This software is named as U-value Calculator, which can easily and effectively calculate the U-value of different types of materials.

When it comes to the purpose of designing this software, the main consideration is that although the environmental performance of buildings now focuses on the use of carbon, the thermal performance of building materials still needs to be considered, which relates to the safety and comfort of the people living in the buildings.

Concerning the importance of U-value, it is also known as thermal transmittance, the rate of transfer of heat through a structure (which can be a single material or a composite), divided by the difference in temperature across that structure. The units of measurement are W/m^2 K. In most cases, the better-insulated a structure is, the lower the U-value will be.

At present, there are many reference standards for the U value of materials on the network, but the design calculation is often theoretical value, and the specific measurement accuracy depends on many factors, such as the influence of environmental temperature difference, convection and so on. In order to calculate the U value of each material more accurately and conveniently, we designed an online U value calculator. By using our U-value calculator, you can easily compare how the use of different materials, or different thicknesses of materials, can impact the overall thermal performance of a construction. This helps to ensure you specify and install the right thickness of insulation.

The key functions and equations we use are as follows,

$$\boldsymbol{U = \frac{\lambda}{d}}$$

$$\boldsymbol{R = \frac{d}{\lambda}}$$

Where,
U = Thermal Transmittance $(\boldsymbol{W/m^2K})$
R = Thermal Resistance $(\boldsymbol{m^2K/W})$
λ = Thermal Conductivity $(\boldsymbol{W/mK})$
d = Material Thickness $(\boldsymbol{m})$

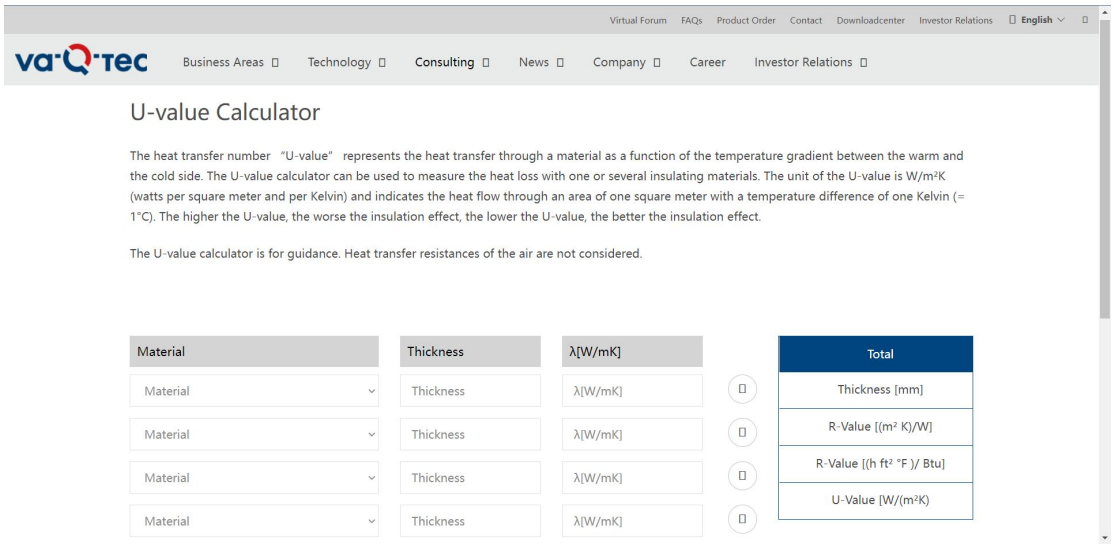
Notice： The U-value of a building element consisting of different layers and surfaces is calculated from the thermal resistances (R-value) of the different parts making up the structure.

