

Design Study of a Ring Stiffened Cylinder for use as a Manned Submersible

Shell Yield using the Simple Hoop Stress Formula - Marks, Lionel S.
 "Mechanical Engineering Handbook, Fifth Edition, 1951, Page 421

This is the maximum theoretical depth.

SafetyFactor := 2

DesignGoal := 300-ft·SafetyFactor DesignGoal = 600ft

Design Variables:

Constants:

Outside Diameter

OD := 24·in

SeaWaterDensity := $64 \frac{\text{lbf}}{\text{ft}^3}$

Shell Thickness

t := .125·in.. .1875·in.. .375·in

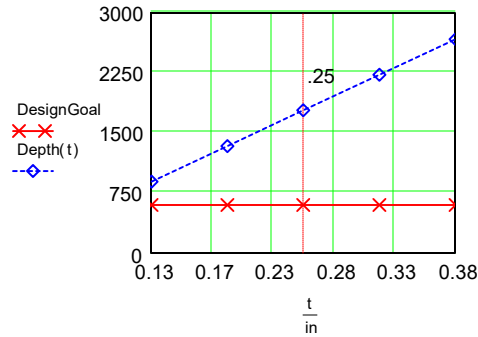
Yield Strength

$\sigma := 38000 \frac{\text{lbf}}{\text{in}^2}$

Cold Roll Steel

Equations:

$$\text{Depth}(t) := \frac{2 \cdot t \cdot \sigma}{\text{OD} \cdot \text{SeaWaterDensity}}$$



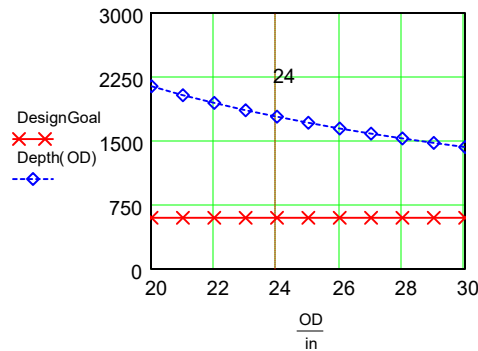
$\frac{t}{\text{in}}$ =
0.125
0.188
0.25
0.312
0.375

$\frac{\text{Depth}(t)}{\text{ft}}$ =
891
1336
1781
2227
2672

OD := 20·in, 21·in.. 30·in

t := .25·in

$$\text{Depth}(\text{OD}) := \frac{2 \cdot t \cdot \sigma}{\text{OD} \cdot \text{SeaWaterDensity}}$$



$\frac{\text{OD}}{\text{in}}$ =
20
21
22
23
24
25
26
27
28
29
30

$\frac{\text{Depth}(\text{OD})}{\text{ft}}$ =
2138
2036
1943
1859
1781
1710
1644
1583
1527
1474
1425