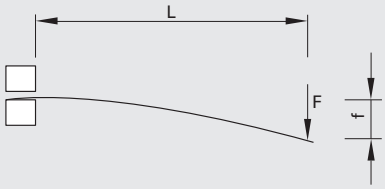
# Extrusion Description Key

| | | |
|---|---|---|
| E | 70000 N/mm² | E-modulus |
| F | [N] | Load |
| $F_G$ | [N] | Dead load of structure |
| f | [mm] | Deflection |
| L | [mm] | Length |
| I | [cm⁴] | Moment of inertia |
| W | [cm³] | Section modulus |
| I;W | see Extrusion Data Sheets | |
| σ max. | 70 N/mm² (recommendation) | Maximum rated bending stress |

# Deflection Calculations

Load case example 1




**Load case example 1**

Deflection by force F

$$f = \frac{F*L^3}{3*E*I*10^4} (mm)$$

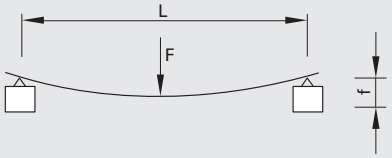
Deflection under own weight

$$f = \frac{F_G*L^3}{8*E*I*10^4} (mm)$$

Bending stress σ max.

$$\sigma = \frac{F*L}{W*10^3} (N/mm^2)$$

Load case example 2




**Load case example 2**

Deflection by force F

$$f = \frac{F*L^3}{48*E*I*10^4} (mm)$$

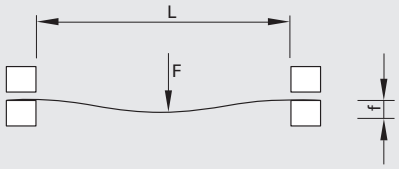
Deflection under own weight

$$f = \frac{5*F_G*L^3}{384*E*I*10^4} (mm)$$

Bending stress σ max.

$$\sigma = \frac{F*L}{4*W*10^3}$$

Load case example 3




**Load case example 3**

Deflection by force F

$$f = \frac{F*L^3}{192*E*I*10^4} (mm)$$

Deflection under own weight

$$f = \frac{F_G*L^3}{384*E*I*10^4} (mm)$$

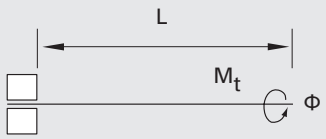
Bending stress σ max.

$$\sigma = \frac{F*L}{}$$

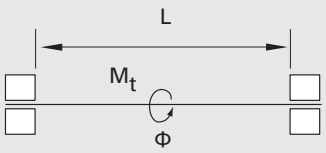
# Torsion Calculations

The following equations are applicable to the calculation of the torsion angle (Φ):

Load case example 1




Load case example 2




**Key:**

$M_t$ = Torque in Nmm

L = Extrusion length in mm

$I_t$ = Torsional moment in $cm^4$

G = 26000 $N/mm^2$

Φ = Torsion angle in degrees

**Load case example 1**

$$\Phi = \frac{180° * M_t * L}{\pi * G * I_t * 10^4} (mm)$$

**Load case example 2**

$$\Phi = \frac{180° * M_t * L}{\pi * 4 * G * I_t * 10^4} (mm)$$

**Checking the shear stress**

The critical factor for failure of an extrusion subject to torsional load is in practice not so much the exceeding of the maximum approved torsional load applied to the extrusion, but rather elastic deformation (torsion). This deformation will affect the functioning of any parts to be assembled onto the extrusion, and so a more torsion-resistant extrusion must be selected, well before the approved maximum values for the torsional load have been reached.