The materials and layers in the building envelope provide resistance to heat flow and determines the building's thermal performance.

Heat transfer characteristics of building envelope like U-value of walls, roof, floor and glazing, shading coefficient, and solar heat gain coefficient play a major role in a building's thermal performance. Specific requirements for U-values, shading coefficient and minimum light transmittance are detailed in this regulation.

Thermal transmittance is the rate of transfer of heat through matter. U-value is an expression used to represent the thermal transmittance of a material or an assembly (such as wall or roof). U-values are expressed in W/m^2K. It is defined as the rate of heat flow in watts (W) through an area of 1 m^2 for a temperature difference across the structure of 1K. Typically lower U-values represent better insulation.

Fig.501.01(2), illustrates the various construction layers in a building envelope. These layers define the overall thermal resistance of the building.
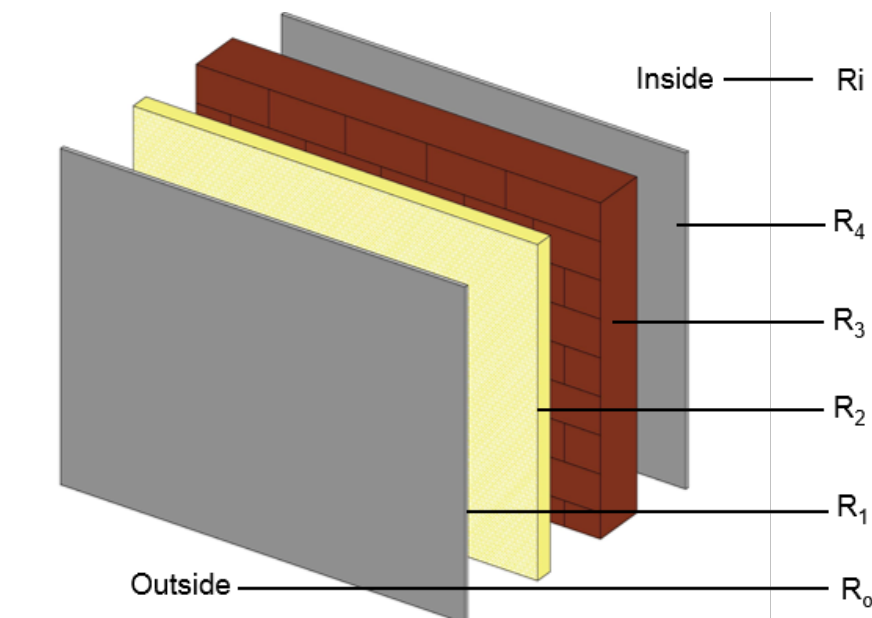

Fig. 501.01(2): Various Construction Layers

U-value of a building element can be calculated using the following equation:

$$U = \frac{1}{R_o + R_1 + R_2 + R_3 + R_4 + R_i}$$

Where,

U is heat transfer coefficient (W/m^2k)

R is thermal resistance for different construction layers, (m^2K/W)

R_i and R_o are different values for air resistance inside and outside the wall, roof or floor

R-value for each material can be calculated as:

$$R_1 = \frac{d_1}{\lambda_1}$$