MOTOR CASING THICKNESS CALCULATION

Considering design pressure:

$$P_D = \frac{2tF_{ty}}{D_0 S_D} \quad \ldots\ldots\ldots (1)$$

Where: $\boldsymbol{F_{ty}}$- Yield strength.

$\boldsymbol{P_D}$ – Design Pressure

t – Thickness

$\boldsymbol{D_O}$ - Outer diameter

$\boldsymbol{S_D}$ - Safety factor

From equation (1)

$$t = \frac{P_D D_0 S_D}{2F_{ty}}$$

For:

P_D = 8.02 Mpa

D_O= 73mm

S_D= 1.87

F_{ty}= 220MPa

$$t = \frac{8.02 \times 73 \times 1.87}{2 \times 220}$$

t =2.5mm

Thus: D_{outer} = 73mm

D_{inner} = 68mm

t = 2.5mm

For:

t= 2.5mm

D_O= 73mm

B= 1.726

F_{ty}= 220MPa

$$P_V = \frac{2 \times 2.5 \times 220 \times 1.726}{73}$$

= 26.0082MPa

=26MPa

REFERENCE:

Design and Burst Pressures for Rocket Motor Casing

[Input data in blue text. English or (SI) units]

Casing Dimensions and Design Factors

Do =	2.874	in. (mm)	Diameter, outside
t =	0.098	in. (mm)	wall thickness
S_D =	1.87		Design Safety factor

Material Properties

Fty =	35	ksi (MPa)	Yield Strength
Ftu =	58	ksi (MPa)	Ultimate Strength
E =	29	Msi (MPa)	Modulus of Elasticity
ν =	0.29		Poisson Ratio
β =	0.603		Fty/Ftu
B =	1.726		Burst factor

Design and Burst Pressures

P_D =	**1282**	psi (kPa)	**Design pressure**
P_U =	**4137**	psi (kPa)	**Burst pressure**
S_U =	**3.23**		**Burst Safety Factor**