

# Thin circular open tube of uniform thickness

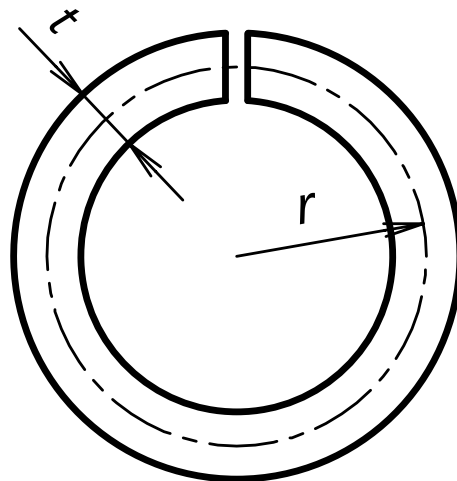


Fig. 1 - Thin circular open tube of uniform thickness

## Values for calculation:

Twisting moment	$T$	1000	Nm
Radius	$r$	100	mm
Dimension	$t$	10	mm
Length	$L$	1000	mm
Modulus of rigidity	$G$	80000	MPa

## Polar moment of inertia:

$$K = \frac{2}{3}\pi r t^3 = \frac{2}{3}\pi \cdot 100 \cdot 10^3 = 209439.5 \text{mm}^4$$

## Angle of twist:

$$\theta = \frac{T \cdot 10^3 \cdot L}{KG} = \frac{1000 \cdot 10^3 \cdot 1000}{209439.5 \cdot 80000} = 0.06 \text{rad}$$

## Torsion stress:

$$\tau_{max} = \frac{10^3 T (6\pi r + 1.8t)}{4\pi^2 r^2 t^2} = \frac{10^3 \cdot 1000 (6\pi \cdot 100 + 1.8 \cdot 10)}{4\pi^2 \cdot 100^2 \cdot 10^2} = 48.2 \text{MPa}$$