Element Thickness, Pressure, Diameter and Allowable Stress :

From	To	Int. Press + Liq. Hd KPa.	Nominal Thickness mm.	Total Corr Allowance mm.	Element Diameter mm.	Allowable Stress(SE) N./mm²
10	20	4534.34	75.0000	3.00000	3500.00	137.900

Element Required Thickness and MAWP :

From	To	Design Pressure KPa.	M.A.W.P. Corroded KPa.	M.A.P. New & Cold KPa.	Minimum Thickness mm.	Required Thickness mm.
10	20	4534.34	4596.77	4828.95	61.5000	60.7029
Minimum			4596.766	4828.942		

MAWP: 4596.766 KPa., limited by: Elliptical Head.

Internal Pressure Calculation Results :

ASME Code, Section VIII, Division 1, 2007 A-08

Elliptical Head From 10 To 20 SA-516 70 , UCS-66 Crv. B at 120 C

Required Thickness due to Internal Pressure [tr]:
= (P*D*Kcor)/(2*S*E-0.2*P) Appendix 1-4(c)
= (4534.340*3506.0000*0.998)/(2*137.90*1.00-0.2*4534.340)
= 57.7029 + 3.0000 = 60.7029 mm.

Max. Allowable Working Pressure at given Thickness, corroded [MAWP]:
= (2*S*E*t)/(Kcor*D+0.2*t) per Appendix 1-4 (c)
= (2*137.90*1.00*58.5000)/(0.998*3506.0000+0.2*58.5000)
= 4596.766 KPa.

Maximum Allowable Pressure, New and Cold [MAPNC]:
= (2*S*E*t)/(K*D+0.2*t) per Appendix 1-4 (c)
= (2*137.90*1.00*61.5000)/(1.000*3499.9998+0.2*61.5000)
= 4828.949 KPa.

Actual stress at given pressure and thickness, corroded [Sact]:
= (P*(Kcor*D+0.2*t))/(2*E*t)
= (4534.340*(0.998*3506.0000+0.2*58.5000))/(2*1.00*58.5000)
= 136.027 N./mm²

Straight Flange Required Thickness:
= (P*R)/(S*E-0.6*P) + c per UG-27 (c)(1)
= (4534.340*1753.0000)/(137.90*1.00-0.6*4534.340)+3.000
= 61.805 mm.

Straight Flange Maximum Allowable Working Pressure:
= (S*E*t)/(R+0.6*t) per UG-27 (c)(1)
= (137.90 * 1.00 * 72.0000) / (1753.0000 + 0.6 * 72.0000)
= 5527.349 KPa.

Factor K, corroded condition [Kcor]:
= (2 + (Inside Diameter/(2 * Inside Head Depth))^(2))/6
= (2 + (3506.000 /(2 * 878.000))^(2))/6
= 0.997724

Percent Elong. per UCS-79, VIII-1-01-57 (75*tnom/Rf)*(1-Rf/Ro) 8.893 %
Note: Please Check Requirements of UCS-79 as Elongation is > 5%.

MDMT Calculations in the Knuckle Portion:

Govrn. thk, tg = 61.500 , tr = 58.500 , c = 3.0000 mm. , E* = 1.00
Stress Ratio = tr * (E*) / (tg - c) = 1.000 , Temp. Reduction = 0 C

Min Metal Temp. w/o impact per UCS-66	21	C
Min Metal Temp. at Required thickness (UCS 66.1)	21	C

MDMT Calculations in the Head Straight Flange:

Govrn. thk, tg = 75.000 , tr = 59.631 , c = 3.0000 mm. , E* = 1.00
Stress Ratio = tr * (E*) / (tg - c) = 0.828 , Temp. Reduction = 10 C

Min Metal Temp. w/o impact per UCS-66	26	C
Min Metal Temp. at Required thickness (UCS 66.1)	16	C

Note: Post Weld Heat Treatment is required for this Element/Joint.

Elements Suitable for Internal Pressure.