BANTREL

PETRO-CANADA

PROJECT TITLE:	PETRO-CANADA HORIZON PROJECT

VENDORS NAME:	Dresser-Rand

DOCUMENT TITLE:	API Data Sheets, As-Built - Compressor(s)

VENDORS DOCUMENT NO:	API-0G0-100
VENDORS REVISION NO:	2
DATE SUBMITTED	8/13/2008

PETRO-CANADA
Supplier Document Review

Permission to proceed does not constitute acceptance or approval of Design Detail, Calculations, Analysis, Test Methods or Materials developed OR selected by SUPPLIER, and does NOT relieve SUPPLIER from FULL compliance with Contractual Obligations

- ☐ 1 Work May Proceed
- ☐ 2 Revise & Resubmit. Work may Proceed subject to incorporation of changes
- ☐ 3 Revise & Resubmit. Work may not Proceed
- ☐ 4 Review not required. Work may proceed

By: Marvin Ishmael Date: 19th September 2008

Discipline: MECHANICAL

Equipment No. J-71011

MR No. 710MRJ0001

1017 VP—D01—710—J—01AC—0002 02

DRESSER-RAND

DOCUMENT CERTIFICATION

DOCUMENT NO. API-0G0-100 REV. NO. 2
DOCUMENT NAME: API Data Sheets, As-Built- Compressor
D-R CT: 33125 DATE: August 13, 2008
NUMBER OF SHEETS: 9 (DOES NOT INCLUDE THIS COVER SHEET)

PetroCanada Montreal Horizon Project
Equipment Name: Wet Gas Compressor
Purchase Order Number – 1017-710-PO-J-0001AC
Contractor: Bantrel
Bantrel Ref: 1017
Dresser-Rand Contract: 33125

☐ **(I) - INFORMATION**
THIS DOCUMENT IS SUBMITTED FOR INFORMATION, COMMENTS ARE NOT SOLICITED NOR IS RETURN REQUIRED.

☐ **(P) - PRELIMINARY/PROPOSAL**
PRELIMINARY PRINT MUST BE RETURNED AND RECEIVED BY DRESSER-RAND NO LATER THAN _____ IN ORDER TO MAINTAIN ENGINEERING AND MANUFACTURING SCHEDULES.

☐ **(R) - REVIEW**
CERTIFIED CORRECT FOR CONFORMITY TO THE SPECIFICATIONS. PRINT MUST BE RETURNED AND RECEIVED BY DRESSER-RAND NO LATER THAN _____ IN ORDER TO MAINTAIN ENGINEERING AND MANUFACTURING SCHEDULES. IF REVIEW ISSUE DRAWINGS ARE NOT RETURNED ON TIME, DRESSER-RAND WILL PROCEED WITH FINAL ISSUE.

☒ **(F) - FINAL**
CERTIFIED CORRECT FOR CONFORMITY TO THE SPECIFICATIONS. PRINT MUST BE RETURNED AND RECEIVED BY DRESSER-RAND NO LATER THAN _____. THE DRAWING HAS BEEN PREPARED FROM CONTRACT SPECIFICATIONS AND NECESSARY MATERIAL REQUIRED HAS ALREADY BEEN PLACED ON ORDER. CHANGES IN DIMENSIONS OR ALTERATIONS IN THE MATERIAL FURNISHED WILL NOT BE ACCEPTED UNLESS SUCH CHANGES OR ALTERATIONS ARE IN ACCORDANCE WITH CONTRACTUAL AGREEMENT OR ACCOMPANIED BY WRITTEN AUTHORIZATION FROM THE PURCHASER AGREEING TO REVISIONS IN PRICE AND DELIVERY.

☐ **(Z) - AS BUILT**
ISSUED FOR RECORD, INCORPORATING AS BUILT FEATURES. RETURN OF DOCUMENT IS NOT REQUIRED.

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOI
DATA SHEET (API 617-7TH Chapter 2
CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125 | ITEM NO. API-0G0-100
REVISION NO. 2 | DATE Wednesday, August 13, 2008
PAGE 1 OF 9 | BY Angelo La Greca

APPLICABLE TO: ○ PROPOSAL ● PURCHASE ○ AS BUILT

FOR Bantrel / 'PetroCanada
SITE Montreal Refinery, Canada
SERVICE Wet Gas
MANUFACTURER DRESSER-RAND
MODEL D10R8B

UNIT
SERIAL NO. C-33125-A01
NO. REQUIRED 1
DRIVER TYPE (1-3.1.1) INDUCTION MOTOR
DRIVER ITEM NO. JMH-71011

INFORMATION TO BE COMPLETED: ○ BY PURCHASER ☐ BY MANUFACTURER △ MUTUAL AGREEMENT (PRIOR TO PURCHASE)

OPERATING CONDITIONS

(ALL DATA ON PER UNIT BASIS)

