Summary:

In fact, the heat transfer process in the air layer is different from the solid material layer. The solid material layer transfers heat in a thermally conductive manner. However, in the air layer, three heat transfer modes of radiation, convection and diversion exist, and the heat transfer process is actually the process of heat transfer between the two surfaces, including convective heat transfer and radiation heat transfer.
When the thermal conductivity of the material is constant, the thermal resistance and thickness of the material layer are proportional. In the inter-air layer, the thermal resistance mainly depends on the thickness of the spatial layer on the two interfaces in the interlayer and the radiant heat transfer between the interfaces. Therefore, there is no proportional relationship between the thermal resistance and thickness of the air layer.

Convection is due to the relative movement between the various parts of the fluid at different temperatures and only occurs in the fluid. There are two reasons for convection: fluids of the same temperature, some of which are heated or cooled to create a temperature difference, this is called "natural convection"; by external forces, the fluid is forced to convect, which is called "forced convection"

$$A = 0.8m \cdot 1.5m = 1.2m^2$$

$$R_{conv,1} = \frac{1}{h_1 A} = \frac{1}{\frac{10W}{m^2 \cdot ℃} \cdot 1.2m^2} \approx 0.0833℃/W$$

$$R_{glass,1} = \frac{L_1}{k_1 A} = \frac{0.006m}{\frac{0.78W}{m \cdot ℃} \cdot 1.2m^2} \approx 0.0064℃/W$$

$$R_{air} = \frac{L_2}{k_2 A} = \frac{0.013m}{\frac{0.026W}{m \cdot ℃} \cdot 1.2m^2} \approx 0.4167℃/W$$

$$R_{glass,2} = \frac{L_3}{k_3 A} = \frac{0.006m}{\frac{0.78W}{m \cdot ℃} \cdot 1.2m^2} \approx 0.0064℃/W$$

$$R_{conv,2} = \frac{1}{h_2 A} = \frac{1}{\frac{40W}{m^2 \cdot ℃} \cdot 1.2m^2} \approx 0.0208℃/W$$

$$R_{total} = R_{conv,1} + R_{glass,1} + R_{air} + R_{glass,2} + R_{conv,2} \approx 0.5333℃/W$$

$$Q = \frac{T_{\infty 1} - T_{\infty 2}}{R_{total}} = \frac{20℃ - (-10℃)}{0.5333℃/W} \approx 56.2535W$$

$$\because \dot{Q} = \frac{T_{\infty 1} - T_1}{R_{conv,1}} = \frac{T_{\infty 1} - T_1}{1/h_1 A}$$

$$\therefore T_1 = T_{\infty 1} - \dot{Q} R_{conv,1} \approx 20℃ - 56.2535W \cdot 0.0833\frac{℃}{W} \approx 15.3℃$$