N: 633791

Probe Model: FS

Probe S/N: 170587

User: JB

Part: 3962MM DIA x 2540MM AFTER FILTER VESSEL

Substrate: FE

Coating 1: INTERTHERM 228 GREY

EXTERIOR FINISH MILS TAG# 3A-F-208A



## CERTIFICATE OF COMPLIANCE

CUSTOMER: ECODYNE LIMITED

CUSTOMER REF.: P.O. # 32125 - 3504

ITEM DESC. 3962mm dia. x 2540mm After Filter

Serial No. 0412

Tag No. 3A-F-208B

BCC JOB #: 48481

BRANT CORROSION CONTROL INC. CERTIFIES THAT IT HAS COMPLIED WITH  
THE FOLLOWING SCOPE OF WORK: P.O. #: 32125 - 3504

INTERIOR - No Blast or Lining Required

BLAST EXTERIOR TO SSPC - SP10(NACE 2) Near White Metal

Prime with INTERTHERM 228 White

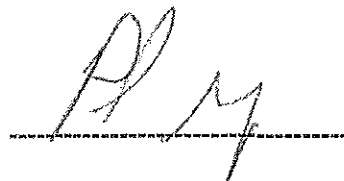
@ 4 - 6 Mils

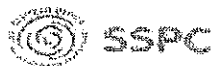
Finish with INTERTHERM 228 Grey

@ 4 - 6 Mils

TOTAL D.F.T. 8 - 12 Mils

ALL INSTRUMENTATION HAS BEEN CALIBRATED AND CERTIFIED AS PER  
BRANT CORROSION CONTROL INC. QUALITY STANDARDS AND PROCEDURES.

  
Q.A TECHNICIAN  
Paul Majcher  
DATE: June 3<sup>rd</sup> 2013



30 GARNET RD, BRANTFORD, ONTARIO, CANADA, N3T 5M1 OFFICE (519) 759-7334 FAX (519) 759-2580  
WWW.BRANTBCC.COM

Jun 03 2013

Readings - ECODYNE LTD. # 32125 - 3504  
ReadingIntertherm 228 Grey  
(mil)

1	13.9
2	11.6
3	9.8
4	10.9
5	11.4
6	10.2
7	12.5
8	13.2
9	8.7
10	8.1
11	17.1
12	9.3
13	11.7
14	12.0
15	10.7
16	11.9
17	8.5
18	11.3
19	9.4
20	10.3
21	11.1
22	8.8
23	6.6
24	11.6
25	13.2
26	10.1
27	10.9
28	10.6
29	16.5
30	8.3
31	8.1
32	9.4
33	7.6
34	8.5
35	15.7
36	10.3
37	6.9
38	8.5
39	9.6
40	14.7
41	9.3
42	10.1
43	11.9
44	10.9
45	7.4
46	14.1
47	15.2
48	11.1
49	12.6
50	12.9

Summary - ECODYNE LTD. # 32125 - 3504  
ReadingIntertherm 228 Grey  
(mil)

Jun 03 2013

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Max	17.10
Min	6.60
Mean	10.90
StdDev.	2.44

Annotations - ECODYNE LTD. # 32125 - 3504

Gage Model: 6000FNS3

Gage S/N: 601287

Probe Model: FNS

Probe S/N: 186996

User: PM

Part: 3962mm dia. x 2540mm After Filter Vessel

Substrate: FE

Coating 1: Intertherm 228 Grey

Exterior Finish Mils S/N 0412 Tag No. 3A-F-208B



## CERTIFICATE OF COMPLIANCE

CUSTOMER: ECODYNE LIMITED  
CUSTOMER P.O.: 321253504  
ITEM DESC: 3962MM DIA x 2540MM AFTER FILTER VESSEL  
SERIAL NO: 0413  
TAG#: 3A-F-208C  
BRANT JOB #: 48492


BRANT CORROSION CONTROL INC. CERTIFIES THAT IT HAS COMPLIED WITH  
THE FOLLOWING SCOPE OF WORK: P.O. #: 321253504

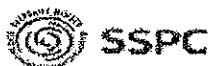
BLAST AND COAT EXTERIOR ONLY

BLAST TO SSPC – SP10 (NACE2) NEAR WHITE  
Prime with *INTERTHERM 228 WHITE*  
Finish with *INTERTHERM 228 GREY*

@ 4 – 6 Mils
@ 4 – 6 Mils
<b>Total D.F.T. 8 – 12 Mils</b>

ALL INSTRUMENTATION IS CALIBRATED AND CERTIFIED. WORK HAS BEEN IN  
COMPLIANCE WITH THE FOLLOWING SPECIAL INSTRUCTIONS.

  
Q.A TECHNICIAN  
John Blue  
DATE: June, 10, 2013



30 GARNET RD, BRANTFORD, ONTARIO, CANADA, N3T 5M1 OFFICE (519) 759-7334 FAX (519) 759-2580  
WWW.BRANTBCC.COM

Jun 10 2013

Readings - ECODYNE LIMITED P/O# 321253504  
ReadingINTERTHERM 228 GREY

	(mil)
1	12.5
2	11.7
3	11.6
4	11.5
5	12.5
6	12.9
7	11.2
8	12.0
9	12.3
10	11.9
11	11.8
12	11.9
13	12.1
14	11.6
15	12.1
16	11.4
17	11.7
18	11.5
19	11.8
20	12.5
21	12.5
22	12.1
23	15.1
24	14.8
25	15.2
26	16.0
27	15.5
28	11.5
29	14.4
30	10.4
31	16.8
32	11.0
33	10.5
34	10.0
35	9.0
36	8.1
37	8.1
38	7.6
39	7.5
40	7.7
41	7.6
42	8.2
43	7.8
44	8.2
45	8.0
46	8.1
47	9.1
48	7.9
49	7.9
50	7.8

Summary - ECODYNE LIMITED P/O# 321253504  
ReadingINTERTHERM 228 GREY

	(mil)
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Jun 10 2013

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Max	16.80
Min	7.50
Mean	11.06
StdDev.	2.51

Annotations - ECODYNE LIMITED P/O# 321253504

Gage Model: 6000FS3

Gage S/N: 633791

Probe Model: FS

Probe S/N: 170587

User: JB

Part: 3962MM DIA x 2450MM AFTER FILTER VESSEL

Substrate: FE

Coating 1: INTERTHERM 228 GREY

EXTERIOR FINISH MILS TAG# 3A-F-208C S/N# 0413





## CERTIFICATE OF COMPLIANCE

CUSTOMER: ECODYNE LIMITED  
CUSTOMER P.O.: 321253504  
ITEM DESC. 3962mm DIA x 2540mm AFTER FILTER VESSEL  
SERIAL#: 0414  
TAG#: 3A-F-208D  
BCC JOB #: 48493

BRANT CORROSION CONTROL INC. CERTIFIES THAT IT HAS COMPLIED WITH THE FOLLOWING SCOPE OF WORK; P.O.# 321253504

BLAST AND COAT EXTERIOR ONLY

BLAST SSPC SP10(NACE2) NEAR WHITE

Prime With: INTERTHERM 228 WHITE

TopCoat With: INTERTHERM 228 GREY

@ 4 - 6 Mils

@ 4 - 6 Mils

TOTAL D.F.T 8 - 12 Mils

ALL INSTRUMENTATION IS CALIBRATED AND CERTIFIED. WORK HAS BEEN IN COMPLIANCE WITH THE FOLLOWING SPECIAL INSTRUCTIONS.