	Design Condition	Design Condition	Normal Operation	Normal Operation	CASE #2	CASE #2	Startup -For Info Only
	D10R8B	D10R8B	D10R8B	D10R8B	D10R8B	D10R8B	D10R8B
	SEC #1	SEC #2	SEC #1	SEC #2	SEC #1	SEC #2	SEC #1
● GAS HANDLED (ALSO SEE PAGE)	Wet HC ST_1	Wet HC ST_2	Wet HC ST_1	Wet HC ST_2	CASE #2 ST_1	CASE #2 ST_2	Startup Gas - Summer
▲ GAS PROPERTIES (1-2.1.1.4)							Nitrogen
● MMSCFD 14.696 & 60 (DRY)	16.63	15.08	14.93	13.56	16.21	14.02	12.27
● WEIGHT FLOW, (Lb/Min) (WET)	1,015	851.5	911.5	765.5	1,097	831.5	629.0
INLET CONDITIONS							
● PRESSURE (PSIA)	16.90	63.19	15.79	61.14	15.77	58.83	14.83
● TEMPERATURE (°F)	100.00	100.00	100.00	100.00	120.0	100.00	100.00
○ RELATIVE HUMIDITY (%)							
● MOLECULAR WEIGHT	33.36	30.85	33.36	30.85	36.99	32.40	28.01
■ Cp/Cv (Kavg)	1.155	1.170	1.154	1.169	1.140	1.168	1.395
■ COMPRESSIBILITY (Z1)	0.9911	0.9739	0.9917	0.9747	0.9902	0.9735	0.9998
■ INLET VOLUME, (ACFM)(WET)	10,721	2,555	10,309	2,376	11,581	2,550	9,095
DISCHARGE CONDITIONS							
● PRESSURE (PSIA)	70.19	220.6	68.14	220.8	65.83	220.1	42.56
■ TEMPERATURE (°F)	241.8	244.6	244.9	248.8	258.5	252.5	345.5
■ Cp/Cv(Kavg)	1.155	1.170	1.154	1.169	1.140	1.168	1.395
■ COMPRESSIBILITY (ZAvg)	0.9889	0.9652	0.9898	0.9662	0.9872	0.9638	0.9960
FLANGE FLOWS							
■ INLET FLANGE WEIGHT FLOW, Lb/Min (WET)	1,015	898.8	911.5	812.6	1,097	879.4	629.0
■ INLET FLANGE VOLUME, (ACFM)(WET)	10,721	2,697	10,309	2,522	11,581	2,697	9,095
■ DISCHARGE FLANGE WEIGHT FLOW, Lb/Min (WET)	1,063	851.5	958.6	765.5	1,145	831.5	648.0
■ DISCHARGE FLANGE VOLUME, (ACFM)(WET)	3,368	905.5	3,147	818.9	3,573	851.4	4,701
■ GHP REQUIRED (HP)	1,506	1,301	1,386	1,215	1,558	1,289	913.2
■ TRAIN BHP REQUIRED EXCL. EXT. LOSSES (HP)	1,549	1,339	1,429	1,252	1,602	1,326	963.9
☐ BHP REQ. AT DRIVER INCL. EXT. LOSSES (GEAR, ETC.) (HP)							
■ SPEED (RPM)	10,666	10,666	10,666	10,666	10,666	10,666	10,666
☐ TURNDOWN (%)							
■ POLYTROPIC HEAD (Ft Lbf/Lb)	40,952	38,036	42,200	39,226	38,090	38,390	39,111
■ POLYTROPIC EFFICIENCY (%)	84.42	78.88	84.90	78.73	82.02	78.63	82.18
● CERTIFIED POINT	YES	YES	NO	NO	NO	NO	NO
○ EXPECTED OPERATION AT EACH CONDITION (%)							
☐ PERFORMANCE CURVE NUMBER							

PROCESS CONTROL (1-3.4.2.1)

METHOD ● SUCTION THROTTLING FROM 16.9 PSIA TO 15.9 PSIA ○ VARIABLE INLET GUIDE VANES (2-2.4.1) ○ SPEED VARIATION FROM ____ % TO ____ % ○ DISCHARGE BLOWOFF TO ____ ○ COOLED BYPASS FROM ____ TO ____

SIGNAL ○ SOURCE (1-3.4.2.1) ____
TYPE ○ ELECTRONIC ○ PNEUMATIC ○ OTHER ____
RANGE ____ MA ____ PSIG ____

● ANTI-SURGE SYSTEM (1-3.4.2.2)

Power is guaranteed on an overall basis for the train. Intermediate pressure is not a guarantee. Discharge flange mass flow shown on data sheets must be used for sizing process equipment.

REMARKS: Power is guaranteed on an overall basis for the train. Intermediate pressure is not a guarantee.
DISCHARGE FLANGE MASS FLOW RATE SHOWN ON DATA SHEETS MUST BE USED FOR SIZING PROCESS EQUIPMENT.

NOTE 1: IF GAS ANALYSIS IS GIVEN, MANUFACTURER SHALL SUPPLY DATA, OTHERWISE DATA SHALL BE SUPPLIED BY USER

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOR DATA SHEET (API 617-7TH Chapter 2) CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125 ITEM NO. API-0G0-100
REVISION NO. 2 DATE Wednesday, August 13, 2008
PAGE 2 OF 9 BY Angelo La Greca

APPLICABLE TO: ○ PROPOSAL ● PURCHASE ○ AS BUILT

FOR Bantrel / 'PetroCanada
SITE Montreal Refinery, Canada
SERVICE Wet Gas
MANUFACTURER DRESSER-RAND
MODEL D10R8B

UNIT
SERIAL NO. C-33125-A01
NO. REQUIRED 1
DRIVER TYPE (1-3.1.1) INDUCTION MOTOR
DRIVER ITEM NO. JMH-71011

INFORMATION TO BE COMPLETED: ○ BY PURCHASER □ BY MANUFACTURER △ MUTUAL AGREEMENT (PRIOR TO PURCHASE)

OPERATING CONDITIONS

Fuel Gas

(ALL DATA ON PER UNIT BASIS)

