

Assignment 3. FTorresPerez

domingo, 20 de octubre de 2019 08:09 p. m.

Previous Results:

$$R_{total} = 6,8122 \text{ }^{\circ}\text{C}/W$$

$$\dot{Q} = \frac{\Delta T}{R_{Tot}} = \frac{20 - (-10)}{6,8122} = \frac{30}{6,8122} = 4,4038 W$$

Same question, with different brick:

$$A = 3m * 5m = 15 m^2$$

$$T(\text{foam}) = 0.03 m$$

$$k(\text{foam}) = 0,026 W/m^{\circ}\text{C}$$

$$T(\text{plaster1}) = 0.02 m$$

$$k(\text{plaster}) = 0,022 W/m^{\circ}\text{C}$$

$$T(\text{plaster2}) = 0.015 m$$

$$T(\text{brick}) = 0.32 m$$

$$k(\text{brick}) = 0,72 W/m^{\circ}\text{C}$$

$$h_1 = 10 W/m^2 \cdot ^{\circ}\text{C}$$

$$h_2 = 40 W/m^2 \cdot ^{\circ}\text{C}$$

$$T(\text{inf})_1 = 20 ^{\circ}\text{C}$$

$$T(\text{inf})_2 = 10 ^{\circ}\text{C}$$

$$R_{conv1} = \frac{1}{h_1 * A} = \frac{1}{10 * (1 * 0,25)} = \frac{1}{10 * 0,25} = \frac{1}{2,5} = 0,4 ^{\circ}\text{C}/W$$

$$R_{conv2} = \frac{1}{h_2 * A} = \frac{1}{40 * (1 * 0,25)} = \frac{1}{40 * 0,25} = \frac{1}{10} = 0,1 ^{\circ}\text{C}/W$$

$$R(\text{foam}) = \frac{T(\text{foam})}{(K(\text{foam}) * A)} = \frac{0,03}{0,026 * 0,25} = \frac{0,03}{0,0065} = 4,6153 ^{\circ}\text{C}/W$$

$$R(\text{plaster1}) = \frac{T(\text{plaster1})}{(K(\text{plaster1}) * A)} = \frac{0,02}{0,22 * 0,25} = \frac{0,02}{0,055} = 0,3636 ^{\circ}\text{C}/W$$

R(parallel)

$$R_{plaster2} = \frac{T(\text{plaster2})}{(K(\text{plaster}) * A)} = \frac{0,32}{0,22 * 0,015} = \frac{0,32}{0,0033} = 96,9696 ^{\circ}\text{C}/W$$

$$R_{brick2} = \frac{T(\text{brick})}{(K(\text{brick}) * A)} = \frac{0,32}{0,72 * 0,22} = \frac{0,32}{0,1584} = 2,0202 ^{\circ}\text{C}/W$$

$$\frac{1}{R(\text{parallel})} = \frac{1}{R(\text{brick2})} + \frac{1}{R(\text{plaster2})} + \frac{1}{R(\text{plaster2})}$$

$$\frac{1}{R(\text{parallel})} = \frac{1}{2,0202} + \frac{1}{96,9696} + \frac{1}{96,9696}$$

$$\frac{1}{R(\text{parallel})} = 0,4950 + 0,0103 + 0,0103$$

$$\frac{1}{R(\text{parallel})} = 0,5156$$

$$R(\text{parallel}) = \frac{1}{0,5156}$$

$$R(\text{parallel}) = 1,9394 \text{ }^{\circ}\text{C/W}$$

$$R_{tot} = R_{conv_1} + R_{(foam)} + R_{(plaster1)} + R_{(parallel)} + R_{(plaster1)} + R_{conv_2}$$

$$R_{tot} = 0,4 + 4,6153 + 0,3636 + 1,9394 + 0,3636 + 0,1 = 7,7819 \text{ }^{\circ}\text{C/W}$$

$$\dot{Q} = \frac{\Delta T}{R_{Tot}} = \frac{20 - (-10)}{7,7819} = \frac{30}{7,7819} = 3,8550 \text{ W}$$

Increasing the thickness of the wall through the bricks is still useless, since \dot{Q} is the same number, even though we have augmented the thickness of the bricks by twice. Once again, what makes the difference is the insulator, which in this case is the foam.

Simplified wall exercise:

	Urethane Rigid Foam	Plywood
Outside Air	0,03	0,03
Wood bevel l.	0,14	0,14
fiberboard(13mm)	0,23	0,23
Urethane R.F.	(0,98*90/25) 3,528	No
Plywood	No	(0,11*90/25) 0,7615
Gypsum board	0,079	0,079
Inside surface	0,12	0,12

$$R'_{URF} = 0.03 + 0.14 + 0.23 + 3,528 + 0.079 + 0.12 = 4,127 \text{ m}^2 \cdot ^{\circ}\text{C/W}$$

$$R'_{Plywood} = 0.03 + 0.14 + 0.23 + 0,7605 + 0.079 + 0.12 = 1,3605 \text{ m}^2 \cdot ^{\circ}\text{C/W}$$