



DESIGN CALCULATION SHEET

• Check Bearing Load of Push-Pull By AISC Code

※Material properties of Push-Pull

1.0m~1.7m	STK400 Steel pipe φ60mm×t4.0mm	E=2,100,000(kg/cm ²)	F _y = 2,880(kg/cm ²)
1.7m~2.5m	STK400 Steel pipe φ60mm×t4.0mm	E=2,100,000(kg/cm ²)	F _y = 2,880(kg/cm ²)
2.5m~3.2m	STK400 Steel pipe φ76mm×t4.5mm	E=2,100,000(kg/cm ²)	F _y = 2,880(kg/cm ²)
3.2m~3.9m	STK400 Steel pipe φ76mm×t4.5mm	E=2,100,000(kg/cm ²)	F _y = 2,880(kg/cm ²)
3.9m~4.5m	STK400 Steel pipe φ76mm×t4.5mm	E=2,100,000(kg/cm ²)	F _y = 2,880(kg/cm ²)

※Calculate allowable axial load(Pa) of Push-Pull :

K = 1.0

r = rotate radius $r = \sqrt{\frac{I}{A}}$

L : effective length

$$C_c = \pi \sqrt{\frac{2E}{F_y}}$$

$\left(\frac{KL}{r}\right) < C_c$ Non-elastic buckle

$$R = \frac{\left(\frac{KL}{r}\right)}{C_c} \quad FS = \frac{5}{3} + \frac{3R}{8} - \frac{R^3}{8}$$

Allowable Compression stress:

$$F_a = \frac{(1 - 0.5R^2) \times F_y}{FS}$$

$\left(\frac{KL}{r}\right) > C_c$ Elastic buckle

Allowable Compression stress:

$$F_a = \frac{12}{23} \frac{\pi^2 E}{\left(\frac{KL}{r}\right)^2}$$

Allowable Compression load $P_a = F_a \times A$

Calculate allowable compression load by above formula :

	Outer diameter	Inside diameter	thickness	Area (cm ²)	I (cm ⁴)	L (cm)	r	KL/r
1.0m~1.7m	6.0 cm	5.20 cm	0.40 cm	7.04	27.73	170	1.985	85.64
1.7m~2.5m	6.0 cm	5.20 cm	0.40 cm	7.04	27.73	250	1.985	125.94
2.5m~3.2m	7.6 cm	6.70 cm	0.45 cm	10.11	64.85	320	2.533	126.33
3.2m~3.9m	7.6 cm	6.70 cm	0.45 cm	10.11	64.85	390	2.533	153.97
3.9m~4.5m	7.6 cm	6.70 cm	0.45 cm	10.11	64.85	450	2.533	177.65

Allowable Compression load :

	Cc	R	FS	Fa (kgf/cm ²)	Pa (ton)	Pa (kN)
1.0m~1.7m	119.97	0.714	1.89	1136.22	8.00	78.44
1.7m~2.5m	119.97	1.050		681.73	4.80	47.06
2.5m~3.2m	119.97	1.053		677.55	6.85	67.19
3.2m~3.9m	119.97	1.283		456.16	4.61	45.23
3.9m~4.5m	119.97	1.481		342.62	3.46	33.97

From above list :

Push-Pull L=1.0m~1.7m is non-elastic buckle;

Push-Pull L1.7m~4.5m are elastic-buckle..