	Startup -For Info Only	Transition #1-For Info Only	Transition #1-For Info Only	Transition #2 -For Info Only	Transition #2 -For Info Only	Turndown-For Info Only	Turndown-For Info Only
	D10R8B	D10R8B	D10R8B	D10R8B	D10R8B	D10R8B	D10R8B
	SEC #2	SEC #1	SEC #2	SEC #1	SEC #2	SEC #1	SEC #2
● GAS HANDLED (ALSO SEE PAGE)	Startup Gas - Summer	Wet HC ST_1	Wet HC ST_2	Startup Gas - Winter	Startup Gas - Winter	Wet HC ST_1	Wet HC ST_2
▲ GAS PROPERTIES (1-2.1.1.4)							
● MMSCFD 14.696 & 60 (DRY)	6.827	14.40	14.40	12.10	4.700	13.09	13.71
● WEIGHT FLOW, (Lb/Min) (WET)	350.0	879.1	813.0	394.1	153.1	799.2	774.1
INLET CONDITIONS							
● PRESSURE (PSIA)	35.56	15.69	62.24	15.11	23.37	15.09	61.33
● TEMPERATURE (°F)	100.00	100.00	100.00	100.00	100.00	100.00	100.00
○ RELATIVE HUMIDITY (%)							
● MOLECULAR WEIGHT	28.01	33.36	30.85	17.80	17.80	33.36	30.85
■ Cp/Cv (Kavg)	1.395	1.154	1.169	1.236	1.236	1.154	1.169
■ COMPRESSIBILITY (Z1)	0.9996	0.9918	0.9742	0.9984	0.9976	0.9921	0.9746
■ INLET VOLUME, (ACFM)(WET)	2,109	10,004	2,477	8,787	2,205	9,460	2,395
DISCHARGE CONDITIONS							
● PRESSURE (PSIA)	100.0	69.24	220.8	30.37	46.20	68.33	220.8
■ TEMPERATURE (°F)	349.5	247.0	246.5	201.4	201.0	250.3	248.4
■ Cp/Cv(Kavg)	1.395	1.154	1.169	1.236	1.236	1.154	1.169
■ COMPRESSIBILITY (ZAvg)	0.9958	0.9900	0.9656	0.9957	0.9946	0.9906	0.9661
FLANGE FLOWS							
■ INLET FLANGE WEIGHT FLOW, Lb/Min (WET)	369.0	879.1	860.3	394.1	159.8	799.2	821.2
■ INLET FLANGE VOLUME, (ACFM)(WET)	2,224	10,004	2,621	8,787	2,302	9,460	2,541
■ DISCHARGE FLANGE WEIGHT FLOW, Lb/Min (WET)	350.0	926.4	813.0	400.8	153.1	846.4	774.1
■ DISCHARGE FLANGE VOLUME, (ACFM)(WET)	1,088	3,002	866.4	5,253	1,317	2,795	827.5
■ GHP REQUIRED (HP)	535.1	1,359	1,263	551.3	218.8	1,267	1,224
■ TRAIN BHP REQUIRED EXCL. EXT. LOSSES (HP)	564.8	1,400	1,302	608.9	241.6	1,308	1,263
□ BHP REQ. AT DRIVER INCL. EXT. LOSSES (GEAR, ETC.) (HP)							
■ SPEED (RPM)	10,666	10,666	10,666	10,666	10,666	10,666	10,666
□ TURNDOWN (%)							
■ POLYTROPIC HEAD (Ft Lbf/Lb)	38,443	42,914	38,592	36,753	35,831	43,791	39,115
■ POLYTROPIC EFFICIENCY (%)	79.42	84.99	78.88	79.97	78.43	84.62	78.77
● CERTIFIED POINT	NO	NO	NO	NO	NO	NO	NO
○ EXPECTED OPERATION AT EACH CONDITION (%)							
□ PERFORMANCE CURVE NUMBER							

Turndown is 85% of normal flow. Please explain this figure

PROCESS CONTROL (1-3.4.2.1)

METHOD ● SUCTION THROTTLING FROM 16.9 PSIA TO 15.9 PSIA ○ VARIABLE INLET GUIDE VANES (2-2.4.1) ○ SPEED VARIATION FROM ____ % TO ____ % ○ DISCHARGE BLOWOFF TO ____ ○ COOLED BYPASS FROM ____ TO ____

SIGNAL ○ SOURCE (1-3.4.2.1)
TYPE ○ ELECTRONIC ○ PNEUMATIC ○ OTHER
RANGE ____ MA ____ PSIG

● ANTI-SURGE SYSTEM (1-3.4.2.2)

Power is guaranteed on an overall basis for the train. Intermediate pressure is not a guarantee. Discharge flange mass flow shown on data sheets must be used for sizing process equipment.

REMARKS: Power is guaranteed on an overall basis for the train. Intermediate pressure is not a guarantee.
DISCHARGE FLANGE MASS FLOW RATE SHOWN ON DATA SHEETS MUST BE USED FOR SIZING PROCESS EQUIPMENT.

NOTE 1: IF GAS ANALYSIS IS GIVEN, MANUFACTURER SHALL SUPPLY DATA, OTHERWISE DATA SHALL BE SUPPLIED BY USER

The columns here should match those on pages 1 and 2

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOR
DATA SHEET (API 617-7TH Chapter 2)
CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125 ITEM NO. API-0G0-100
REVISION NO. 2 DATE Wednesday, August 13, 2008
PAGE 3 OF 9 BY Angelo La Greca

OPERATING CONDITIONS (Continued) (1-2.1.1.1) (1-3.1.2) (1-3.1.3)

GAS ANALYSIS: ● MOL %	MW	Wet HC ST_1	Wet HC ST_2	CASE #2 ST_1	CASE #2 ST_2	Startup Gas - ~~Summer~~	Startup Gas - ~~Winter~~	REMARKS:
1,2-pentadiene	68.119	0.3319	0.3034	0.6729	0.5474			
1-pentene	70.134	0.1043	0.1012	0.0993	0.0878			
Methane (C1)	16.043	31.34	34.63	23.59	29.33		46.00	
Hydrogen sulfide	34.080	10.55	11.57	15.23	18.64		0.0100	(1-2.2.1.6)
Carbon Dioxide	44.010	0.4835	0.5327	0.3916	0.4863		0.1300	
Hydrogen	2.016	6.103	6.886	4.729	5.951		30.55	(1-2.2.1.9)
Water Vapor	18.015	5.316	1.644	9.445	1.638			
n-Hexane (n-C6)	86.177	8.350	4.292	11.96	4.131		0.3700	
cyclopentane	70.135	1.204	1.025	0.9097	0.6842			
n-Pentane (n-C5)	72.150	0.8987	0.8251	1.393	1.191		0.3800	
i-Pentane (i-C5)	72.150	1.115	1.069	1.037	0.9573		0.7900	
1-butene	56.108	2.981					0.6900	
n-Butane (n-C4)	58.123	2.929	3.041	3.066	3.331		1.650	
i-Butane (i-C4)	58.123	0.7895	0.8332	1.716	1.936		1.830	
Propylene	42.081	3.374	3.673	2.484	2.982		1.080	
Propane (C3)	44.097	7.616	8.261	7.576	9.044		5.920	
Ethylene	28.054	1.813	2.001	1.346	1.664		1.150	
Ethane (C2)	30.070	14.71	16.18	11.74	14.46		6.460	
isobutylene	56.108		3.128	2.477	2.745			
Carbon Monoxide	28.010		0.0110	0.0393	0.0579		0.0900	
TOTAL								
AVG. MOL. WT.								

