

User Guide

The calculator owns two view separately are the Wall U-value calculator and the Floor structure U-value calculator.

The screenshot shows the 'Wall Structure U-value calculation' tab selected. The interface includes the following elements:

- Navigation Tabs:** 'Wall Structure U-value calculation' (active) and 'Floor Structure U-value calculation'.
- Thermal Resistance Inputs:**
 - Air Space Layer Thermal Resistance (in $\text{m}^2\text{k/W}$): 0
 - Outside Surface Thermal Resistance (in $\text{m}^2\text{k/W}$): 0
 - Inside Surface Thermal Resistance (in $\text{m}^2\text{k/W}$): 0
- Material List:** A table with the header 'Name / Thickness (in meter) / Conductivity (in W/mk)' and an empty body.
- Material Input Fields:**
 - Material Name: A dropdown menu.
 - Thickness: A text input field followed by a unit dropdown set to 'm'.
 - Conductivity: A text input field followed by a unit dropdown set to 'W/mk'.
- Buttons:** 'Insert New Material' and 'Remove Selected Material'.
- Output:** A red label 'U-value:' followed by a black text box.
- Action:** A red 'Calculate U-value' button.

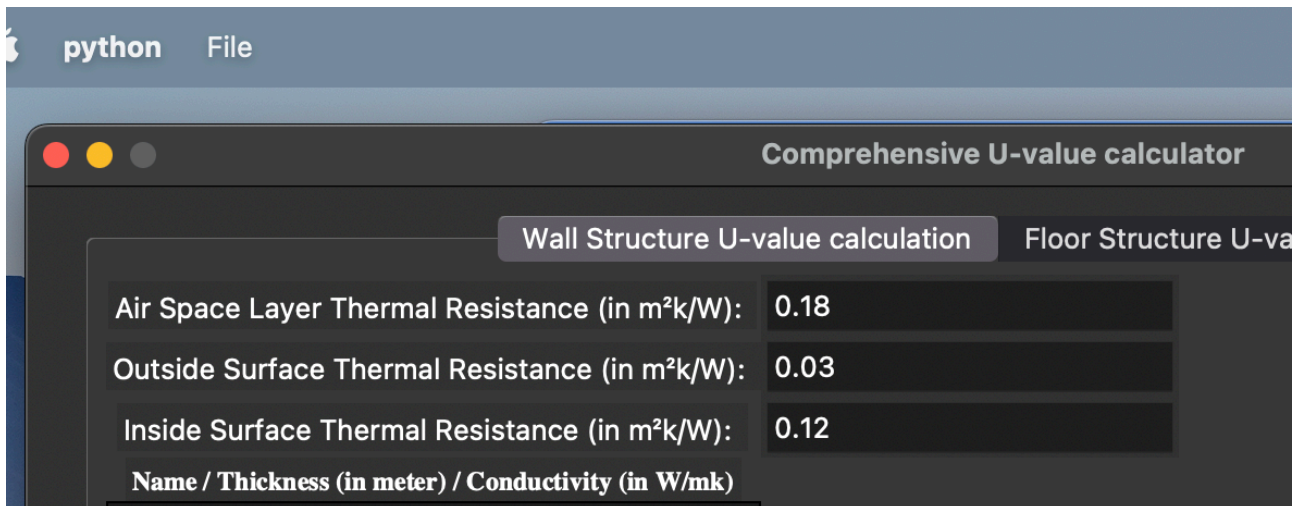
The screenshot shows the 'Floor Structure U-value calculation' tab selected. The interface includes the following elements:

- Navigation Tabs:** 'Wall Structure U-value calculation' and 'Floor Structure U-value calculation' (active).
- Thermal Resistance Inputs:**
 - Air Space Layer Thermal Resistance (in $\text{m}^2\text{k/W}$): 0
 - Outside Surface Thermal Resistance (in $\text{m}^2\text{k/W}$): 0
 - Inside Surface Thermal Resistance (in $\text{m}^2\text{k/W}$): 0
- Material List:** A table with the header 'Name / Thickness (in meter) / Conductivity (in W/mk)' and an empty body.
- Material Input Fields:**
 - Material Name: A dropdown menu.
 - Thickness: A text input field followed by a unit dropdown set to 'm'.
 - Conductivity: A text input field followed by a unit dropdown set to 'W/mk'.
- Buttons:** 'Insert New Material' and 'Remove Selected Material'.
- Output:** A red label 'U-value:' followed by a black text box.
- Action:** A red 'Calculate U-value' button.

