Answer on Question #51924-Physics-Field Theory

Expansion joints are used for materials that easily expand and contract depending upon its temperature. How much expansion can take place for a brass pipe 25.8 m long that experiences temperature changes of 75.2°C?

3.44 cm 5.90 cm 3.69 cm 1.23 cm

Solution

Linear expansion formula is

$$l = l_0(1 + \alpha \Delta T),$$

where l is the length after expansion, l_0 is the length before expansion, ΔT is the change in temperature, α is the coefficient of linear expansion.

The coefficient of linear expansion for brass is

$$\alpha = 0.000019 \frac{1}{°C}.$$

So,

$$\Delta l = l_0 \alpha \Delta T = 25.8 \text{ m} \cdot 0.000019 \frac{1}{°C} \cdot 75.2°C = 0.0369 \text{ m} = 3.69 \text{ cm}.$$

Answer: 3.69 cm.