LOCATION: (1-2.1.8)
○ INDOOR ● OUTDOOR ○ GRADE
○ HEATED ● UNDER ROOF ● MEZZANINE
● UNHEATED ○ PARTIAL SIDES ● Urban Industrial
● ELEC. AREA CLASSIFICATION (1-2.1.14) CL 1 GR C,D DIV 2

SITE DATA (1-2.1.8)
● ELEVATION 90 FT BAROMETER 14.70 PSIA
● RANGE OF AMBIENT TEMPS:

		DRY BULB	WET BULB
NORMAL	°F	60	56
MAXIMUM	°F	104	100
MINIMUM	°F	-40	-40
	°F		

UNUSUAL CONDITIONS: ○ DUST ○ FUMES °F
○ OTHER (1-2.1.8)
○ COPPER AND COPPER ALLOYS PROHIBITED (1-2.2.1.14)

COATING: (1-2.2.1.16)
○ ROTATING COMPONENTS
○ STATIONARY COMPONENTS

REMARKS:
Equation of state: DR Standard

NOISE SPECIFICATIONS: (1-2.1.9)
○ APPLICABLE TO MACHINE:
SEE SPECIFICATION
○ APPLICABLE TO NEIGHBORHOOD:
SEE SPECIFICATION
ACOUSTIC HOUSING: ○ YES ● NO

APPLICABLE SPECIFICATIONS:
API 617, 7TH CHAPTER 1&2
○ VENDOR HAVING UNIT RESPONSIBILITY (1-1.5.52) (1-1.8) (1-2.1.3)
○ GOVERNING SPECIFICATION (IF DIFFERENT)

PAINTING:
○ MANUFACTURER'S STD.
● OTHER Severe Environment

SHIPMENT: (1-4.4)
● DOMESTIC ○ EXPORT ○ EXPORT BOXING REQ'D.
● OUTDOOR STORAGE MORE THAN 6 MONTHS (1-4.4.1) 12 MO
SPARE ROTOR ASSEMBLY PACKAGE (1-4.4.3.10)
● HORIZONTAL STORAGE ● VERTICAL STORAGE

Will it be good for both position horizontal and vertical?

Design,Normal, case 2, Start up (N2), Transition 1, Transition 2. There is no summer and winter case.. Please refer to Bantrel/PC datasheet Rev 1.

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOR
DATA SHEET (API 617-7TH Chapter 2)
CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125 ITEM NO. API-0G0-100
REVISION NO. 2 DATE Wednesday, August 13, 2008
PAGE 4 OF 9 BY Angelo La Greca

OPERATING CONDITIONS (Continued) (1-2.1.1.1) (1-3.1.2) (1-3.1.3)

GAS ANALYSIS: ● MOL %	MW	Wet HC ST_1	Wet HC ST_2	CASE #2 ST_1	CASE #2 ST_2	Startup Gas - Summer	Startup Gas - Winter	REMARKS:
Nitrogen	28.013			0.1047	0.1389	100.0	2.900	
TOTAL		100.00	100.00	100.00	100.00	100.00	100.00	
AVG. MOL. WT.		33.36	30.85	36.99	32.40	28.01	17.80	

LOCATION: (1-2.1.8)
○ INDOOR ● OUTDOOR ○ GRADE
○ HEATED ● UNDER ROOF ● MEZZANINE
● UNHEATED ○ PARTIAL SIDES ● Urban Industrial
● ELEC. AREA CLASSIFICATION (1-2.1.14) CL 1 GR C,D DIV 2

SITE DATA (1-2.1.8)
● ELEVATION 90 FT BAROMETER 14.70 PSIA
● RANGE OF AMBIENT TEMPS:

		DRY BULB	WET BULB
NORMAL	°F	60	56
MAXIMUM	°F	104	100
MINIMUM	°F	-40	-40
	°F		

UNUSUAL CONDITIONS: ○ DUST ○ FUMES
°F
○ OTHER (1-2.1.8)

○ COPPER AND COPPER ALLOYS PROHIBITED (1-2.2.1.14)

COATING: (1-2.2.1.16)
○ ROTATING COMPONENTS
○ STATIONARY COMPONENTS

REMARKS:
Equation of state: DR Standard

NOISE SPECIFICATIONS: (1-2.1.9)
○ APPLICABLE TO MACHINE:
SEE SPECIFICATION
○ APPLICABLE TO NEIGHBORHOOD:
SEE SPECIFICATION
ACOUSTIC HOUSING: ○ YES ● NO

APPLICABLE SPECIFICATIONS:
API 617, 7TH CHAPTER 1&2
○ VENDOR HAVING UNIT RESPONSIBILITY (1-1.5.52) (1-1.8) (1-2.1.3)
○ GOVERNING SPECIFICATION (IF DIFFERENT)

PAINTING:
○ MANUFACTURER'S STD.
● OTHER Severe Environment

SHIPMENT: (1-4.4)
● DOMESTIC ○ EXPORT ○ EXPORT BOXING REQ'D.
● OUTDOOR STORAGE MORE THAN 6 MONTHS (1-4.4.1) 12 MO
SPARE ROTOR ASSEMBLY PACKAGE (1-4.4.3.10)
● HORIZONTAL STORAGE ● VERTICAL STORAGE

