

Opmerkingen: Zie §2.6.5, blz. 39 t/m 41

Antwoord:

$$\Delta \ell = -3,8 \text{ mm}$$

Toelichting:

$$A(x) = \pi \left\{ r_2 - (r_2 - r_1) \frac{x}{\ell} \right\}^2$$

$$\varepsilon(x) = -\frac{F}{EA} = -\frac{F}{E \cdot \pi \left\{ r_2 - (r_2 - r_1) \frac{x}{\ell} \right\}^2}$$

$$\begin{aligned} \Delta \ell &= \int_0^\ell \varepsilon dx = -\frac{F}{\pi E} \int \frac{dx}{\left\{ r_2 - (r_2 - r_1) \frac{x}{\ell} \right\}^2} = \\ &= -\frac{F}{\pi E} \frac{\ell}{r_2 - r_1} \left. \frac{1}{\left\{ r_2 - (r_2 - r_1) \frac{x}{\ell} \right\}} \right|_0^\ell = -\frac{F \ell}{\pi E \cdot r_1 \cdot r_2} = -3,8 \text{ mm} \end{aligned}$$