  
Q.A. TECHNICIAN

John Blue

DATE: June, 17, 2013



SSPC



Jun 14 2013

Readings - ECODYNE LIMITED P/O# 321253504

ReadingINTERTHERM 228 GREY

(mil)

1	11.6
2	10.8
3	11.1
4	11.5
5	10.7
6	11.1
7	11.2
8	10.3
9	11.1
10	11.4
11	9.8
12	8.9
13	8.0
14	8.2
15	7.9
16	12.1
17	14.6
18	8.5
19	9.7
20	9.4
21	9.0
22	9.1
23	9.9
24	8.5
25	8.7
26	8.5
27	8.7
28	9.5
29	11.1
30	10.7
31	11.3
32	11.0
33	11.2
34	11.6
35	11.4
36	11.1
37	10.9
38	11.3
39	10.7
40	11.1
41	10.9
42	10.6
43	9.4
44	10.0
45	10.3
46	10.0
47	10.2
48	9.2
49	9.3
50	9.4

Summary - ECODYNE LIMITED P/O# 321253504

ReadingINTERTHERM 228 GREY

(mil)

Jun 14 2013

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Max	14.60
Min	7.90
Mean	10.25
StdDev.	1.28

Annotations - ECODYNE LIMITED P/O# 321253504

Gage Model: 6000FS3

Gage S/N: 633791

Probe Model: FS

Probe S/N: 170587

User: JB

Part: 3862mm Dia x 2450mm AFTER FILTER VESSEL

Substrate: FE

Coating 1: INTERTHERM 228 GREY

EXTERIOR FINISH MILS TAG# 3A-F-208D S/N 0414



## CERTIFICATE OF COMPLIANCE

CUSTOMER: ECODYNE LIMITED  
CUSTOMER P.O.: 321253504  
ITEM DESC. 3962mm DIA x 2540mm AFTER FILTER VESSEL  
SERIAL#: 0415  
TAG#: 3A-F-208E  
BCC JOB #: 48494

BRANT CORROSION CONTROL INC. CERTIFIES THAT IT HAS COMPLIED WITH THE FOLLOWING  
SCOPE OF WORK; P.O.# 321253504

BLAST AND COAT EXTERIOR ONLY

BLAST SSPC SP10(NACE2) NEAR WHITE

Prime With: INTERTHERM 228 WHITE

TopCoat With: INTERTHERM 228 GREY

@ 4 - 6 Mils

@ 4 - 6 Mils

TOTAL D.F.T 8 - 12 Mils

ALL INSTRUMENTATION IS CALIBRATED AND CERTIFIED. WORK HAS BEEN IN COMPLIANCE  
WITH THE FOLLOWING SPECIAL INSTRUCTIONS.

13  
-----  
Q.A. TECHNICIAN

John Blue

DATE: July,22,2013



SSPC



Jul 22 2013

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Readings - ECODYNE LIMITED P/O# 321253504  
ReadingINTERTHERM 228 GREY

	(mil)
1	11.7
2	9.1
3	9.4
4	9.1
5	9.5
6	9.1
7	9.5
8	9.5
9	9.3
10	9.0
11	8.7
12	8.6
13	8.7
14	8.3
15	8.5
16	9.2
17	9.4
18	9.0
19	8.4
20	6.8
21	9.4
22	7.4
23	7.8
24	9.7
25	9.8
26	9.4
27	8.9
28	10.1
29	9.4
30	9.3
31	9.7
32	10.0
33	10.1
34	9.8
35	9.9
36	9.5
37	9.5
38	9.3
39	9.6
40	9.9
41	9.4
42	9.6
43	14.5
44	13.5
45	13.7
46	11.0
47	10.6
48	10.2
49	9.8
50	9.8

Summary - ECODYNE LIMITED P/O# 321253504  
ReadingINTERTHERM 228 GREY  
(mil.)

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Jul 22 2013

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Max	14.50
Min	6.80
Mean	9.63
StdDev.	1.36

Annotations - ECODYNE LIMITED P/O# 321253504  
Gage Model: 6000FS3  
Gage S/N: 633791  
Probe Model: FS  
Probe S/N: 170587  
User: JB  
Part: 3962MM DIA x 2540 AFTER FILTER VESSEL  
Substrate: FE  
Coating 1: INTERTHERM 228 GREY  
EXTERIOR FINISH MILS S/N 0415 TAG# 3A-F-208E



## CERTIFICATE OF COMPLIANCE

CUSTOMER: ECODYNE LIMITED  
CUSTOMER P.O.: 321253504  
ITEM DESC. 3962mm DIA x 2540mm AFTER FILTER VESSEL  
SERIAL#: 0416  
TAG#: 3A-F-208F  
BCC JOB #: 48495

BRANT CORROSION CONTROL INC. CERTIFIES THAT IT HAS COMPLIED WITH THE FOLLOWING SCOPE OF WORK; P.O.# 321253504

BLAST AND COAT EXTERIOR ONLY

BLAST SSPC SP10(NACE2) NEAR WHITE  
Prime With: INTERTHERM 228 WHITE  
TopCoat With: INTERTHERM 228 GREY

@ 4 - 6 Mils

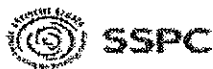
@ 4 - 6 Mils

TOTAL D.F.T 8 - 12 Mils

ALL INSTRUMENTATION IS CALIBRATED AND CERTIFIED. WORK HAS BEEN IN COMPLIANCE WITH THE FOLLOWING SPECIAL INSTRUCTIONS.

  
Q.A. TECHNICIAN  
John Blue

DATE: August, 01, 2013



30 GARNET RD, BRANTFORD, ONTARIO, CANADA, N3T 5M1 OFFICE (519) 759-7334 FAX (519) 759-2580  
WWW.BRANTBCC.COM

Aug 01 2013

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Readings - ECODYNE LTD. # 32125 - 3504  
ReadingIntertherm 228 Grey  
(mil)

1	8.7
2	9.4
3	10.5
4	12.3
5	12.3
6	14.2
7	14.2
8	11.2
9	10.8
10	10.7
11	10.3
12	17.4
13	7.5
14	7.0
15	8.8
16	9.9
17	10.0
18	14.4
19	14.1
20	17.8
21	10.5
22	10.5
23	10.9
24	13.7
25	12.7
26	17.4
27	16.8
28	17.3
29	10.9
30	10.6
31	10.6
32	8.8
33	13.8
34	14.1
35	9.4
36	9.4
37	8.7
38	9.4
39	9.2
40	8.7
41	9.7
42	8.7
43	9.4
44	9.2
45	9.1
46	8.4
47	9.0
48	9.2
49	9.0
50	9.3

Summary - ECODYNE LTD. # 32125 - 3504  
ReadingIntertherm 228 Grey  
(mil)

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Aug 01 2013

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Max	17.80
Min	7.00
Mean	11.12
StdDev.	2.79

Annotations - ECODYNE LTD. # 32125 - 3504

Gage Model: 6000FNS3

Gage S/N: 601287

Probe Model: FNS

Probe S/N: 186996

User: PM

Part: 3962mm dia. x 2450mm After Filter Vessel

Substrate: FE

Coating 1: Intertherm 228 Grey

Exterior Finish Mils Serial No. 0416 Tag No. 3A-F-208F



## CERTIFICATE OF COMPLIANCE

CUSTOMER: ECODYNE LIMITED  
CUSTOMER P.O.: 321253504  
ITEM DESC. 3962mm DIA x 2540mm AFTER FILTER VESSEL  
SERIAL#: 0417  
TAG#: 3A-F-208G  
BCC JOB #: 48496

BRANT CORROSION CONTROL INC. CERTIFIES THAT IT HAS COMPLIED WITH THE FOLLOWING SCOPE OF WORK; P.O.# 321253504

BLAST AND COAT EXTERIOR ONLY

BLAST SSPC SP10(NACE2) NEAR WHITE  
Prime With: INTERTHERM 228 WHITE  
TopCoat With: INTERTHERM 228 GREY

@ 4 - 6 Mils  
@ 4 - 6 Mils  
TOTAL D.F.T 8 - 12 Mils

ALL INSTRUMENTATION IS CALIBRATED AND CERTIFIED. WORK HAS BEEN IN COMPLIANCE WITH THE FOLLOWING SPECIAL INSTRUCTIONS.

  
Q.A. TECHNICIAN  
John Blue

DATE: July,24,07,13



SSPC



30 GARNET RD, BRANTFORD, ONTARIO, CANADA, N3T 5M1 OFFICE (519) 759-7334 FAX (519) 759-2580  
WWW.BRANTBCC.COM

Jul 24 2013

Readings - ECODYNE LIMITED P/O# 321253504

ReadingINTERTHERM 228 GREY

(mil)

1	11.6
2	10.8
3	11.1
4	11.4
5	10.8
6	11.1
7	11.3
8	11.0
9	11.7
10	12.0
11	11.8
12	11.4
13	11.2
14	9.5
15	9.4
16	9.4
17	9.4
18	11.5
19	11.3
20	10.9
21	11.1
22	11.0
23	10.8
24	6.9
25	13.5
26	9.0
27	8.5
28	8.6
29	8.8
30	8.9
31	9.3
32	9.4
33	9.8
34	9.2
35	8.8
36	9.0
37	9.4
38	9.0
39	9.4
40	10.3
41	10.4
42	10.1
43	9.7
44	9.4
45	9.1
46	9.0
47	10.1
48	10.1
49	9.3
50	9.9

Summary - ECODYNE LIMITED P/O# 321253504

ReadingINTERTHERM 228 GREY

(mil)

Jul 24 2013

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Max	13.50
Min	6.90
Mean	10.13
StdDev.	1.20

Annotations - ECODYNE LIMITED P/O# 321253504

Gage Model: 6000FS3

Gage S/N: 633791

Probe Model: FS

Probe S/N: 170587

User: JB

Part: 3962mm dia x 2540mm AFTER FILTER VESSEL

Substrate: FE

Coating 1: INTERTHERM 228 GREY

EXTERIOR FINISH MILS TAG# 3A-F-208G S/N 0417



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

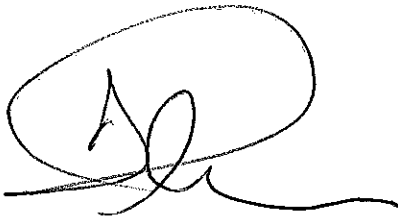
## Visual Inspection Report

PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **VISUAL INSPECTION REPORT**

EQUIPMENT: After Filter Vessel  
TAG: 3A-F-208 A to G

The above referenced equipment was dimensionally and visually inspected and determined to be in compliance with the project requirements and any referenced Codes and Specifications.