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOR
DATA SHEET (API 617-7TH Chapter 2)
CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125a ITEM NO. API-0G0-100
REVISION NO. 2 DATE 8/13/08
PAGE 5 OF 9 BY Angelo La Greca

CONSTRUCTION FEATURES

SPEEDS:
MAX. CONT. 10,756 RPM TRIP 10,756 RPM
MAX. TIP SPEEDS: 810 FPS @ 100% SPEED
810 FPS @ MAX. CONT. SPEED

LATERAL CRITICAL SPEEDS (DAMPED)
FIRST CRITICAL RPM MODE
SECOND CRITICAL RPM MODE
THIRD CRITICAL RPM MODE
FOURTH CRITICAL RPM MODE
○ LATERAL ANALYSIS ADDITIONAL REQUIREMENTS (1-2.6.2.14)
● TRAIN LATERAL ANALYSIS REQUIRED (1-2.6.2.6)
● TRAIN TORSIONAL ANALYSIS REQUIRED (1-2.6.7.1)

TORSIONAL CRITICAL SPEEDS:
FIRST CRITICAL RPM
SECOND CRITICAL RPM
THIRD CRITICAL RPM
FOURTH CRITICAL RPM
○ LIST OF TRAIN UNDESIRABLE SPEEDS (1-2.6.1.4)

VIBRATION:
ALLOWABLE TEST LEVEL 1 MILS
(PEAK TO PEAK)

NAMEPLATE (2-2.11.2)
● US CUSTOMARY ○ METRIC

ROTATION, VIEWED FROM DRIVEN END ○ CW ● CCW

MATERIALS INSPECTION REQUIREMENTS (1-4.2.2.1)
○ RADIOGRAPHY REQUIRED FOR
○ ULTRASONIC REQUIRED FOR
○ MAGNETIC PARTICLE REQUIRED FOR
○ LIQUID PENETRANT REQUIRED FOR
○ LOW TEMPERATURE (1-2.2.1.15.3)
MIN.DESIGN METAL TEMPERATURE (°F) -20
AT CONCURRANT PRESSURE (PSIG)
○ OTHER TRAIN COMPONENTS (1-2.2.1.15.2)

CASING:
MODEL D10R8B
CASING SPLIT RADIAL
MATERIAL
THICKNESS (IN) 2.5 CORR. ALLOW. (IN) 0.125
MAX. ALLOWABLE PRESS 280 PSIG
TEST PRESS (PSIG): HYDRO 420
MAX. ALLOWABLE TEMPERATURE (°F) 380
MAX OPER. TEMP. 380 °F MIN. OPER. TEMP. -20 °F
MAX CASING CAPACITY (ACFM) 15,964
○ SYSTEM RELIEF VALVE SET PT. (2-2.3.1.1) PSIG
○ Q.C. OF INACCESSIBLE WELDS (1-2.3.1.11.2)

GUIDE VANES
MATERIAL
NO. VANES GUIDE VANE
○ IGV EXTERNAL PURGE (2-2.4.2)
○ VANE CONTROL SYSTEM (2-2.4.3)

DIAPHRAGMS:
MATERIAL ASTM A36 Carbon Steel Plate
AXIALLY SPLIT ■ YES ☐ NO (2-2.4.8)
○ INTERMEDIATE MAIN PROCESS CONNECTIONS (2-2.4.5)
DISCH. PRESSURE (PSIG) MAX MIN
INLET PRESSURE (PSIG) MAX MIN
DIAPHRAGM MAX. Δ P (PSIA)

IMPELLERS:
NO. 8 DIA (IN) (6)@17.27,(2)@16.41
NO. VANES EA. IMPELLER (4)@17,(4)@19
TYPE (OPEN, ENCLOSED, ETC.) ENCLOSED
TYPE FABRICATION FABRICATED
MATERIAL (8)@ gr 17-4ph
MIN. YIELD STRENGTH (PSI) 70000, 80000
HARDNESS: (Rc) (BRINNEL) MAX 235, 235 MIN 175, 200
SMALLEST TIP INTERNAL WIDTH (IN) 0.425
MAX. MACH. NO. @ IMPELLER EYE 0.71
MAX. IMPELLER HEAD@100% SPD (Ft Lbf/Lb) 11834

SHAFT:
■ ONE PIECE ☐ BUILT UP
MATERIAL ASTM A666 Class L gr4340
DIA @ IMPELLERS (IN) 7.015 DIA @ COUPLING (IN) 3.000
SHAFT END: ■ TAPERED ☐ CYLINDRICAL
☐ SPLINED ☐ INTEGRAL FLANGE
MIN. YIELD STRENGTH (PSI) 105000
SHAFT HARDNESS (BNH)(Rc) 277 BHN / 321 HB
MAX TORQUE CAPABILITY (FT-LBS) 1422

BALANCE PISTON:
MATERIAL astm a743 gr ca-15 AREA 12.43 IN²
FIXATION METHOD Shrink Fit
NORMAL CLEARANCE (IN)
FLOW WITH NORMAL CLEARANCE (Lb/Min) 39.05
FLOW WITH 2x NORMAL CLEARANCE (Lb/Min)
○ PRESS. CONN. BAL LINE DOWNSTREAM (2-2.5.4.3)

SHAFT SLEEVES:
AT INTERSTG. CLOSE MATL astm a743 gr ca-15
CLEARANCE POINTS
AT SHAFT SEALS MATL
○ ACCESSIBLE (2-2.8.3)

ROTOR
○ DISASSEMBLY AND REASSEMBLY (1-2.6.8.2.1.1)
○ AT SPEED BALANCING (1-2.6.8.3)
○ SEQUENTIAL LOW SPEED BAL. PREC. AT SPEED BAL. (1-2.6.8.6)
○ RESIDUAL BALANCE CHECK (1-2.6.8.7)

LABYRINTHS:
INTERSTAGE
TYPE Knife Edge MATERIAL PEK Ketron 1331-HT
BALANCE PISTON
TYPE Knife Edge MATERIAL PEK Ketron 1331-HT

This is a back to back machine.
Why a balance piston?
DR confirmed earlier that none in required.

