

WEEK 2

Wednesday, October 16, 2019 12:36 AM

Musa Bayzada

Last week I had to leave early for some special reason. (Sorry 😊) I learned the subject by doing research on the internet.

And I calculated on the question I found on the internet.

<https://docplayer.biz.tr/30275601-3-bolum-ornek-sorular.html>

Consider a 1.2-m-high and 2 m-wide double-pane window consisting of two 3-mm- thick layers of glass ($k = 0.78 \text{ W/m} \cdot ^\circ\text{C}$) separated by a 12-mm-wide stagnant air space ($k = 0.026 \text{ W/m} \cdot ^\circ\text{C}$). Determine the steady rate of heat transfer through this double-pane window and the temperature of its inner surface.

room temperature is 24°C when the outdoor temperature is -5°C

Take the convection heat transfer coefficients on the inner and outer surfaces of the window to be $h_1 = 10 \text{ W/m}^2 \cdot ^\circ\text{C}$ and $h_2 = 25 \text{ W/m}^2 \cdot ^\circ\text{C}$, which includes the effects of radiation.

The total resistance

$$A = 1.2 \times 2 = 2.4$$

$$R_{g1} = R_{g2} = L_{g1} / k_g \times A = 0.003 / 0.78 \times 2.4 = 0.0016 \text{ } ^\circ\text{C/W}$$

$$R_{airgrab} = L_{airgrab} / k_{airgrab} \times A = 0.012 / 0.026 \times 2.4 = 0.1923 \text{ } ^\circ\text{C/W}$$

$$R_{conv1} = 1 / h_1 \times A = 1 / 10 \times 2.4 = 0.0416 \text{ } ^\circ\text{C/W}$$

$$R_{conv2} = 1 / h_2 \times A = 1 / 25 \times 2.4 = 0.0166 \text{ } ^\circ\text{C/W}$$

$$R_{tot} = R_{conv1} + R_{conv2} + 2 \times R_g + R_{airgrab} = 0.0416 + 0.0166 + 2 \times 0.0016 + 0.1923 = 0.2537 \text{ } ^\circ\text{C/W}$$

$$Q = \Delta T / R_{tot} = 29 / 1.923 = 15.08 \text{ W}$$

$$Q = T_{inff1} - T_{s1} / R_{conv1}$$

$$15.08 = 24 - T_{s1} / 0.0416 = 23.37 \text{ } ^\circ\text{C}$$