

ASME 8 Div 1 Appendix 1
Section 1.4 f Dished Heads
With $ts/L < 0.002$

ASME 8 Division 1:- Torispherical Ends To UG32 and Appendix 1.4

P := 0.2	Design Pressure Mpa	(Note:- 1 Mpa = 1 N/mm ²)
D := 3000	Inside Diameter	mm
r := 200	Knuckle Radius	mm
L := 2450	Spherical Radius	mm
t := 3.4	Min Required Thickness After forming	mm
S := 138	Design Stress	Mpa
S _y := 165.2	Yield Strength at max design temp	Mpa
E _T := 184590	Youngs Modulus At Temperature	Mpa
E := 1	Joint Factor	

$$M := \frac{\left(3 + \sqrt{\frac{L}{r}}\right)}{4} \quad M = 1.625$$

$$t_{\min} := \frac{P \cdot L \cdot M}{2 \cdot S \cdot E - 0.2 \cdot P} \quad t_{\min} = 2.885 \text{ mm}$$

if ($t_{\min} < t$, "Acceptable Calculation", "Head Too Thin") = "Acceptable Calculation"

$$\frac{t}{L} = 0.001$$

Additional rules for thin heads $t/L < 0.002$

$$C_1 := \text{if}\left(\frac{r}{D} > 0.08, 0.692 \cdot \frac{r}{D} + 0.605, 9.31 \cdot \frac{r}{D} - 0.086\right) \quad C_1 = 0.535$$

$$S_e := C_1 \cdot E_T \cdot \left(\frac{t}{r}\right) \quad S_e = 1.678 \times 10^3$$

$$C_2 := \text{if}\left(\frac{r}{D} > 0.08, 1.46 - 2.6 \cdot \frac{r}{D}, 1.25\right) \quad C_2 = 1.25$$

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$$a := 0.5D - r \qquad a = 1.3 \times 10^3$$

$$b := L - r \qquad b = 2.25 \times 10^3$$

$$\beta := \arccos\left(\frac{a}{b}\right) \qquad \beta = 0.955$$

$$\psi := \frac{(\sqrt{L \cdot t})}{r} \qquad \psi = 0.456$$

$$c := \text{if}\left[\psi < \beta, \frac{a}{(\cos(\beta - \psi))}, a\right] \qquad c = 1.48 \times 10^3$$

$$Re := c + r \qquad Re = 1.68 \times 10^3$$

$$Pe := \frac{S_e \cdot t}{C_2 \cdot Re \cdot \left[\left(0.5 \cdot \frac{Re}{r}\right) - 1\right]} \qquad Pe = 0.849$$

$$Py := \frac{S_y \cdot t}{C_2 \cdot Re \cdot \left[\left(0.5 \cdot \frac{Re}{r}\right) - 1\right]} \qquad Py = 0.084$$

$$Pck := \text{if}\left(\frac{Pe}{Py} \leq 1, 0.6 \cdot Pe, 0.408 \cdot Py + 0.192 \cdot Pe\right) \qquad Pck = 0.197$$

$$Pck := \text{if}\left(\frac{Pe}{Py} > 8.29, 2.0 \cdot Py, Pck\right) \qquad Pck = 0.167$$

Maximum Design Pressure P

$$P_{\max} := \frac{Pck}{1.5} \qquad P_{\max} = 0.1114 \text{ Mpa}$$

if $(P < P_{\max}, \text{"Acceptable Calculation"}, \text{"Head Too Thin"}) = \text{"Head Too Thin"}$