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOR
DATA SHEET (API 617-7TH Chapter 2)
CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125a ITEM NO. API-0G0-100
REVISION NO. 2 DATE 8/13/08
PAGE 6 OF 9 BY Angelo La Greca

CONSTRUCTION FEATURES (CONTINUED)

SHAFT SEALS:

- ● SEAL TYPE (1-2.8.1.3) Gas
- ● MAX SEALING/SETTLING OUT PRESSURE (1-2.8.1.1) (PSIA) 170.0
- ○ MIN.SEALING PRESSURE (PSIG)
- ○ SUPPLEMENTAL DEVICE REQUIRED FOR CONTAC SEALS (1-2.8.3.4) TYPE
- ○ BUFFER GAS SYSTEM REQUIRED (1-2.8.1.5)
- ○ TYPE BUFFER GAS (1-2.8.1.5)
- ☐ PRESSURE (1-2.8.1.6) PSIA
- ☐ FLOWRATE Lb/Sec
- ☐ FILTRATION
- ○ MANIFOLD (1-2.8.1.7)
- ● METHOD OF CONTROL (1-2.8.1.5) Delta P- Seal Gas

- ● BUFFER GAS CONTROL SYSTEM SCHEMATIC BY VENDOR
- ○ PRESSURIZING GAS FOR SUBATMOSPHERIC SEALS (1-2.8.2.4)
  - ○ EDUCTOR ○ INJECTION (1-2.8.2.3)
- ☐ SEAL MANUFACTURER
- ☐ LEAKAGE TO PROCESS (GAL/DAY/SEAL)
  BUFFER GAS REQUIRED FOR:
  - ☐ AIR RUN-IN ☐ OTHER
- ☐ FLOW (PER SEAL):
  NORM: GPM@ PSI Δ P
  MAX. GPM@ PSI Δ P
- ■ **BEARING HOUSING CONSTRUCTION:**
  TYPE (SEPARATE, INTEGRAL) SEPARATE SPLIT AXIAL
  MATERIAL astm a514 & astm a36

AXIAL COMPRESSOR

STAGE	1	2	3	4	5	6	7	8	9
ROTOR									
☐ BLADE MATERIAL									
☐ BLADE ROOT TYPE									
☐ CORD WIDTH (IN)									
☐ OUTER DIAMETER (IN)									
☐ BLADE HEIGHT (IN)									
☐ BLADE QUANTITY									
STATOR									
■ BLADE MATERIAL									
☐ TYPE (MOVABLE, FIXED, ○ ADJUSTABLE) (2-3.4.2.3)									
☐ CORD WIDTH (IN)									
☐ BLADE QUANTITY									

STAGE	10	11	12	13	14	15	16	17	18
ROTOR									
☐ BLADE MATERIAL									
☐ BLADE ROOT TYPE									
☐ CORD WIDTH (IN)									
☐ OUTER DIAMETER (IN)									
☐ BLADE HEIGHT (IN)									
☐ BLADE QUANTITY									
STATOR									
☐ BLADE MATERIAL									
☐ TYPE (MOVABLE, FIXED, ○ ADJUSTABLE) (2-3.4.2.3)									
☐ CORD WIDTH (IN)									
☐ BLADE QUANTITY									

REMARKS:

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOR
DATA SHEET (API 617-7TH Chapter 2)
CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125a ITEM NO. API-0G0-100
REVISION NO 2 DATE 8/13/08
PAGE 7 OF 9 BY Angelo La Greca

CONSTRUCTION FEATURES (CONTINUED)

BEARINGS AND BEARING HOUSINGS

○ MAGNETIC BEARINGS (2-2.7.1.1.2)

RADIAL	THRUST	NON-THRUST
■ TYPE	Damper-Tiltpad	Damper-Tiltpad
■ MANUFACTURER	Orion	Orion
■ LENGTH (IN)	2.75	2.75
■ SHAFT DIA. (IN)	4.5	4.5
■ UNIT LOAD (ACT/ALLOW) (PSI)	48/200	50/200
■ BASE MATERIAL	Steel	Steel
■ BABBIT THICKNESS (IN)	0.063	0.063
■ NO. PADS	5	5
■ LOAD: B'TWN/ON PAD	ON PIVOT	ON PIVOT
■ PIVOT: CTR/OFFSET, (%)	0.55	0.55

PAD MATERIAL ○ (2-2.7.2.2) ○ (2-2.7.2.3)

■ BEARING SPAN 70.729 IN

THRUST	ACTIVE	INACTIVE
■ TYPE	Tilting Pad	Tilting Pad
■ MANUFACTURER	Kingsbury	Kingsbury
■ UNIT LOADING (MAX) (PSI)	500	500
■ UNIT LOAD (ULT.) (PSI)	1000	1000
■ AREA (IN²)	31.4	31.4
■ NO. PADS	6	6
■ PIVOT: CENTER / OFFSET, (%)	Offset , 60	Offset , 60
■ PAD BASE MATL	Steel	Steel

○ COPPER BACKED (2-2.7.3.7)
LUBRICATION: ○ FLOODED ● DIRECTED (2-2.7.3.6)
THRUST COLLAR: ○ INTEGRAL ● REPLACEABLE
MATERIAL gr 4340

BEARING TEMPERATURE DETECTORS (2-3.4.7.3)

○ SEE ATTACHED API-670 DATASHEET
○ THERMOCOUPLES TYPE
● RESISTANCE TEMP DETECTORS
● RESISTANCE MAT'L Platinum ● 100 OHMS
■ ALARM TEMPERATURE (°F) (2-2.7.1.3) 245
■ SHUTDOWN TEMPERATURE (°F) (2-2.7.1.3) 260
○ PROVISION FOR LOCAL DISCONNECT (1-2.7.4.6)
● LOCATION-JOURNAL BRG
NO. 1 EA PAD ____ EVERY OTH PAD 2 PER BRG
OTHER
● LOCATION-THRUST BRG
NO. 1 EA PAD ____ EVERY OTH PAD 2 PER BRG
OTHER
NO. (INACT) 1 EA PAD ____ EVERY OTH PAD 2 PER BRG
OTHER

○ MONITOR SUPPLIED BY (2-3.4.7.4)
○ LOCATION ____ ENCLOSURE ____
○ MFR. ____ ☐ MODEL ____
☐ SCALE RGE ____ ALARM ■ SET @ 245 °F
● SHTDWN ■ SET @ 260 °F ○ TIME DELAY ____ SEC

KEY PHASOR REQUIRED

○ COMPRESSOR ○ GEAR H.S. ○ GEAR L.S.

