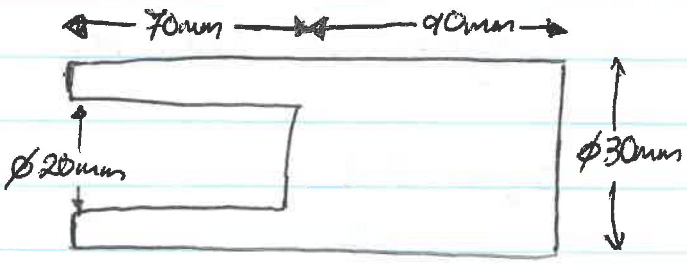

$\sigma_{max} = 125 MPa$

$E = 100 GPa$

PART A:

$$\sigma = \frac{F}{A}$$

$$125\times10^6 = \frac{F}{\frac{\pi}{4}(0{,}03^2 - 0{,}02^2)}$$

$$F = 49{,}087 kN$$

PART B:

$$\sigma = \frac{F}{A}$$

$$F = \sigma \times A$$

$$= 125\times10^6 \times \frac{\pi}{4}(0{,}03^2)$$

$$= 88{,}357 kN$$

If a force of 88,357 kN is applied then the stress in part A:

$$\sigma = \frac{88{,}357 \times 10^3}{\frac{\pi}{4}(0{,}03^2 - 0{,}02^2)}$$

$= 22{,}5 MPa$ which exceeds σ_{max}

∴ applied load is 49,087 kN.

Change in length of PART A:

$$x_A = \frac{Fl}{AE}$$

$$= \frac{49{,}087 \times 10^3 \times 70 \times 10^{-3}}{\frac{\pi}{4}(0{,}03^2 - 0{,}02^2) \times 100 \times 10^9}$$

$$= 0{,}087\,mm$$

Change in length of PART B:

$$x_B = \frac{Fl}{AE}$$

$$= \frac{49{,}087 \times 10^3 \times 90 \times 10^{-3}}{\frac{\pi}{4}(0{,}03^2) \times 100 \times 10^9}$$

$$= 0{,}0625\,mm$$

Total change in length:

$$X = X_A + X_B$$

$$= 0{,}087\,mm + 0{,}0625\,mm$$

$$= 0{,}149\,mm$$