A handwritten signature in black ink, appearing to be 'T. Morcom', with a large loop at the top and a horizontal line at the bottom.

Thomas Morcom  
QA Manager  
Ecodyne

September 3, 2013





PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **Non-Conformance Reports & Resolution**

PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

# NCR LOG

[illegible]

PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **P51 – Miscellaneous & Additional Documents**



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## **Nameplate Rubbing/Photo**

CERTIFIED BY

LESENA STEEL LTD.

SCARBOROUGH, ONTARIO

M.A.W.P.

1041

kPa at

120

°C

M.A.E.W.P.

103

kPa at

120

°C

M.D.M.T.

104

°C at

1041

kPa

SERIAL NUMBER

1041

YEAR BUILT

1953

MAT'L

THK. SHELL

THK. HEADS

JOB NO.

INSP.

CRN NO.

CLIENT PO.



CERTIFIED BY

LESENA STEEL LTD.

SCARBOROUGH, ONTARIO

M.A.W.P.

kPa at

120

M.A.E.W.P.

kPa at

120

M.D.M.T.

°C at

100

SERIAL NUMBER

YEAR BUILT

2013

MAT'L

THK. SHELL

THK. HEAD

JOB NO.

INSP.

CRN NO.

CLIENT PC

3212



CERTIFIED BY

LESENA STEEL LTD.

SCARBOROUGH, ONTARIO

M.A.W.P.	1041	kPa at	120	°C
M.A.E.W.P.	103	kPa at	120	°C
M.D.M.T.	29	°C at	1041	kPa

2013

YEAR BUILT

TOP 18.22MM  
BTM 19.05MM

THK. HEADS

321253503

CLIENT PO.

SERIAL NUMBER

19.05MM NOM

THK. SHELL

W1150.5

CAN NO.

INSP.

JOB NO.

12-320

MAT'L

SA-516-70 N





CERTIFIED BY  
**LESENA STEEL LTD**

SCARBOROUGH, ONTARIO

W  
RT-2

TAG 3A-F-2080

M A W P

1041

120

°C

M A E W P

103

120

°C

M D M T

-29

1041

°C

0414

2013

SERIAL NUMBER

YEAR BUILT

SA-516-70 N

19.05MM NOM

TOP 18.22MM MIN  
BTM 19.05MM MIN

MAT'L

THK SHELL

THK HEADS

12-320

W1159.2

321253503

JOB NO

INSP

GRN NO

CLIENT PO



CERTIFIED BY  
LESENA STEEL LTD.

SCARBOROUGH ONTARIO

W	M.A.W.P.	1041	kPa	at	120	°C
RT-2	M.A.E.W.P.	103	kPa	at	120	°C
TAG. 3A-F-208E	M.D.M.T.	-29	°C	at	1041	kPa

0415

2013

SERIAL NUMBER

YEAR BUILT

SA-516-70 N

19.05MM NOM

TOP 18.22MM MIN

BTM 19.05MM MIN

MAT'L

THK SHELL

THK HEADS

12-32E

W1159.2

321253503

JOB NO

INSP

CRN NO

GILINT PO



CERTIFIED BY  
**LESENA STEEL LTD.**

SCARBOROUGH, ONTARIO

W	M.A.W.P.	1041	kPa or	120	°C
RT-2	M.A.E.W.P.	103	kPa or	120	°C
TAG. 3A-F-208F	M.D.M.T.	-29	°C or	1041	kPa

0416

2013

SERIAL NUMBER

YEAR BUILT

SA-516-70 N

19.05MM NOM

TOP 18.22MM MIN  
BTM 19.05MM MIN

MAT'L

THICK. STEEL

THICK. HEADS

12-32F

W1159.2

321253503

JOB NO.

INSP.

CRR. NO.

CLIENT PO.



CERTIFIED BY  
LESENA STEEL LTD.

SCARBOROUGH, ONTARIO

W	M.A.W.P.	1041	KPa. on	120	PC
RT-2	M.A.E.W.P.	103	KPa. on	120	PC
TAG3A-F-208G	M.D.M.I.	-29	PC. on	1041	KPa.

0417

2013

SERIAL NUMBER

YEAR BUILT

SA-516-70N

19.05MM NOM

TOP 18.22MM MIN  
BTM 19.05MM MIN

MAT'L

THICK. STEEL

THICK. HEADS

12-32G

W1159.2

321253503

JOB NO.

INSP.

CIRN NO.

CLIENT PO.



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## Manufacturer's Data Report

**FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS**  
**(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9  
(Name and address of Purchaser)

3. Location of installation MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA  
(Name and address)

4. Type HORIZONTAL 0411 W1159.2 \*32125 2013  
(Horizontal or vertical, tank) (Manufacturer's serial number) (CRN) (Drawing number) (National Board number) (Year built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2010  
Year

to 2011  
(Addenda, if applicable (date)) (Code Case numbers) (Special service per UG-120(d))

6. Shell SA-516-70N 19.05mm 3.2mm 3923.9 mm 2387mm  
(Material spec. number, grade) (Nominal thickness) (Corr. allow.) (Inner diameter) (Length (overall))

7. Seams WELDED, dbl, butt FULL 100 -- -- WELDED, dbl, butt SPOT 85 1  
(Long. (welded, dbl, singl., lap, butt)) (R.T. (spot or full)) (Eff., %) (H.T. temp.) (Time, hr) (Girth (welded, dbl, singl., lap, butt)) (R.T. (spot or full)) (Eff., %) (No. of courses)

8. Heads: (a) Material SA-516-70N (b) Material SA-516-70N  
(Spec. no., grade) (Spec. no., grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	TOP HD	18.20 mm	3.2mm	---	---	2:1	---	---	---	CONCAVE
(b)	BOTTOM HD	19.05 mm	3.2mm	---	---	2:1	---	---	---	CONCAVE

If removable, bolts used (describe other fastenings) N/A  
(Material spec. number, grade, size, number)

9. MAWP 1041 kPa 103 kPa at max. temp. 120 deg.C 120 deg.C  
(Internal) (External) (Internal) (External)

Min. design metal temp. -29 deg.C at 1041/103 kPa . Hydro., pneu., or comb. test pressure 1354 kPa

Proof test ---

## 10. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
N1:WATER INLET	1	304.8mm	WN	SA106B	SA105	14.27mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
N2:WATER OUTLET	1	304.8mm	WN	SA106B	SA105	4.27mm	3.2mm	SA-516-70	WELDED	WELDED	BTM HEAD
N3A & N3B	2	101.6mm	LWN	---	SA105	38.1mm	3.2mm	---	WELDED	---	BTM HEAD
N4	1	76.2mm	WN	SA106B	SA105	11.12mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
SG1A & SG1B	2	254mm	PAD	SA516-70N	---	63.5mm	3.2mm	---	WELDED	---	SHELL
M1	1	609.6mm	WN	SA106B	SA105	12.7mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD

11. Supports: Skirt NO Lugs 2 Legs 4 Other --- Attached WELDED ON TOP & BTM HEAD  
(Yes or no) (Number) (Number) (Describe) (Where and how)

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: TOP HEAD MANUFACTURE BY ENERFAB S/N 1016553-1, BTM HEAD MANUFACTURE BY ENERFAB S/N 101554-1  
(Name of part, item number, Manufacturer's name and identifying stamp)

WO:12-32A 10. NOZZLES, INSPECTION & SAFETY VALVE OPENINGS CONTINUED ON FORM U-4\*32125-D-2202-01E

## CERTIFICATE OF SHOP/FIELD COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. "U" Certificate of Authorization Number 15,066  
 expires 04/24/2015

Date 05/23/2013 Co. name LESENA STEEL LTD Signed J. Bu  
(Manufacturer) (Representative)

