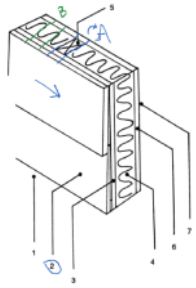
Amirhossein Roustaei 10689304 week 4
29/10/2019

٢٩ أكتبر ٢٠١٩ سه شنبه، ٠٤:٤١ ب.ظ

1.

	Section A	Section B
1.Outside Surface	0.03	0.03
2.Wood Bevel Lapped Siding (13mm*200mm)	0.14	0.14
3.Plywood (13mm)	0.11	0.11
4.Urethane Rigid Foam Insulation (90mm)	No	0.98*90/25=3.528
5.Wood Stud (90mm)	0.63	No
6.Gypsum Wallboard (13mm)	0.079	0.079
7.Inside Surface	0.12	0.12



Section A : Section with wood
Section B : Section with insulation

$$R'_{withWood} = 0.03 + 0.14 + 0.11 + 0.63 + 0.079 + 0.12 = 1.109\ m^2.°\frac{C}{W}$$

$$R'_{withIns} = 0.03 + 0.14 + 0.11 + 3.528 + 0.079 + 0.12 = 4.007\ m^2.°\frac{C}{W}$$

$$U_{withWood} = \frac{1}{R'_{wood}} = \frac{1}{1.109} = 0.9017\frac{W}{m^2°C}$$

$$U_{ins} = \frac{1}{R'_{ins}} = \frac{1}{4.007} = 0.2495\ \frac{W}{m^2°C}$$

$$A_{wall} = 50 * 2.5 * 0.8 = 100\ m^2$$

$$U_{tot} = U_{wood} \times \frac{A_{wood}}{A_{tot}} + U_{ins} \times \frac{A_{ins}}{A_{tot}} = U_{wood} \times 0.25 + U_{ins} \times 0.75 = 0.9017 \times 0.25 + 0.2495 \times 0.75 = 0.4125\frac{W}{m^2°C}$$

$$\Delta T = 22 - (-2) = 24°C$$

$$Q_{tot} = U_{tot} \times A_{tot} \times \Delta T = 0.4125 * 100 * 24 = 990\ W$$

2.

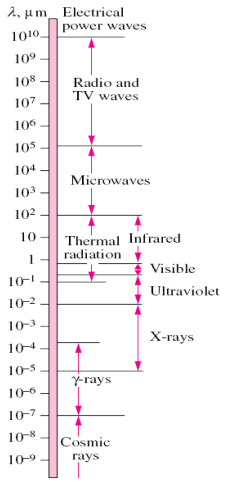
The term radiation is usually used for the phenomena which can be described by the transportation of energy in space. Most typical examples of radiation are light and heat. In contrary to convection and conduction, radiation doesn't require material to take place. There is a type of radiation which composed of electromagnetic waves. They represent the energy emitted by matter as a result of the changes in the electronic configuration of the molecules . Once the energy which is transported by electromagnetic waves contact with another medium it causes increase in the temperature of medium because of increasing the movement of the particles of that medium.

The speed of the electromagnetic waves which is shown by C is a constant amount equals approximately to 299792 km/s . It's particular frequency is indicated by V and it's wavelength is indicated by .

We have this formula for the relations between this factors:

$$\lambda = \frac{c}{\nu}$$

Visible light, is an electromagnetic radiation with a wavelength ranging from 380 nm of violet to 760 nm of red.

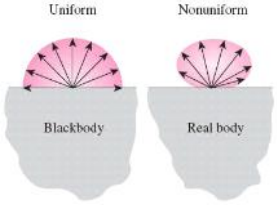


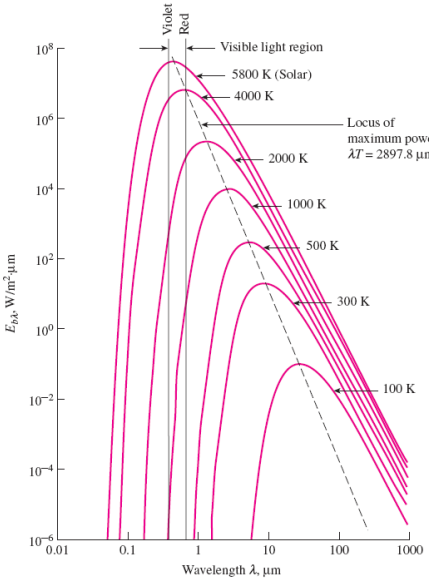
A blackbody is a body that emits the maximum amount of radiation.

The radiation energy which can be emitted by a body which is called black body :

$E_b(T) = \sigma T^4 \qquad (\mathrm{W/m^2}) \qquad \sigma = 5.670 \times 10^{-8}\ \mathrm{W/m^2 \cdot K^4}$

Black body emissive power





- The emitted radiation is a function of wavelength
- The emitted radiation increased with increasing temperature
- A larger fraction of the radiation is emitted at shorter wavelength at higher temperatures
- Surfaces at T<800 k emit almost entirely in the infrared region and thus are not visible to the human eye unless they reflect light coming from other sources.
- The radiation emitted by the sun reaches it's peak in the visible light region. For this reason we can see it