BWM-715-18
D4661 Firetube External Pressure Calcs.
Crn: TBD

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External Pressure Calculation Results :

External Pressure Calculations:

From	To	Section Length ft.	Outside Diameter in.	Corroded Thickness in.	Factor A	Factor B psi
10	20	No Calc	...	0.625	No Calc	No Calc
20	30	17	20	0.4375	0.00055446	8039.68
30	40	No Calc	...	1.125	No Calc	No Calc

External Pressure Calculations:

From	To	External Actual T. in.	External Required T. in.	External Design Pressure psig	External M.A.W.P. psig
10	20	0.625	0.592	75	No Calc
20	30	0.4375	0.29567	75	234.491
30	40	1.125	No Calc	75	No Calc

Minimum 234.491

External Pressure Calculations:

From	To	Actual Length Bet. Stiffeners ft.	Allowable Length Bet. Stiffeners ft.	Ring Inertia Required in**4	Ring Inertia Available in**4
10	20	No Calc	No Calc	No Calc	No Calc
20	30	17	480.329	No Calc	No Calc
30	40	No Calc	No Calc	No Calc	No Calc

Elements Suitable for External Pressure.

ASME Code, Section VIII Division 1, 2017

Cylindrical Shell From 20 to 30 Ext. Chart: CS-2 at 150 °F

Elastic Modulus from Chart: CS-2 at 150 °F : 0.290E+08 psi

Results for Maximum Allowable External Pressure (MAEP):

Tca	OD	SLEN	D/t	L/D	Factor A	B
0.438	20.00	204.00	45.71	10.2000	0.0005545	8039.68

EMAP = (4*B)/(3*(D/t)) = (4*8040)/(3*45.71) = 234.5 psig

Results for Required Thickness (Tca):

Tca	OD	SLEN	D/t	L/D	Factor A	B
0.296	20.00	204.00	67.64	10.2000	0.0002624	3805.11

EMAP = (4*B)/(3*(D/t)) = (4*3805)/(3*67.64) = 75 psig

Results for Maximum Stiffened Length (Slen):

Tca	OD	SLEN	D/t	L/D	Factor A	B

0.438	20.00	5763.95	45.71	50.0000	0.0005364	7777.85

EMAP = (4*B)/(3*(D/t)) = (4*7778)/(3*45.71) = 226.9 psig

Welded Flat Head

Note: This element's required thickness was computed in the internal Pressure Report using the maximum of the Internal and External pressures.