## CERTIFICATE OF SHOP/FIELD INSPECTION

Vessel constructed by LESENA STEEL LTD at 1060 BIRCHMOUNT ROAD, SCARBOROUGH  
 I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of ONTARIO and employed by T.S.S.A  
 have inspected the component described in this Manufacturer's Data Report on MAY 23, 2013, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date MAY 23, 2013 Signed [Signature] Commissions NR13106A, ONT915  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

1. Manufactured and certified by	LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4		
	(Name and address of Manufacturer)		
2. Manufactured for	ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9		
	(Name and address of Purchaser)		
3. Location of installation	MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA		
	(Name and address)		
4. Type	HORIZONTAL	AFTER FILTER	0411
	(Horizontal, vertical, or sphere)	(Tank, separator, heat exch., etc.)	(Manufacturer's serial number)
	W1159.2	32125-D-2202-01 REV. E	---
	(CRN)	(Drawing number)	(National Board number)
			2013
			(Year built)

[illegible]

(11/06)



**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk.  
(Description of vessel part (shell, two-piece head, tube bundle))  
PO# 321253501 1016553 - 1,2 1016553 - 1,2  
(National Board number) (Drawing number) (Manufacturer's serial number) (CRN)  
2010 EDITION/2011 ADDENDA TG# FILTER TOP HD. 2013  
(Edition and Addenda (date)) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Code Case number) [Special service per UG-120(d)]

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)                     

8. MAWP                      at max. temp.                      (Material spec. number, grade, size, number)  
(Internal) (External) (Internal) (External) Min. design metal temp. at

9. Impact test NO at test temperature of                       
[indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 3-20-2013 Name Enerfab, Inc. Signed Richard J. Kater  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 3/21/2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 3/21/2013 Signed                      Commissions NSB/CMA OHIO  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk.  
(Description of vessel part (shell, two-piece head, tube bundle)) 1016554 - 1,2  
(Manufacturer's serial number) 1016554 - 1,2  
(CRN)

PO# 321253501 TG# FILTER BOTTOM HD. 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) (Special service per UG-120(d))

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
	Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)	19.05				2:1						1	FULL	Unk.
(b)													

If removable, bolts used (describe other fastening)                     

8. MAWP                      at max. temp.                      Min. design metal temp.                      at                       
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of                       
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 3-20-2013 Name Enerfab, Inc. Signed *Richard A. O'Neil*  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 3-20-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 3-20-2013 Signed *[Signature]* Commissions NB1041A OKAY  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS**  
**(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9  
(Name and address of Purchaser)

3. Location of installation MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA  
(Name and address)

4. Type HORIZONTAL 0412 W1159.2 \*32125 2013  
(Horizontal or vertical, tank) (Manufacturer's serial number) (CRN) (Drawing number) (National Board number) (Year built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2010  
Year

to 2011  
(Addenda, if applicable (date))

6. Shell SA-516-70N 19.05mm 3.2mm 3923.9 mm 2387mm  
(Material spec. number, grade) (Nominal thickness) (Corr. allow.) (Inner diameter) (Length (overall))

7. Seams WELDED, dbl, butt FULL 100 -- -- WELDED, dbl, butt SPOT 85 1  
(Long. (welded, dbl, singl., lap, butt)) (R.T. (spot or full)) (EFF., %) (H.T. temp.) (Time, hr) (Girth (welded, dbl, singl., lap, butt)) (R.T. (spot or full)) (EFF., %) (No. of courses)

8. Heads: (a) Material SA-516-70N (b) Material SA-516-70N  
(Spec. no., grade) (Spec. no., grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	TOP HD	18.20 mm	3.2mm	---	---	2:1	----	----	----	CONCAVE
(b)	BOTTOM HD	19.05 mm	3.2mm	---	---	2:1	----	----	----	CONCAVE

If removable, bolts used (describe other fastenings) N/A  
(Material spec. number, grade, size, number)

9. MAWP 1041 kPa 103 kPa at max. temp. 120 deg.C  
(Internal) (External)

Min. design metal temp. -29 deg.C at 1041/103 kPa . Hydro., pneu., or comb. test pressure 1354 kPa  
(Internal) (External)

Proof test ---

10. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
N1:WATER INLET	1	304.8mm	WN	SA106B	SA105	14.27mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
N2:WATER OUTLET	1	304.8mm	WN	SA106B	SA105	4.27mm	3.2mm	SA-516-70	WELDED	WELDED	BTM HEAD
N3A & N3B	2	101.6mm	LWN	--	SA105	38.1mm	3.2mm	--	WELDED	----	BTM HEAD
N4	1	76.2mm	WN	SA106B	SA105	11.12mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
SG1A & SG1B	2	152.4mm	PAD	SA516-70N	----	63.5mm	3.2mm	----	WELDED	----	SHELL
M1	1	609.6mm	WN	SA106B	SA105	12.7mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD

11. Supports: Skirt NO Lugs 2 Legs 4 Other ----- Attached WELDED ON TOP & BTM HEAD  
(Yes or no) (Number) (Number) (Describe) (Where and how)

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: TOP HEAD MANUFACTURE BY ENERFAB S/N 1016553-2, BTM HEAD MANUFACTURE BY ENERFAB S/N 101554-2  
(Name of part, item number, Manufacturer's name and identifying stamp)

WO:12-32B 10. NOZZLES, INSPECTION & SAFETY VALVE OPENINGS CONTINUED ON FORM U-4\*32125-D-2202-01E

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. "U" Certificate of Authorization Number 15,066  
 expires 04/24/2015

Date 05/17/2013

Co. name

LESENA STEEL LTD

(Manufacturer)

Signed



(Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

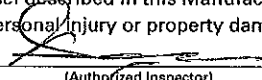
Vessel constructed by LESENA STEEL LTD at 1060 BIRCHMOUNT ROAD, SCARBOROUGH

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of ONTARIO and employed by T.S.S.A

have inspected the component described in this Manufacturer's Data Report on MAY 17, 2013, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date MAY 17, 2013

Signed



(Authorized Inspector)


Commissions


NSB106A, ONT915

(National Board (incl. endorsements), State, Province, and number)

1. Manufactured and certified by		LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4	
		(Name and address of Manufacturer)	
2. Manufactured for		ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9	
		(Name and address of Purchaser)	
3. Location of installation		MEG ENERGY CORP. CHRISTINA LAKE , ALBERTA	
		(Name and address)	
4. Type	HORIZONTAL	AFTER FILTER	0412
	(Horizontal, vertical, or sphere)	(Tank, separator, heat exch., etc.)	(Manufacturer's serial number)
	W1159.2	32125-D-2202-01 REV. E	---
	(CRN)	(Drawing number)	(National Board number)
			2013
			(Year built)

Certificate of Authorization: Type U No. 15,066 Expires 04/24/2015

Date 05/17/2013 Name LESENA STEEL LTD Signed   
(Manufacturer) (Representative)

Date MAY 17, 2013 Name  Commissions NB 1310GA ONT915  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk. 1016553 - 1,2  
[Description of vessel part (shell, two-piece head, tube bundle)] (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER TOP HD. 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)    
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
(Internal) (External) (Internal) (External) Min. design metal temp.   at  

9. Impact test NO at test temperature of    
[Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 3-20-2013 Name Enerfab, Inc. Signed Richard J. Carter  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT

have inspected the pressure vessel part described in this Manufacturer's Data Report on 3/21/2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 3/21/2013 Signed [Signature] Commissions 1810901A OHIO  
(Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
 (Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
 (Name and address of Purchaser)

3. Location of installation UNKNOWN  
 (Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk. 1016554 - 1,2  
 [Description of vessel part (shell, two-piece head, tube bundle)] (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER BOTTOM HD. 2013  
 (National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
 (Edition and Addenda (date)) (Code Case number) (Special service per UG-120(d))

6. Shell (a) No. of course(s): \_\_\_\_\_ (b) Overall length \_\_\_\_\_

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b) \_\_\_\_\_  
 (Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening) \_\_\_\_\_

8. MAWP \_\_\_\_\_ at max. temp. \_\_\_\_\_ Min. design metal temp. \_\_\_\_\_  
 (Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of \_\_\_\_\_  
 [Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test \_\_\_\_\_

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt \_\_\_\_\_ Lugs \_\_\_\_\_ Legs \_\_\_\_\_ Others \_\_\_\_\_ Attached \_\_\_\_\_  
 (Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 3-20-2013 Name Enerfab, Inc. Signed Richard J. [Signature]  
 (Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 3-20-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 3-20-2013 Signed [Signature] Commissions NB10101A 01400e  
 (Authorized Inspector) (National Board (Incl. endorsements), State, Province, and number)

3A-F-208C

**FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS**  
 (Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)  
 As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1

1. Manufactured and certified by LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4  
 (Name and address of Manufacturer)