Firstly introduce how to use the Wall Structure U-value calculator

If the structure consider the Outside Surface / Inside Surface Thermal Resistance, then enter the values instead of the zeros.

In the same way, enter the unventilated cavity layer thermal resistant value if the air space layer exists.



python File

Comprehensive U-value calculator

Wall Structure U-value calculation Floor Structure U-value calculation

Air Space Layer Thermal Resistance (in m²k/W): 0.18

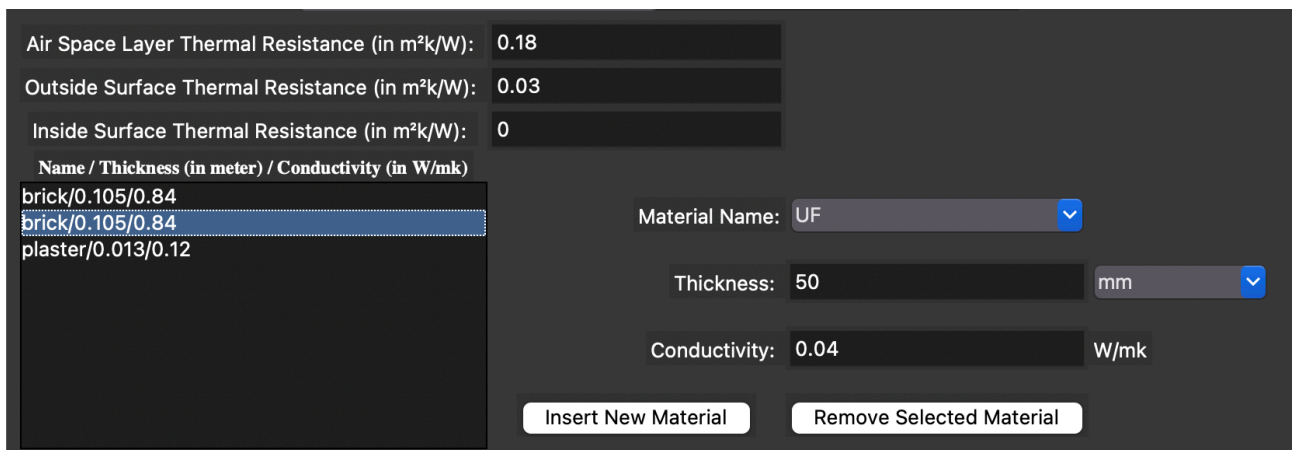
Outside Surface Thermal Resistance (in m²k/W): 0.03

Inside Surface Thermal Resistance (in m²k/W): 0.12

Name / Thickness (in meter) / Conductivity (in W/mk)

Then add each insulation layer materials, there are the optional materials with preset conductivity are choosable. Select by click the arrow right side of the material name enter box.

The thickness support different length unit, finally transferred to the units in meters.



Air Space Layer Thermal Resistance (in m²k/W): 0.18

Outside Surface Thermal Resistance (in m²k/W): 0.03

Inside Surface Thermal Resistance (in m²k/W): 0

Name / Thickness (in meter) / Conductivity (in W/mk)

brick/0.105/0.84

brick/0.105/0.84

plaster/0.013/0.12

Material Name: UF

Thickness: 50 mm

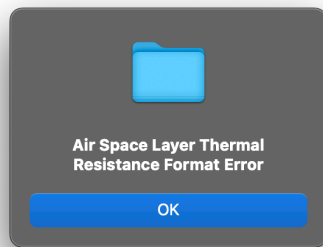
Conductivity: 0.04 W/mk

Insert New Material Remove Selected Material

After fill up the material parameters and add the 'Insert New Material', If one material was selected , new material will be insert in front of the selected materials, else it will be add to the tail of the list.

