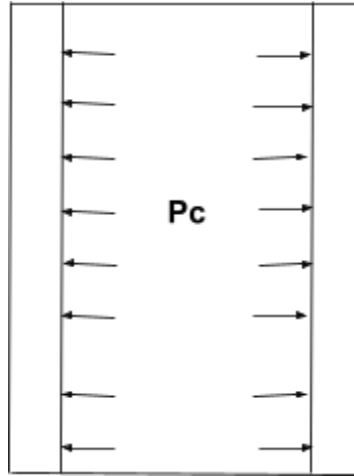


## Casing Thickness Calculation

The casing is treated as a thin cylinder subjected to an internal pressure  $P_c$



### Geometric Properties:

Length,  $L = 725$  mm

Thickness,  $t = ?$

Diameter,  $d = 100$  mm

### Problem specifications

$P_c = 4.26$  MPa

Material: Aluminum 6063-T6

$\sigma_{yp} = 210$  MPa

$\sigma_{uts} = 240$  MPa

$E = 68900$  MPa

$\nu = 0.33$

Safety factor,  $S_f = 2$

### Minimum Thickness

Considering the hoop stress,

$$t = \frac{P_c * d * S_f}{2 * \sigma_{yp}} = \frac{4.26 * 100 * 2}{2 * 210} = 2.02857 \text{ mm}$$

A thickness of 3mm is selected as it is readily available and meets the design requirements

### Expected change in length

$$\Delta l = \frac{P_c * d * l}{4 * t * E} (1 - 2\nu) = \frac{4.26 * 100 * 725}{4 * 3 * 68900} = 0.127 \text{ mm}$$

### Expected change in diameter

$$\Delta d = \frac{P_c * d^2}{4 * t * E} (2 - \nu) = 0.086 \text{ mm}$$

### Burst Pressure

$$P_B = \frac{2 * t * \sigma_{uts}}{d} = \frac{2 * 3 * 240}{100} = 14.4 \text{ MPa}$$