2. Manufactured for ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9  
 (Name and address of Purchaser)

3. Location of installation MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA  
 (Name and address)

4. Type HORIZONTAL 0413 W1159.2 \*32125 2013  
 (Horizontal or vertical, tank) (Manufacturer's serial number) (CRN) (Drawing number) (National Board number) (Year built)

5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2010  
 to 2011  
 (Addenda, if applicable (date)) (Code Case numbers) (Special service per UG-120(d))

6. Shell SA-516-70N 19.05mm 3.2mm 3923.9 mm 2387mm  
 (Material spec. number, grade) (Nominal thickness) (Corr. allow.) (Inner diameter) (Length (overall))

7. Seams WELDED, dbf, butt FULL 100 -- -- WELDED, dbf, butt SPOT 85 1  
 (Long. (welded, dbf., snl., lap, butt)) (R.T. (spot or full)) (Eff., %) (H.T. temp.) (Time, hr) (Girth (welded, dbf., snl., lap, butt)) (R.T. (spot or full)) (Eff., %) (No. of courses)

8. Heads: (a) Material SA-516-70N (b) Material SA-516-70N  
 (Spec. no., grade) (Spec. no., grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	TOP HD	18.20 mm	3.2mm	---	---	2:1	---	---	---	CONCAVE
(b)	BOTTOM HD	19.05 mm	3.2mm	---	---	2:1	---	---	---	CONCAVE

If removable, bolts used (describe other fastenings) N/A

9. MAWP 1041 kPa 103 kPa at max. temp. 120 deg.C 120 deg.C  
 (Internal) (External) (Internal) (External)

Min. design metal temp. -29 deg.C at 1041/103 kPa Hydro., pneu., or comb. test pressure 1354 kPa

Proof test ---

## 10. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
N1: WATER INLET	1	304.8mm	WN	SA106B	SA105	14.27mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
N2: WATER OUTLET	1	304.8mm	WN	SA106B	SA105	4.27mm	3.2mm	SA-516-70	WELDED	WELDED	BTM HEAD
N3A & N3B	2	101.6mm	LWN	---	SA105	38.1mm	3.2mm	---	WELDED	---	BTM HEAD
N4	1	76.2mm	WN	SA106B	SA105	11.12mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
SG1A & SG1B	2	152.4mm	PAD	SA516-70N	---	63.5mm	3.2mm	---	WELDED	---	SHELL
M1	1	609.6mm	WN	SA106B	SA105	12.7mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD

11. Supports: Skirt NO Lugs 2 Legs 4 Other --- Attached WELDED ON TOP & BTM HEAD  
 (Yes or no) (Number) (Number) (Describe) (Where and how)

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: TOP HEAD MANUFACTURE BY ENERFAB S/N 1016555-1, BTM HEAD MANUFACTURE BY ENERFAB S/N 101556-1  
 (Name of part, item number, Manufacturer's name and identifying stamp)

WO:12-32C 10. NOZZLES, INSPECTION & SAFETY VALVE OPENINGS CONTINUED ON FORM U-4\*32125-D-2202-01E

## CERTIFICATE OF SHOP/FIELD COMPLIANCE

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. "U" Certificate of Authorization Number 15,066  
 expires 04/24/2015

Date 05/28/2013 Co. name LESENA STEEL LTD Signed J. Bul  
 (Manufacturer) (Representative)

## CERTIFICATE OF SHOP/FIELD INSPECTION

Vessel constructed by LESENA STEEL LTD at 1060 BIRCHMOUNT ROAD, SCARBOROUGH  
 I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of ONTARIO and employed by T.S.S.A  
 have inspected the component described in this Manufacturer's Data Report on MAY 28, 2013, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date MAY 28, 2013 Signed [Signature] Commissions NS13106A, ONT 915  
 (Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

1. Manufactured and certified by	LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4		
	(Name and address of Manufacturer)		
2. Manufactured for	ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9		
	(Name and address of Purchaser)		
3. Location of installation	MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA		
	(Name and address)		
4. Type	HORIZONTAL	AFTER FILTER	0413
	(Horizontal, vertical, or sphere)	(Tank, separator, heat exch., etc.)	(Manufacturer's serial number)
	W1159.2	32125-D-2202-01 REV. E	---
	(CRN)	(Drawing number)	(National Board number)
			2013
			(Year built)

Certificate of Authorization: Type U No. 15,066 Expires 04/24/2015

Date 05/28/2013 Name LESENA STEEL LTD Signed J. Biel  
(Manufacturer) (Representative)

Date MAY 28, 2013 Name [Signature] Commissions NB B10GA,ONT915  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)



**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk.  
[Description of vessel part (shell, two-piece head, tube bundle)] 1016555 - 1,2  
(Manufacturer's serial number) 2013  
(CRN)

PO# 321253501 TG# FILTER TOP HD.  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
[Edition and Addenda (date)] (Code Case number) [Special service per UG-120(d)]

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)                     

8. MAWP                      at max. temp.                      Min. design metal temp.                      at                       
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of                       
[Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 4-11-2013 Name Enerfab, Inc. Signed Richard J. Carter  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-11-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-11-2013 Signed [Signature] Commissions NB10904A 06176  
(Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk.  
(Description of vessel part (shell, two-piece head, tube bundle)) 1016556 -1,2  
(Manufacturer's serial number) 2013  
(CRN)

PO# 321253501  
(National Board number) TG# FILTER BOTTOM HD.  
(Drawing prepared by) 2013  
(Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date))   
(Code Case number)   
(Special service per UG-120(d))

6. Shell (a) No. of course(s):  (b) Overall length

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)   
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)

8. MAWP  at max. temp.  (Material spec. number, grade, size, number)  
(Internal) (External) (Internal) (External) Min. design metal temp.  at

9. Impact test NO at test temperature of   
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

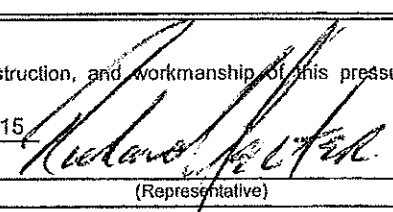
13. Supports: Skirt  Lugs  Legs  Others  Attached   
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

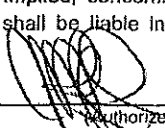
We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-09-2013 Name Enerfab, Inc. Signed   
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-9-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-9-2013 Signed  Commissions NBIR01A 01046  
(Authorized Inspector) (National Board (Incl. endorsements), State, Province, and number)



1. Manufactured and certified by	LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4		
	(Name and address of Manufacturer)		
2. Manufactured for	ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9		
	(Name and address of Purchaser)		
3. Location of installation	MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA		
	(Name and address)		
4. Type	HORIZONTAL	AFTER FILTER	0414
	(Horizontal, vertical, or sphere)	(Tank, separator, heat exch., etc.)	(Manufacturer's serial number)
	W1159.2	32125-D-2202-01 REV. E	2013
	(CRN)	(Drawing number)	(Year built)

Certificate of Authorization: Type U No. 15,066 Expires 04/24/2015

Date 06/03/2013 Name LESENA STEEL LTD Signed [Signature]  
(Manufacturer) (Representative)

Date JUNE 03, 2013 Name [Signature] Commissions NE 13/OGA, OUT915  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
 (Name and address of Manufacturer)  
 2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
 (Name and address of Purchaser)  
 3. Location of installation UNKNOWN  
 (Name and address)  
 4. Type ELLIP HEADS 3962.4mm x 22.23mm thk.  
 (Description of vessel part (shell, two-piece head, tube bundle))  
PO# 321253501 1016555 - 1,2  
 (National Board number) (Drawing number) (Manufacturer's serial number)  
TG# FILTER TOP HD. 2013  
 (Drawing prepared by) (Year built)  
 5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
 [Edition and Addenda (date)] (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) <u>SA516-70 (1650°F - 1/2 HOUR PER INCH)</u> (b) <u> </u>										(Material spec. number, grade or type) (H.T. - time & temp.)				
	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
 (Internal) (External) (Internal) (External) Min. design metal temp.   at    
 9. Impact test NO at test temperature of    
 (indicate yes or no and the component(s) impact tested)  
 10. Hydro., pneu., or comb. test pressure NONE Proof test    
 11. Nozzles, inspection, and safety valve openings:  

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
 (Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 4-11-2013 Name Enerfab, Inc. Signed Richard J. Water  
 (Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT

have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-11-2013, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4/11/2013 Signed [Signature] Commissions NB101014 041716  
 (Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
 (Name and address of Manufacturer)  
 2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
 (Name and address of Purchaser)  
 3. Location of installation UNKNOWN  
 (Name and address)  
 4. Type ELLIP HEADS 3962.4mm x 25.4mm thk. 1016556 -1,2  
 (Description of vessel part (shell, two-piece head, tube bundle)) (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER BOTTOM HD. 2013  
 (National Board number) (Drawing number) (Drawing prepared by) (Year built)  
 5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
 (Edition and Addenda (date)) (Code Case number) (Special service per UG-120(d))

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) <u>SA516-70 (1650°F - 1/2 HOUR PER INCH)</u> (b) <u> </u>													
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)													
	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A	
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None
(a)		19.05				2:1						1	FULL
(b)													Unk.

