martes, 22 de octubre de 2019 2:22 p.m.

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1 Finalize the composite wall question by finding the heat transfer rate.

$$= R_{total} = R_{conv1} + R_f + R_p + \frac{1}{R_{p1}} + \frac{1}{R_b} + \frac{1}{R_{p2}} + R_p + R_{conv2}$$

$$= R_{total} = 0.4 + 4.61 + 0.36 + \frac{1}{48.48} + \frac{1}{1.01} + \frac{1}{48.48} + 0.36 + 0.1$$

$$= 6.86\,° \frac{C}{W}$$

$$\dot{Q} = \frac{T1 - T2}{R_{Total}}$$

$$= \frac{20-(-10°C)}{6.86°C/W}$$

$$= 4.37\ W$$

- $R_{conv1} = 0{,}4 \frac{C}{W}$
- $R_{foam} = 4{,}61 \frac{C}{W}$
- $R_{plaster} = 0{,}36 \frac{C}{W}$
- $R_{p1} = 48{,}48 \frac{C}{W}$
- $R_b = 1{,}01 \frac{C}{W}$
- $R_{conv2} = 0{,}1 \frac{C}{W}$

Solve the same question while the thickness of the brick is increased to 32 cm and comment on the results.

$$= R_{total} = R_{conv1} + R_f + R_p + \frac{1}{R_{p1}} + \frac{1}{R_b} + \frac{1}{R_{p2}} + R_p + R_{conv2}$$

$$= R_{total} = 0.4 + 4.61 + 0.36 + \frac{1}{96.96} + \frac{1}{2.02} + \frac{1}{96.96} + 0.36 + 0.1$$

$$= 6.34 \circ \frac{C}{W}$$

$$\dot{Q} = \frac{T1 - T2}{R_{Total}}$$

$$= \frac{20-(-10°C)}{6.34°C/W}$$

$$= 4.73\ W$$

- $R_{conv1} = 0{,}4\frac{C}{W}$
- $R_{foam} = 4{,}61\frac{C}{W}$
- $R_{plaster} = 0{,}36\frac{C}{W}$
- $R_{p1} = 96.96\frac{C}{W}$
- $R_b = 2.02\frac{C}{W}$
- $R_{conv2} = 0{,}1\frac{C}{W}$

By increasing the thickness of the brick, the total resistance of the wall decreases but not significantly. The resistance of the brick and the plaster doubles, because it is inversely proportional to the total resistance.

2 You should solve again the simplified wall calculation procedure replacing the glass fiber one with urethane rigif foam andwhile replacing the fiberboard with plywood and find the two R_unit values.

	Wood	Insulation
Outside air winter	$0{,}030\frac{m^2C}{W}$	$0{,}030\frac{m^2C}{W}$
Wood Bevel	$0{,}14\frac{m^2C}{W}$	$0{,}14\frac{m^2C}{W}$

	vv	*vv*
Plywood	$0{,}011\frac{m^2C}{W}$	$0{,}011\frac{m^2C}{W}$
Urethane rigid foam 90 mm Insulation		$3{,}52\frac{m^2C}{W}$
Wood stud	$0{,}63\frac{m^2C}{W}$	
Gypsum Board	$0{,}079\frac{m^2C}{W}$	$0{,}079\frac{m^2C}{W}$
Inside Air	$0{,}12\frac{m^2C}{W}$	$0{,}12\frac{m^2C}{W}$
R Value	$1{,}01\frac{m^2C}{W}$	$3{,}9\frac{m^2C}{W}$