Product Requirement Document

General

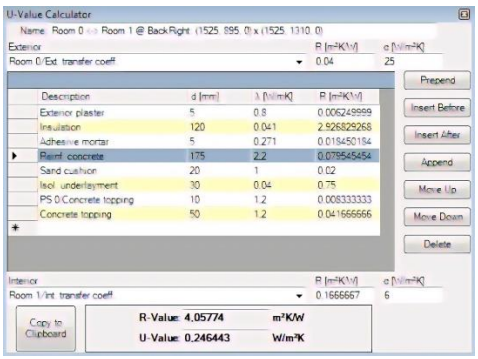
The name of this software is 'U-value Calculator for Wall and Roof'. U-value, the thermal transmittance, is a very important value in Architectural Environment field. It represents the rate of heat flow in Watts across a particular thickness of a material across a temperature difference of 1 kelvin. U-value takes into account the thickness, length and depth of a kind of material, so it is the most useful numerical value to represent the thermal property of a kind of material. As a result, it could assist engineers to choose suitable materials for different parts of a building. Moreover, U-value is a necessary element when Architectural Environment engineers calculate the fabric heat loss of a room of a building by the formula $Q_f = UA \times (t_{indoor} - t_{outdoor})$, which is an important component of the total heat loss of a building. Since U-value is an important element for calculating the energy required and energy loss of a building, and the calculation methods are quite difficult and different from different parts of a building, we decide to design a U-value Calculator to calculate the U-values of wall and roof, which are two important components of a building.

Functions & Algorithm

The function of the software is very simple. All you need to do is to input the thickness and K-value (thermal conductivity) of each wall/roof layer, the calculator will firstly calculate the R-value (thermal resistance) and then calculate the U-value of the wall/roof. The external and internal surface resistance are also taken into consideration. You can directly input the values for the two elements and the final U-value will take these data into calculation. The algorithm behind the U-value calculator is very simple. The thermal resistance R-value can be calculated by the formula $R = \frac{d}{k}$, where d is the thickness of a material and k is the thermal conductivity k-value. Since R-value can be directly added together, and $U = \frac{1}{R}$, U-value can be simply calculated.

Similar Products

There are already similar products in the market, like this one below:



Since the U-value of wall, roof and floor share similar calculation methods, the U-value calculator mostly focus on these elements. Our product also focuses on the U-value of wall and roof with simple user interface and direct running method.