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
 (Internal) (External) (Internal) (External) Min. design metal temp.   at    
 9. Impact test NO at test temperature of    
 (Indicate yes or no and the component(s) impact tested)  
 10. Hydro., pneu., or comb. test pressure NONE Proof test    
 11. Nozzles, inspection, and safety valve openings:  

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)							
Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt   Lugs   Legs   Others   Attached    
 (Yes or No) (Number) (Number) (Describe) (Where and how)  
 14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015  
 Date 4-09-2013 Name Enerfab, Inc. Signed Richard J. Fisher  
 (Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-9-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-9-2013 Signed [Signature] Commissions NB10001A 01486  
 (Authorized Inspector) (National Board (Incl. endorsements), State, Province, and number)

**FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS**  
**(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

**10. Nozzles, inspection, and safety valve openings:**

11. Supports: Skirt NO Lugs 2 Legs 4 Other ----- Attached WELDED ON TOP & BTM HEAD  
(Yes or no) (Number) (Number) (Describe) (Where and how)

12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: TOP HEAD MANUFACTURE BY ENERFAB S/N 1016557-2 , BTM HEAD MANUFACTURE BY ENERFAB S/N 101558-3  
(Name of part, item number, Manufacturer's name and identifying stamp)

WO:12-32E 10. NOZZLES, INSPECTION & SAFETY VALVE OPENINGS CONTINUED ON FORM U-4\*32125-D-2202-01E

Vessel constructed by LESENA STEEL LTD at 1060 BIRCHMOUNT ROAD, SCARBOROUGH  
I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of  
ONTARIO and employed by T.S.S.A  
have inspected the component described in this Manufacturer's Data Report on JUN 12, 2013, and state that,  
to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME BOILER AND PRESSURE  
VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or  
implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer  
shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.  
Date JUN 12, 2013 Signed [Signature] Commissions NB 13106A, ONT 915  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

1. Manufactured and certified by	LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4		
	(Name and address of Manufacturer)		
2. Manufactured for	ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9		
	(Name and address of Purchaser)		
3. Location of installation	MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA		
	(Name and address)		
4. Type	HORIZONTAL	AFTER FILTER	0415
	(Horizontal, vertical, or sphere)	(Tank, separator, heat exch., etc.)	(Manufacturer's serial number)
	W1159.2	32125-D-2202-01 REV. E	---
	(CRN)	(Drawing number)	(National Board number)
			2013
			(Year built)

[illegible]

Certificate of Authorization: Type U No. 15,066 Expires 04/24/2015

Date 06/12/2013 Name LESENA STEEL LTD Signed J Bul  
(Manufacturer) (Representative)

Date 06/12/2013 Name [Signature] Commissions NB 1310GA, ONT915  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)



**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk.  
(Description of vessel part (shell, two-piece head, tube bundle)) 1016557 - 1,2,3  
(Manufacturer's serial number) 2013  
(CRN)

PO# 321253501 FILTER TOP HEAD  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) (Special service per UG-120(d))

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)                       
(Material spec. number, grade, size, number)

8. MAWP                      at max. temp.                      Min. design metal temp.                      at                       
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of                       
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

CERTIFICATE OF SHOP/FIELD COMPLIANCE	
We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.	
U Certificate of Authorization No. <u>2,631</u>	Expires <u>December 31, 2015</u>
Date <u>4-29-2013</u> Name <u>Enerfab, Inc.</u> Signed <u>[Signature]</u>	<u>[Signature]</u>
<small>(Manufacturer)</small>	<small>(Representative)</small>
CERTIFICATE OF SHOP/FIELD INSPECTION	
I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of <u>Ohio</u> and employed by <u>HSB CT</u> of <u>Hartford, CT</u>	
have inspected the pressure vessel part described in this Manufacturer's Data Report on <u>4-29-2013</u> and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.	
Date <u>4-29-2013</u> Signed <u>[Signature]</u> Commissions <u>NB10901A 04426</u>	
<small>(Authorized Inspector)</small>	<small>(National Board (incl. endorsements), State, Province, and number)</small>

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)
2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)
3. Location of installation UNKNOWN  
(Name and address)
4. Type ELLIP HEADS 3962.4mm x 25.4mm thk.  
[Description of vessel part (shell, two-piece head, tube bundle)] 1016558 - 1,2,3 (Manufacturer's serial number) 2013 (CRN)  
PO# 321253501 (National Board number) TG# FILTER BOTTOM HD. (Drawing number) 2013 (Year built)  
2010 EDITION/2011 ADDENDA (Edition and Addenda (date))  (Code Case number)  [Special service per UG-120(d)]
5. ASME Code, Section VIII, Div. 1
6. Shell (a) No. of course(s):  (b) Overall length

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)   
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)

8. MAWP  at max. temp.  Min. design metal temp.  at   
(Internal) (External) (Internal) (External)
9. Impact test NO at test temperature of   
[Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt  Lugs  Legs  Others  Attached   
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed [Signature]  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4/29/2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4/29/2013 Signed [Signature] Commissions NB10001A-1 OH1044  
(Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]

3A-F-208 F

**FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS**  
**(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4  
(Name and address of Manufacturer)
2. Manufactured for ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9  
(Name and address of Purchaser)
3. Location of installation MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA  
(Name and address)
4. Type HORIZONTAL 0416 W1159.2 \*32125 ----- 2013  
(Horizontal or vertical, tank) (Manufacturer's serial number) (CRN) (Drawing number) (National Board number) (Year built)
5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2010  
Year  
 to 2011  
(Addenda, if applicable (date)) (Code Case numbers) (Special service per UG-120(d))
6. Shell SA-516-70N 19.05mm 3.2mm 3923.9 mm 2387mm  
(Material spec. number, grade) (Nominal thickness) (Corr. allow.) (Inner diameter) (Length (overall))
7. Seams WELDED, dbt, butt FULL 100 -- WELDED, dbt, butt SPOT 85 1  
(Long. (welded, dbt., sngl., lap, butt)) (R.T. (spot or full)) (Eff., %) (H.T. temp.) (Time, hr) (Girth (welded, dbt., sngl., lap, butt)) (R.T. (spot or full)) (Eff., %) (No. of courses)
8. Heads: (a) Material SA-516-70N (b) Material SA-516-70N  
(Spec. no., grade) (Spec. no., grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	TOP HD	18.20 mm	3.2mm	---	---	2:1	---	---	---	CONCAVE
(b)	BOTTOM HD	19.05 mm	3.2mm	---	---	2:1	---	---	---	CONCAVE

If removable, bolts used (describe other fastenings) N/A

9. MAWP 1041 kPa 103 kPa at max. temp. 120 deg.C 120 deg.C  
(Internal) (External) (Internal) (External)
- Min. design metal temp. -29 deg.C at 1041/103 kPa . Hydro., pneu., or comb. test pressure 1354 kPa
- Proof test ---

## 10. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
N1: WATER INLET	1	304.8mm	WN	SA106B	SA105	14.27mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
N2: WATER OUTLET	1	304.8mm	WN	SA106B	SA105	4.27mm	3.2mm	SA-516-70	WELDED	WELDED	BTM HEAD
N3A & N3B	2	101.6mm	LWN	---	SA105	38.1mm	3.2mm	---	WELDED	---	BTM HEAD
N4	1	76.2mm	WN	SA106B	SA105	11.12mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
SG1A & SG1B	2	152.4mm	PAD	SA516-70N	---	63.5mm	3.2mm	---	WELDED	---	SHELL
M1	1	609.6mm	WN	SA106B	SA105	12.7mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD

11. Supports: Skirt NO Lugs 2 Legs 4 Other --- Attached WELDED ON TOP & BTM HEAD  
(Yes or no) (Number) (Number) (Describe) (Where and how)
12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: TOP HEAD MANUFACTURE BY ENERFAB S/N 1016557-1, BTM HEAD MANUFACTURE BY ENERFAB S/N 101558-2  
(Name of part, item number, Manufacturer's name and identifying stamp)
- WO:12-32F 10. NOZZLES, INSPECTION & SAFETY VALVE OPENINGS CONTINUED ON FORM U-4\*32125-D-2202-01E**

