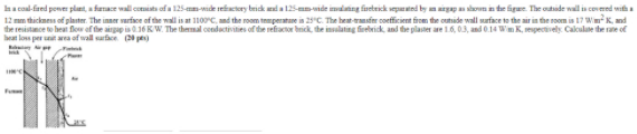
Question: In a coal-fired power plant, a furnace wall consists of a 125-mm-...



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Expert Answer

12345678 answered this
5,503 answers

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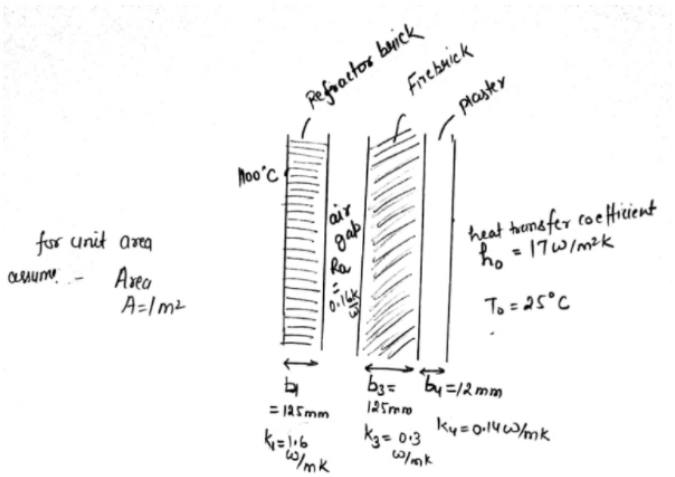


Thermal Resistance due to Refractor brick

$$R_1 = \frac{b_1}{k_1 A} = \frac{125 \times 10^{-3}}{1.6 \times 1}$$

Thermal Resistance due to air gap

$$R_a = 0.16 \text{ k/w}$$

Thermal Resistance due to fire brick

$$R_3 = \frac{b_3}{k_3 A} = \frac{125 \times 10^{-3}}{0.3 \times 1}$$

Thermal Resistance due to Plaster

$$R_4 = \frac{b_4}{k_4 A} = \frac{12 \times 10^{-3}}{0.14 \times 1}$$

Thermal Resistance due to Out side heat transfer coefficient

$$R_o = \frac{1}{h_o A} = \frac{1}{17 \times 1}$$

total Net thermal Resistance

$$R = R_1 + R_a + R_3 + R_4 + R_o$$

$$= \frac{0.125}{1.6} + 0.16 + \frac{0.125}{0.3} + \frac{0.012}{0.14} + \frac{1}{17}$$

$$= 0.799329 \text{ k/w}$$

Overall rate of heat loss per unit area of the wall surface

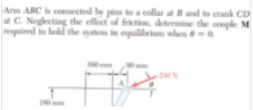
$$q = \frac{T_w - T_o}{R} = \frac{(1100 - 25)}{0.799329}$$

$$\boxed{q = 1344.8772 \text{ w}}$$ Answer

Comment >

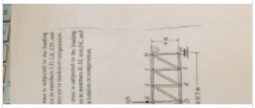
Up next for you in Mechanical Engineering

Arm ABC is connected by pins to a collar at B and to crank CD at C. Neglecting the effect of friction, determine...



See answer

The Pratt bridge truss is subjected to the loading shown. Determine the force in members LD, LK, CD, an...



See answer

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Q: 3. In a coal-fired power plant, a furnace wall consists of a 125-mm-wide refractory brick and a 125-mm-wide insulating firebrick separated by an airgap as shown in the figure. The outside wall is covered with a 12 mm thickness of plaster. The inner surface of the wall is at 1100°C, and the roomi temperature is 25°C. The heat-transfer coefficient from the outside wall surface to the...

A: See answer