

Calculation of number of tiers

for 1700 x 25,4 mm Grade X 52

Static Load :

$$\sigma = 0,426 \frac{D^2 n}{t} \left[\frac{0,152 (L - Bw)}{B} + 1 \right]$$

Where

σ : Static load Stress in psi = 52.000 (X 52 or S 355)

n : number of tiers

D : Diameter in inch - 67"

t : wall thickness in inch - 1"

L : length of pipe in feet - 26 m or 85,3'

W : width of bearing strip in feet = 0,15 m = 0,492'

B : effective number of bearing strips = 10

Static load < Allowable stress = minimum yield strength / (1 + g)

Dynamic loads g = 0,4

For grade S355 Allowable stress shall be less than 345 MPa or 50.112 psi / 1,4 = 33.998 psi

$$\sigma = 0,426 / 1 \times 67^2 \times 10 \left[\frac{0,152 (85,3 - 12 \times 0,492)}{12} + 1 \right] = 34.000 \text{ psi} < 35.790 \text{ psi}$$

Calculated static load stress with 10 bearing strips is 34.000 psi and is acceptable

Conclusion :

With 10 bearing strips and 8 tiers the static load is below the allowable steel yield strength