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. "U" Certificate of Authorization Number 15,066  
 expires 04/24/2015

Date 06/27/2013 Co. name LESENA STEEL LTD Signed J. Bur  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

Vessel constructed by LESENA STEEL LTD at 1060 BIRCHMOUNT ROAD, SCARBOROUGH  
 I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of ONTARIO and employed by T.S.S.A

have inspected the component described in this Manufacturer's Data Report on JUNE 27, 2013, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date JUN 27, 2013 Signed [Signature] Commissions NB3106A ONT915  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

{11/06}

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC., 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk. 1016557 - 1,2,3  
(Description of vessel part (shell, two-piece head, tube bundle)) (Manufacturer's serial number) (CRN)

PO# 321253501 FILTER TOP HEAD 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) (Code Case number) [Special service per UG-120(d)]

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec/Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)                     

8. MAWP                      at max. temp.                      Min. design metal temp.                      at                       
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of                       
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:                     

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)                     

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed                       
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT  
have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-29-2013  
and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4-29-2013 Signed                      Commissions NB10901A 04426  
(Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk.  
(Description of vessel part (shell, two-piece head, tube bundle)) 1016558 - 1,2,3  
(Manufacturer's serial number) 2013  
(CRN)

PO# 321253501  
(National Board number) TG# FILTER BOTTOM HD.  
(Drawing number) 2013  
(Drawing prepared by) 2013  
(Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
(Edition and Addenda (date)) 2010 EDITION/2011 ADDENDA  
(Code Case number) 2010 EDITION/2011 ADDENDA  
(Special service per UG-120(d))

6. Shell (a) No. of course(s):                      (b) Overall length                     

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)                       
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)                       
(Material spec. number, grade, size, number)

8. MAWP                      at max. temp.                      Min. design metal temp.                      at                       
(Internal) (External) (Internal) (External)

9. Impact test NO at test temperature of                       
[Indicate yes or no and the component(s) impact tested]

10. Hydro., pneu., or comb. test pressure NONE Proof test                     

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt                      Lugs                      Legs                      Others                      Attached                       
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed                       
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT have inspected the pressure vessel part described in this Manufacturer's Data Report on 4.29.2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4.29.2013 Signed                      Commissions NB10101A! OH1424  
(Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]

3A-F-208 G

**FORM U-1A MANUFACTURER'S DATA REPORT FOR PRESSURE VESSELS**  
**(Alternative Form for Single Chamber, Completely Shop or Field Fabricated Vessels Only)**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4  
(Name and address of Manufacturer)
2. Manufactured for ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9  
(Name and address of Purchaser)
3. Location of installation MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA  
(Name and address)
4. Type HORIZONTAL 0417 W1159.2 \*32125 2013  
(Horizontal or vertical, tank) (Manufacturer's serial number) (CRN) (Drawing number) (National Board number) (Year built)
5. The chemical and physical properties of all parts meet the requirements of material specifications of the ASME BOILER AND PRESSURE VESSEL CODE. The design, construction, and workmanship conform to ASME Rules, Section VIII, Division 1 2010  
Year
- to 2011  
[Addenda, if applicable (date)] (Code Case numbers) (Special service per UG-120(d))
6. Shell SA-516-70N 19.05mm 3.2mm 3923.9 mm 2387mm  
(Material spec. number, grade) (Nominal thickness) (Corr. allow.) (Inner diameter) (Length (overall))
7. Seams WELDED, dbl, butt FULL 100 -- -- WELDED, dbl, butt SPOT 85 1  
[Long. (welded, dbl., sngl., lap, butt)] [R.T. (spot or full)] [Eff., %] [H.T. temp.] [Time, hr] [Girth (welded, dbl., sngl., lap, butt)] [R.T. (spot or full)] [Eff., %] (No. of courses)
8. Heads: (a) Material SA-516-70N (b) Material SA-516-70N  
(Spec. no., grade) (Spec. no., grade)

	Location (Top, Bottom, Ends)	Minimum Thickness	Corrosion Allowance	Crown Radius	Knuckle Radius	Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure (Convex or Concave)
(a)	TOP HD	18.20 mm	3.2mm	---	---	2:1	---	---	---	CONCAVE
(b)	BOTTOM HD	19.05 mm	3.2mm	---	---	2:1	---	---	---	CONCAVE

If removable, bolts used (describe other fastenings) N/A

9. MAWP 1041 kPa 103 kPa at max. temp. 120 deg.C 120 deg.C  
(Internal) (External) (Internal) (External)
- Min. design metal temp. -29 deg.C at 1041/103 kPa Hydro., pneu., or comb. test pressure 1354 kPa
- Proof test ---

## 10. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain etc.)	No.	Diameter or Size	Type	Material		Nozzle Thickness		Reinforcement Material	Attachment Details		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	
N1: WATER INLET	1	304.8mm	WN	SA106B	SA105	14.27mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
N2: WATER OUTLET	1	304.8mm	WN	SA106B	SA105	4.27mm	3.2mm	SA-516-70	WELDED	WELDED	BTM HEAD
N3A & N3B	2	101.6mm	LWN	---	SA105	38.1mm	3.2mm	---	WELDED	---	BTM HEAD
N4	1	76.2mm	WN	SA106B	SA105	11.12mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD
SG1A & SG1B	2	152.4mm	PAD	SA516-70N	---	63.5mm	3.2mm	---	WELDED	---	SHELL
M1	1	609.6mm	WN	SA106B	SA105	12.7mm	3.2mm	SA-516-70	WELDED	WELDED	TOP HEAD

11. Supports: Skirt NO Lugs 2 Legs 4 Other --- Attached WELDED ON TOP & BTM HEAD  
(Yes or no) (Number) (Number) (Describe) (Where and how)
12. Remarks: Manufacturer's Partial Data Reports properly identified and signed by Commissioned Inspectors have been furnished for the following items of the report: TOP HEAD MANUFACTURE BY ENERFAB S/N 1016557-3, BTM HEAD MANUFACTURE BY ENERFAB S/N 101558-1  
(Name of part, item number, Manufacturer's name and identifying stamp)
- WO:12-32G 10. NOZZLES, INSPECTION & SAFETY VALVE OPENINGS CONTINUED ON FORM U-4\*32125-D-2202-01E**

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of design, material, construction, and workmanship of this vessel conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. "U" Certificate of Authorization Number 15,066  
 expires 04/24/2015

Date 06/20/2013 Co. name LESENA STEEL LTD Signed J. Bul  
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

Vessel constructed by LESENA STEEL LTD at 1060 BIRCHMOUNT ROAD, SCARBOROUGH

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of ONTARIO and employed by T.S.S.A

have inspected the component described in this Manufacturer's Data Report on WN 20, 2013, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date WN 20, 2013 Signed [Signature] Commissions NB13106A, ONT 915  
(Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

1. Manufactured and certified by	LESENA STEEL LTD, 1060 BIRCHMOUNT ROAD, SCARBOROUGH, ONTARIO M1K 1S4		
	(Name and address of Manufacturer)		
2. Manufactured for	ECODYNE LTD. 4475 CORPORATE DRIVE, BURLINGTON, ONTARIO L7L 5T9		
	(Name and address of Purchaser)		
3. Location of installation	MEG ENERGY CORP. CHRISTINA LAKE, ALBERTA		
	(Name and address)		
4. Type	HORIZONTAL	AFTER FILTER	0417
	(Horizontal, vertical, or sphere)	(Tank, separator, heat exch., etc.)	(Manufacturer's serial number)
	W1159.2	32125-D-2202-01 REV. E	---
	(CRN)	(Drawing number)	(National Board number)
			2013
			(Year built)

[illegible]

{11/06}



**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
 (Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
 (Name and address of Purchaser)

3. Location of installation UNKNOWN  
 (Name and address)

4. Type ELLIP HEADS 3962.4mm x 22.23mm thk. 1016557 - 1,2,3  
 (Description of vessel part (shell, two-piece head, tube bundle)) (Manufacturer's serial number) (CRN)

PO# 321253501 FILTER TOP HEAD 2013  
 (National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
 (Edition and Addenda (date)) (Code Case number) [Special service per UG-120(d)]

6. Shell (a) No. of course(s): \_\_\_\_\_ (b) Overall length \_\_\_\_\_

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b) \_\_\_\_\_  
 (Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		18.20				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening) \_\_\_\_\_

8. MAWP \_\_\_\_\_ at max. temp. \_\_\_\_\_ (Material spec. number, grade, size, number)  
 (Internal) (External) (Internal) (External) Min. design metal temp. \_\_\_\_\_ at \_\_\_\_\_

9. Impact test NO at test temperature of \_\_\_\_\_  
 (Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test \_\_\_\_\_

11. Nozzles, inspection, and safety valve openings:

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)

Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

13. Supports: Skirt \_\_\_\_\_ Lugs \_\_\_\_\_ Legs \_\_\_\_\_ Others \_\_\_\_\_ Attached \_\_\_\_\_  
 (Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed \_\_\_\_\_  
 (Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT

have inspected the pressure vessel part described in this Manufacturer's Data Report on 4-29-2013 and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or loss of any kind arising from or connected with this inspection.