$$\boldsymbol{R_{wall} = R_{brick} + R_{airspace} + R_{block} + R_{plaster}}$$

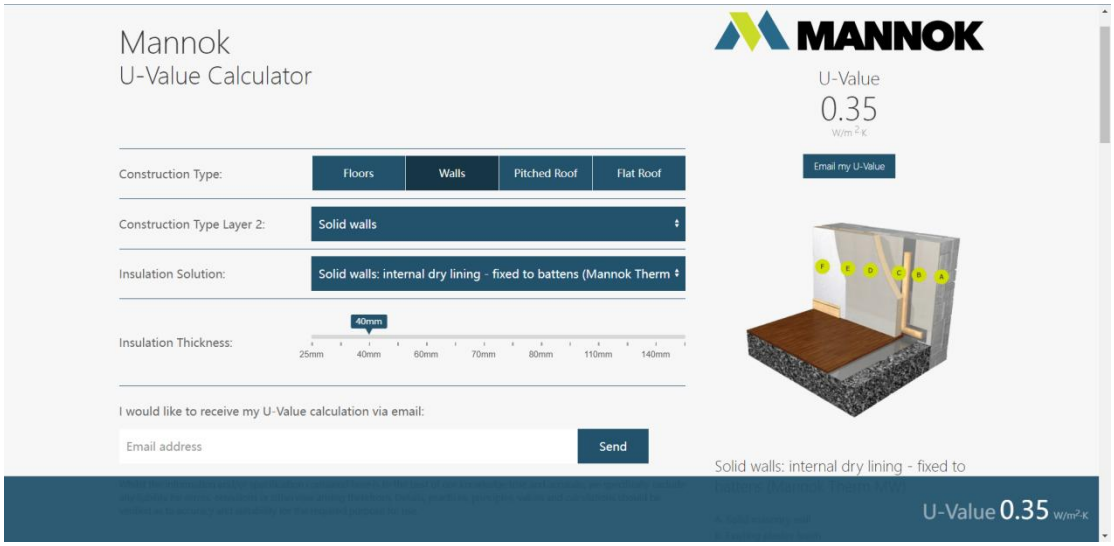
The U-value of a building element is the inverse of the total thermal resistances of the different layers making up the building element.

$$\boldsymbol{U_{wall} = \frac{1}{R_{wall}}}$$

There are two examples of similar products in the market:

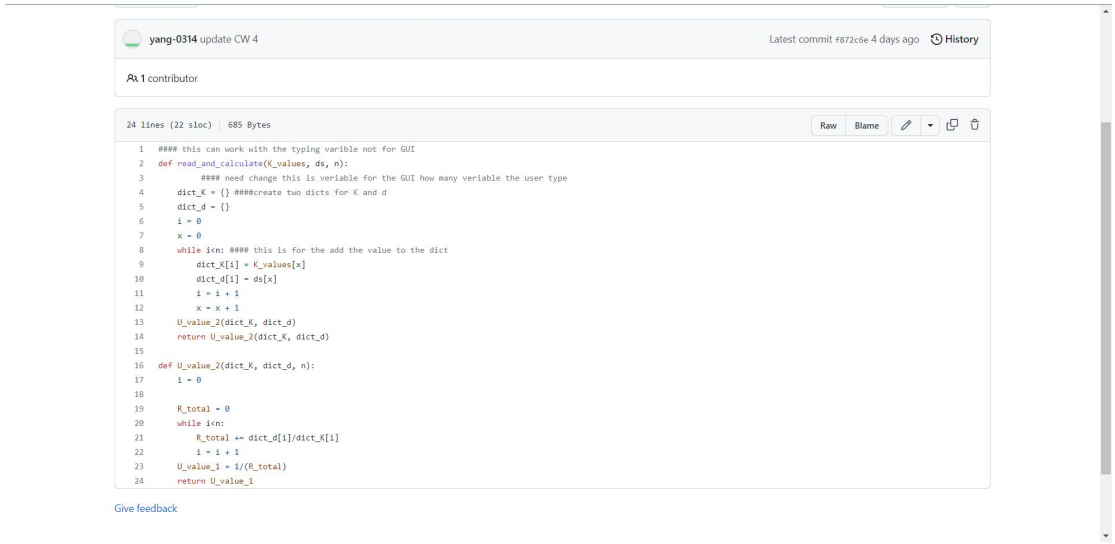


Available at： https://va-q-tec.com/en/u-value-calculator/



Available at：
https://uvaluecalculator.mannokbuild.com/?category=Walls&category2=Solid%20walls&product=11&insulation_thickness=QW%5E40

Here is our core code for calculating the U-value,



yang-0314 update CW 4 — Latest commit f872c6e 4 days ago — History

1 contributor

24 lines (22 sloc) | 685 Bytes — Raw | Blame

```
#### this can work with the typing varible not for GUI
def read_and_calculate(K_values, ds, n):
        #### need change this is veriable for the GUI how many veriable the user type
    dict_K = {} ####create two dicts for K and d
    dict_d = {}
    i = 0
    x = 0
    while i<n: #### this is for the add the value to the dict
        dict_K[i] = K_values[x]
        dict_d[i] = ds[x]
        i = i + 1
        x = x + 1
    U_value_2(dict_K, dict_d)
    return U_value_2(dict_K, dict_d)

def U_value_2(dict_K, dict_d, n):
    i = 0

    R_total = 0
    while i<n:
        R_total += dict_d[i]/dict_K[i]
        i = i + 1
    U_value_1 = 1/(R_total)
    return U_value_1
```

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