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## TASK 1. SIMPLIFIED WALL CALCULATION

| | WOOD | INSULATION |
|---|---|---|
| **OUTSIDE AIR WINTER** | $0{,}030\frac{m^2C}{W}$ | $0{,}030\frac{m^2C}{W}$ |
| **WOOD BEVEL** | $0{,}14\frac{m^2C}{W}$ | $0{,}14\frac{m^2C}{W}$ |
| **PLYWOOD (13 MM)** | $0{,}011\frac{m^2C}{W}$ | $0{,}011\frac{m^2C}{W}$ |
| **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** | $\mathbf{1{,}01\frac{m^2C}{W}}$ | $\mathbf{3{,}9\frac{m^2C}{W}}$ |

$$U_{total} = 0{,}25\,U_{wood} + 0{,}75\,U_{ins}$$

$$U_{total} = 0{,}25\ x\ 0{,}99\frac{\mathrm{W}}{\mathrm{m^2\ °C}} + 0{,}75\ x\ 0{,}256\frac{\mathrm{W}}{\mathrm{m^2\ °C}}$$

$$U_{total} = 0{,}2475\frac{\mathrm{W}}{\mathrm{m^2\ °C}} + 0{,}192\frac{\mathrm{W}}{\mathrm{m^2\ °C}}$$

$$U_{total} = 0{,}4395\frac{\mathrm{W}}{\mathrm{m^2\ °C}}$$

$$U_{wood} = \frac{1}{R_{wood}} \qquad U_{ins} = \frac{1}{R_{ins}}$$

$$U_{wood} = \frac{1}{1{,}01\ m^2\ °C} \qquad U_{ins} = \frac{1}{3{,}9\ m^2\ °C}$$
$$W \qquad\qquad W$$

$$\boxed{\boldsymbol{U_{wood} = 0{,}99\frac{W}{m^2\ °C}}} \qquad \boxed{\boldsymbol{U_{ins} = 0{,}256\frac{W}{m^2\ °C}}}$$

$$Q_{total} = U\ A_s(T_1 - T_2)$$

$$Q_{total} = 0{,}4395\frac{W}{m^2\ °C} \times\ 100\ m^2 \times\ 24\ °C$$

$$\boxed{\boldsymbol{Q_{total} = 1054.8\ W}}$$

## TASK 2. RADIATION SUMMARY

Radiation is the heat transfer mechanism in which the objects get the thermal equilibrium with its surrounding. It is not necessary to have a physical medium to his propagation; due to that it can be propagated on vacuum. For instance, the heat transfer from the sun.

This propagation is possible because the electromagnetic waves and the energy transported by them and it depends on the wavelength that is defined by the speed of propagation and the frequency.

For us, the thermal radiation is the important in the electromagnetic wave spectrum because is the one in which temperature is produced. It is produced by three different kind of waves: infrared, visible and ultraviolet.

The light and the thermal radiation are directly related, because the visible waves, and the colors, are contained between the thermal radiation range. The color of the different objects that the human eye can see is due to the reflection produced by that material. On the other hand, a material that can emit radiation in the visible range is considered a light source. For instance, the sun and the light of the classroom are light sources and the colors you can see in the environment are because the light reflection of the different materials.

The surfaces between 800 K and 1000 K emit light and are visible to the human eye, defining them as light sources while the surfaces under 800 K do not emit any light and are not visible unless they reflect the light from other light sources.