VIBRATION DETECTORS: ○ SEE ATTACHED API-670 DATA SHEET

● TYPE Proximity/Non Contacting ■ MODEL 3300XL
● MFR BENTLY NEVADA
● NO. AT EA SHAFT BEARING 2 TOTAL NO. 4
○ OSCILLATOR-DETECTORS SUPPLIED BY ____
○ MFR ____ ☐ MODEL ____
MONITOR SUPPLIED BY (2-3.4.7.2) ____
○ LOCATION ____ ENCLOSURE ____
○ MFR. ____ ☐ MODEL ____
☐ SCALE RGE ____ ALARM ■ SET @ 3 MILS
● SHTDWN: ■ SET @ 3 MILS ○ TIME DELAY ____ SEC
○ CASING VIBRATION TRANSDUCERS (2-3.4.7.5)
○ CASING VIBRATION MONITORS (2-3.4.7.6)

AXIAL POSITION DETECTOR: ○ SEE ATTACH. API-670 DATA SHEET

● TYPE Proximity/Non Contacting ■ MODEL 3300XL
● MFR BENTLY NEVADA ● NO. REQUIRED 2
○ OSCILLATOR-DEMODULATOR SUPPLIED BY ____
○ MFR ____ ☐ MODEL ____
MONITOR SUPPLIED BY (2-3.4.7.2) ____
○ LOCATION ____ ENCLOSURE ____
○ MFR. ____ ☐ MODEL ____
☐ SCALE RGE ____ ● ALARM ☐ SET @ ____ MILS
○ SHTDWN: ☐ SET @ ____ MILS ○ TIME DELAY ____ SEC

CASING CONNECTIONS (1-2.3.2.2.1)

● CONNECTION	■ ANSI/ASME (B16.1; B16.5; B16.42; B16.47 series A, B; ISO 7005-1, -2; OTHER	☐ FACING ☐ BORE	○ ORIENTATION	■ FLANGED OR STUDDED (1-2.3.2.2.1)	○ MATING FLG & GASKET BY VENDOR (1-2.3.2.2.7)	■ GAS VELOCITY (FT/SEC)
Inlet-1	20	600# RF	Up	Flanged		98.69
Discharge-2	12	600# RF	22.5	Flanged		95.84
Discharge-3	8	600# RF	315	Flanged		47.57
Inlet-4	10	600# RF	Up	Flanged		82.1

○ BOROSCOPIC INSPECTION PORTS (2-2.3.2.4)

The set points for alarm & shutdown can not be same
Provide correct setpoints.

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOR
DATA SHEET (API 617-7TH Chapter 2)
CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125a ITEM NO. API-0G0-100
REVISION NO. 2 DATE 8/13/08
PAGE 8 OF 9 BY Angelo La Greca

☐ OTHER CONNECTIONS

SERVICE:	NO.	SIZE	TYPE
LUBE-OIL INLET			
LUBE OIL OUTLET			
SEAL-OIL INLET			
SEAL-OIL OUTLET			
SEAL GAS INLET			
SEAL GAS OUTLET			
CASING DRAINS			
STAGE DRAINS			

	NO.	SIZE	TYPE
PRESSURE			
TEMPERATURE			
SOLVENT INJECTION			
PURGE FOR:			
BRG. HOUSING			
BTWN BRG & SEAL			
BTWN SEAL & GAS			

○ INDIVIDUAL STAGE DRAINS REQUIRED (1-2.3.2.1.7)
● VALVED & BLINDED
○ VALVED & BLINDED & MANIFOLD

LUBRICATION AND SEALING SYSTEMS (1-2.10) (1-3.5.1.2)

○ SEE ATTACHED API 614 DATASHEET
○ SEPARATE ○ COMBINED (2-2.10.1)
○ INTEGRAL OIL RESERVOIR (1-3.3.2.11)
● OIL TYPE (2-2.10.2) ISO 32

ACCESSORIES

COUPLING AND GUARDS (3.2)

NOTE: SEE ROTATING ELEMENTS - SHAFT ENDS

○ SEE ATTACHED API-671 DATA SHEET ● KEYLESS HYDRAULIC ○ KEYED ○ FLANGED ○ OTHER _____

COUPLING FURNISHED BY D-R

MANUFACTURER Kop-Flex TYPE Disc MODEL #154 MP/ #204 RM

COUPLING GUARD FURNISHED BY: _____

TYPE: ● FULLY ENCLOSED ○ SEMI-OPEN ○ OTHER

COUPLING DETAILS

☐ MAX O.D. _____ IN
☐ HUB WEIGHT _____ LBS
☐ SPACER LENGTH _____ IN
☐ SPACER WEIGHT _____ LBS

● PLUG AND RING GAUGES (1-3.2.5)
LUBRICATION REQUIREMENTS:
☐ NON-LUBE ☐ CONT. OIL LUBE ☐ OTHER _____
QUANTITY PER HUB _____ GPM

MOUNTING PLATES (1-3.3)

○ BASEPLATES FURNISHED BY (1-3.3.2.1) D-R
○ COMPRESSOR ONLY ● DRIVER ● GEAR
○ OTHER _____
○ NONSKID DECKING (1-3.3.2.4) ○ SLOPED DECK (1-3.3.2.4.1)
△ LEVELING PADS OR TARGETS (1-3.3.2.6)
△ COLUMN MOUNTING (1-3.3.2.5)
○ SUB-SOLE PLATES REQUIRED (1-3.3.2.10)
☐ STAINLESS STEEL SHIM THICKNESS _____ IN
○ MACHINED MOUNTING PADS REQUIRED (1-3.3.2.9)