Date 4-29-2013 Signed \_\_\_\_\_ Commissions 0310901A 00426  
 (Authorized Inspector) (National Board (incl. endorsements), State, Province, and number)

**FORM U-2A MANUFACTURER'S PARTIAL DATA REPORT (ALTERNATIVE FORM)**  
**A Part of a Pressure Vessel Fabricated by One Manufacturer for Another Manufacturer**  
**As Required by the Provisions of the ASME Boiler and Pressure Vessel Code Rules, Section VIII, Division 1**

1. Manufactured and certified by ENERFAB, INC, 4955 SPRING GROVE AVENUE, CINCINNATI, OHIO 45232  
(Name and address of Manufacturer)

2. Manufactured for ECODYNE LIMITED, 4475 CORPORATE DRIVE, BURLINGTON ON L7L 5T9  
(Name and address of Purchaser)

3. Location of installation UNKNOWN  
(Name and address)

4. Type ELLIP HEADS 3962.4mm x 25.4mm thk. 1016558 - 1,2,3  
[Description of vessel part (shell, two-piece head, tube bundle)] (Manufacturer's serial number) (CRN)  
PO# 321253501 TG# FILTER BOTTOM HD. 2013  
(National Board number) (Drawing number) (Drawing prepared by) (Year built)

5. ASME Code, Section VIII, Div. 1 2010 EDITION/2011 ADDENDA  
[Edition and Addenda (date)] (Code Case number) [Special service per UG-120(d)]

Course(s)			Material		Thickness		Long. Joint (Cat. A)			Circum. Joint (Cat. A, B, & C)			Heat Treatment	
No.	Diameter, in.	Length (ft & in.)	Spec./Grade or Type		Nom.	Corr.	Type	Full, Spot, None	Eff.	Type	Full, Spot, None	Eff.	Temp.	Time

7. Heads: (a) SA516-70 (1650°F - 1/2 HOUR PER INCH) (b)    
(Material spec. number, grade or type) (H.T. - time & temp.) (Material spec. number, grade or type) (H.T. - time & temp.)

	Location (Top, Bottom, Ends)	Thickness		Radius		Elliptical Ratio	Conical Apex Angle	Hemispherical Radius	Flat Diameter	Side to Pressure		Category A		
		Min.	Corr.	Crown	Knuckle					Convex	Concave	Type	Full, Spot, None	Eff.
(a)		19.05				2:1						1	FULL	Unk.
(b)														

If removable, bolts used (describe other fastening)  

8. MAWP   at max. temp.   (Material spec. number, grade, size, number)  
(Internal) (External) (Internal) (External) Min. design metal temp.   at  

9. Impact test NO at test temperature of    
(Indicate yes or no and the component(s) impact tested)

10. Hydro., pneu., or comb. test pressure NONE Proof test  

11. Nozzles, inspection, and safety valve openings:  

Purpose (Inlet, Outlet, Drain, etc.)	No.	Diameter or size	Flange Type	Material		Nozzle Thickness		Reinforcement Material	How Attached		Location (Insp. Open.)
				Nozzle	Flange	Nom.	Corr.		Nozzle	Flange	

12. Identification of part(s)							
Name of Part	Quantity	Line No.	Mfr's. Identification No.	Mfr's Drawing No.	CRN	National Board No.	Year Built

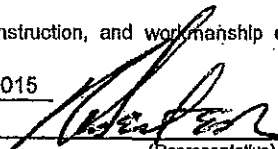
13. Supports: Skirt   Lugs   Legs   Others   Attached    
(Yes or No) (Number) (Number) (Describe) (Where and how)

14. Remarks: NO DESIGN FUNCTION BY ENERFAB INC.

**CERTIFICATE OF SHOP/FIELD COMPLIANCE**

We certify that the statements made in this report are correct and that all details of material, construction, and workmanship of this pressure vessel part conform to the ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1.

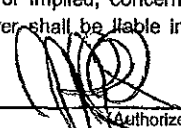
U Certificate of Authorization No. 2,631 Expires December 31, 2015

Date 4-29-2013 Name Enerfab, Inc. Signed   
(Manufacturer) (Representative)

**CERTIFICATE OF SHOP/FIELD INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and/or the State or Province of Ohio and employed by HSB CT of Hartford, CT

have inspected the pressure vessel part described in this Manufacturer's Data Report on 4/29/2013, and state that, to the best of my knowledge and belief, the Manufacturer has constructed this pressure vessel part in accordance with ASME BOILER AND PRESSURE VESSEL CODE, Section VIII, Division 1. By signing this certificate neither the Inspector nor his/her employer makes any warranty, expressed or implied, concerning the pressure vessel part described in this Manufacturer's Data Report. Furthermore, neither the Inspector nor his/her employer shall be liable in any manner for any personal injury or property damage or a loss of any kind arising from or connected with this inspection.

Date 4/29/2013 Signed  Commissions NB10001A! OH446  
(Authorized Inspector) [National Board (incl. endorsements), State, Province, and number]



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

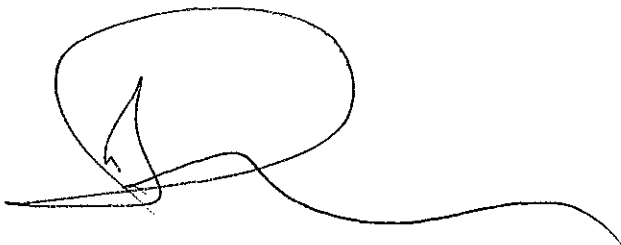
## Certificate of Compliance

PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

**Insulation Certificate of Compliance**

EQUIPMENT: After Filter Vessel  
TAG: 3A-F-208 A to G

The above referenced equipment have been insulated in compliance with the project requirements and any referenced Codes and Specifications.

A handwritten signature in black ink, consisting of a large, loopy initial 'T' followed by a long, horizontal, wavy line extending to the right.

**Thomas Morcom**  
QA Manager  
Ecodyne

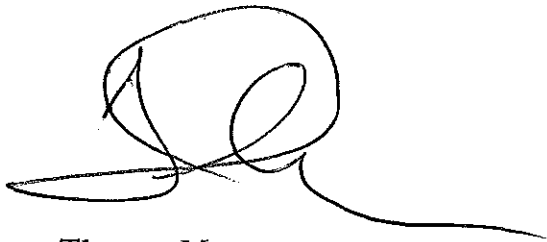
Oct 10, 2013

PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

**CERTIFICATE of COMPLIANCE**

EQUIPMENT: After Filter Vessel  
TAG: 3A-F-208 A to G

The above referenced equipment was provided in accordance with the Ecodyne ISO 9001:2008 Quality Management program and determined to be in compliance with the project requirements and any referenced Codes and Specifications.

A handwritten signature in black ink, consisting of a large, stylized loop at the top, followed by a horizontal stroke, and then a long, sweeping line that extends to the right and then curves back down.

Thomas Morcom  
QA Manager  
Ecodyne

September 3, 2013



PROJECT: MEG Energy - Christina Lake Phase 3A  
ECODYNE JOB: 32125  
REFERENCE: PO P-5675-02

## CRN Confirmation





the pressure equipment safety authority

9410 - 20 Ave N.W.  
Edmonton, Alberta, Canada T6N 0A4  
Tel: (780) 437-9100 / Fax: (780) 437-7787

RECEIVED

MAY 02 2013

**W.O. 12-32**

April 11, 2013

Tom Patrzalek  
LESENA STEEL  
DIV BOTHWELL-ACCURATE CO LTD  
1060 BIRCHMOUNT ROAD  
SCARBOROUGH, ON M1K 1S4

Dear Tom Patrzalek,

The design submission, tracking number 2013-01539, originally received on March 01, 2013 was surveyed and accepted for registration as follows:

CRN : W1159.2

Accepted on: April 11, 2013

Reg Type : New Design

Drawing No. : 32125-D-2202-01 Rev E

Description	MAWP	Design Temperature	MDMT
Internal Pressure	1041 kPa	120°C	-29°C
External Pressure	103 kPa	120°C	-29°C

An invoice covering survey and registration fees will be forwarded from our Revenue Accounts.

Enclosed are stamped prints for your reference.

Sincerely,

PREDA, DRAGOS, P. Eng.  
Design Survey Engineer