Hollow, this-walled section of uniform thickness

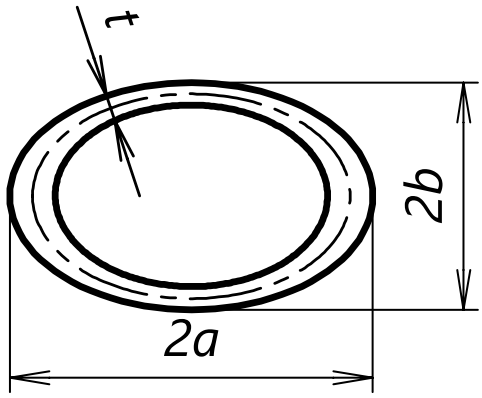

Fig. 1 - Hollow, this-walled section of uniform thickness

Values for calculation:

Twisting moment	T	1000	Nm
Dimension 1	a	100	mm
Dimension 2	b	60	mm
Dimension 3	t	4	mm
Length	L	1000	mm
Modulus of rigidity	G	80000	MPa

$$U = \pi\left(a+b-t\right)\left[1+0.258\frac{\left(a-b\right)^2}{\left(a+b-t\right)^2}\right]$$
$$= \pi\left(100+60-4\right)\left[1+0.258\frac{\left(100-60\right)^2}{\left(100+60-4\right)^2}\right] = 498.4$$

Polar moment of inertia:

$$K = \frac{4\pi^2 t\left[\left(a-\frac{1}{2}t\right)^2\left(b-\frac{1}{2}t\right)^2\right]}{U} = \frac{4\pi^2 4\left[\left(100-\frac{1}{2}4\right)^2\left(60-\frac{1}{2}4\right)^2\right]}{498.4}$$
$$= 10236460.9\text{mm}^4$$

Angle of twist:

$$\theta = \frac{T\cdot 10^3\cdot L}{KG} = \frac{1000\cdot 10^3\cdot 1000}{10236460.9\cdot 80000} = 0.001\text{rad}$$

Torsion stress:

$$\tau_{average} = \frac{10^3 T}{2\pi t\left(a-\frac{1}{2}t\right)\left(b-\frac{1}{2}t\right)} = \frac{10^3\cdot 1000}{2\pi 4\left(100-\frac{1}{2}4\right)\left(60-\frac{1}{2}4\right)} = 7\text{MPa}$$