○ SOLEPLATES FURNISHED BY (1-3.3.3.1) _____
☐ THICKNESS _____ IN
○ SUBSOLE PLATES REQUIRED (1-3.3.3.1.3)
○ EXTENT OF PIPING (2-3.5.1.1) _____
☐ STAINLESS STEEL SHIM THICKNESS _____ IN
○ COMPRESSOR _____
○ COUNTER BORE ANCHOR BOLT HOLES (1-3.3.3.1.2)

REMARKS: _____

DRESSER-RAND

CENTRIFUGAL AND AXIAL COMPRESSOR
DATA SHEET (API 617-7TH Chapter 2)
CUSTOMARY UNITS (1-1.6.5)

JOB NO. 33125a ITEM NO. API-0G0-100
REVISION NO. 2 DATE 8/13/08
PAGE 9 OF 9 BY Angelo La Greca

UTILITIES

○ **MONTREAL,CANADA**

STEAM:	**DRIVERS**		
INLET MIN		PSIG	°F
NORM		PSIG	°F
MAX		PSIG	°F
EXHAUST, MIN		PSIG	°F
NORM		PSIG	°F
MAX		PSIG	°F

ELECTRICITY:

	DRIVERS	CONTROL	SHUTDOWN
VOLTAGE	4000	24	24
HERTZ	60	DC	DC
PHASE	3	1	1

○ REDUCED VOLTAGE START (1-3.1.6)
△ NUMBER OF STARTS (1-2.6.7.6.4)

INSTRUMENT AIR:
MAX PRESS PSIG MIN PRESS PSIG

SHOP INSPECTION AND TESTS: (1-4.1.4)

	REQ'D	WIT/OBV
HYDROSTATIC (1-4.3.2)	●	O
IMPELLER OVERSPEED (1-4.3.3)	○	
MECHANICAL RUN (1-4.3.6)(2-4.3.1)	●	W
● CONTRACT COUPLING		
OPTIONAL TESTS		
PURCHASER VIB. EQUIPMENT (2-4.3.1.1.10)	○	
VARY LUBE & SEAL OIL PRESSURES		
AND TEMPERATURES (1-4.3.6.1.5)	●	
POLAR FORM VIB DATA (1-4.3.6.1.2)	●	
TAPE RECORD VIB DATA (1-4.3.6.1.3)	●	
SHAFT END SEAL INSP. (1-4.3.6.2.2)	●	
GAS LEAK TEST AT DISCH PRESS (2-4.3.2.3)	○	
POST TEST INTERNAL INSP. (1-4.3.8.5)		
BEFORE GAS LEAKAGE TEST	○	
AFTER GAS LEAKAGE TEST	○	
PERFORMANCE TEST (GAS) (AIR) (2-4.3.3.1.1)	●	W
INTERMEDIATE HEAD/PRESSURE TOL. (2-4.3.3.1.6)	△	P
COMPLETE UNIT TEST (2-4.3.3.2)	○	
TANDEM TEST (2-4.3.3.3)	○	
GEAR TEST (2-4.3.3.4)	○	
HELIUM LEAK TEST (1-4.3.8.2)	○	
SOUND LEVEL TEST (1-4.3.8.3)	●	
AUX. EQUIPMENT TEST (1-4.3.8.4)	○	
FULL LOAD / SPEED / PRESS TEST (1-4.3.8.6)	○	
HYDRAULIC COUPLING INSP (1-4.3.8.7)	○	
SPARE PARTS TEST (1-4.3.8.8)	○	
INSPECTOR'S CHECKLIST COMPLIANCE (1-4.1.6)	○	
GAS SEAL TEST VENDOR SHOP (1-4.3.5)	○	

MANUALS
○ DRAFT MANUAL FOR REVIEW (1-5.3.5.1.2)
○ TECHNICAL DATA MANUAL (1-5.3.5.4)

MISCELLANEOUS:
■ RECOMMENDED STRAIGHT RUN OF PIPE DIAMETERS
BEFORE SUCTION 2
○ COMPRESSOR TO BE SUITABLE FOR FIELD RUN-IN ON AIR (1-2.1.16)
○ PROVISION FOR LIQUID INJECTION (1-2.1.10)
○ INJECTION MANIFOLD (2-3.5.1.2)
● VENDOR'S REVIEW & COMMENTS ON PURCHASER'S CONTROL SYSTEMS (1-3.4.1.1)
○ SHOP FITUP OF VENDOR PROCESS PIPING (1-4.4.3.11)
● WELDING HARDNESS TESTING (1-4.2.1.5)
○ INSPECT CLEANLINESS (1-4.2.1.4)
○ DESIGN AUDIT (1-5.1.4)
○ BALANCE PISTON △P (1-5.3.2.1.5) (PSI)
○ PROVIDE TAIL END SCHEDULES (1-5.3.3.2)

VENDOR'S REPRESENTATIVE SHALL (1-2.1.13)
○ OBSERVE FLANGE PARTING
○ CHECK ALIGNMENT AT TEMPERATURE
○ BE PRESENT AT INITIAL ALIGNMENT

■ **WEIGHTS (LB):**

COMPR.	26,500	GEAR	8,916	DRIVER	27,700	BASE	34,000
ROTORS:	COMPR.	1,200		DRIVER	5,112	GEAR	3,887

COMPRESSOR UPPER CASE 12,500
MAX. FOR MAINTENANCE (IDENTIFY) 12,500
TOTAL SHIPPING WEIGHT 105,116

■ **SPACE REQUIREMENTS (FT & IN):**
COMPLETE UNIT: L 40' 7/12" W 13' 19/48" H 11' 10 1/2"

REMARKS: