A coil of wire has a resistance of 250Ω at 20 degrees Celsius and a resistance of 251Ω at 35 degrees Celsius. What is its temperature coefficient of resistance?

a. 45×10^−4/degrees Celsius

b. $35×10^−3/degrees Celsius

c. 26×10^−4/degrees Celsius

d. 40×10^−5/degrees Celsius

Solution

Resistance values for conductors at any temperature other than the standard temperature (usually specified at 20 Celsius) on the specific resistance table must be determined through yet another formula:

$$R = R_{ref}\left(1 + \alpha\left(T - T_{ref}\right)\right)$$

Where

R - Conductor resistance at temperature T.

R_{ref} - Conductor resistance at reference temperature T_{ref}, usually 20 degrees Celsius.

α - Temperature coefficient of resistance for the conductor material.

T - Conductor temperature in degrees Celsius.

T_{ref} – Reference temperature that α is specified at for the conductor material.

$$\alpha = \frac{R - R_{ref}}{R_{ref}\left(T - T_{ref}\right)} = \frac{251 - 250}{250(35 - 20)} = 2.6 \times 10^{-4}/\text{degrees Celsius}$$

Answer: c. 2.6×10^{-4}/degrees Celsius.