If the material was wrongly added, just selected the material and click 'Remove Selected Material'

Notice that all the values should be numeric and enter box are filled with the valid datas, else after click the calculate button the error will be pop up.



Example:

An external wall consisting of 105mm brick, 50mm unventilated cavity, 105mm brick and 13mm dense plaster has a severe exposure. Find its U value.

The brick has a thermal conductivity 0.84 W/mK.

Plaster has a thermal conductivity 0.50 W/mK

Resistance of unventilated cavity is 0.18 m²k/W

The screenshot shows a software window titled "Comprehensive U-value calculator". It has two tabs: "Wall Structure U-value calculation" (active) and "Floor Structure U-value calculation". Under the active tab, there are input fields for "Air Space Layer Thermal Resistance (in m²k/W): 0.18", "Outside Surface Thermal Resistance (in m²k/W): 0.03", and "Inside Surface Thermal Resistance (in m²k/W): 0.12". Below these is a list of materials with their names, thicknesses, and conductivities: "plaster/0.013/0.5", "brick wall/0.105/0.84", and "brick wall/0.105/0.84". To the right of this list, there are dropdown menus for "Material Name" (set to "brick wall") and "Thickness" (set to "105 mm"), and a text input for "Conductivity" (set to "0.84 W/mk"). Below these are two buttons: "Insert New Material" and "Remove Selected Material". At the bottom, there is a red "U-values:" label next to a black box containing "1.6502", and a red "Calculate U-value" button.

Easily fill in the datas, and click Calculate button.

For the floor structure U-value calculation, follow the steps:
Firstly enter the total perimeter of the layer and the structure area.
Next, enter the insulation layer thickness and the material thermal conductivity.
Finally click the calculate button to get the U-value (and the P/A ratio)

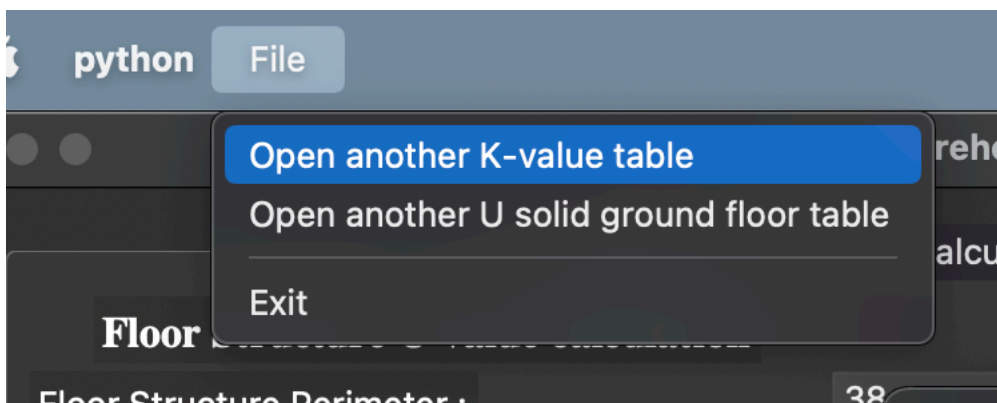
The screenshot shows a software window titled "Comprehensive U-value calculator". It has two tabs: "Wall Structure U-value calculation" and "Floor Structure U-value calculation". The "Floor Structure U-value calculation" tab is active. It contains the following fields and values:

Field	Value	Unit
Floor Structure Perimeter :	38.4	m
Floor Structure Area :	74.25	m ²
Insulation Layer Name(Optional):	insulation layer	
Insulation Layer Thickness:	95	mm
Insulation Layer Thermal Conductivity(in W/mk):	0.04	
U-value of floor structure:	0.2526	
Perimeter / Area ratio (in m/m ²):	0.5171717171717172	

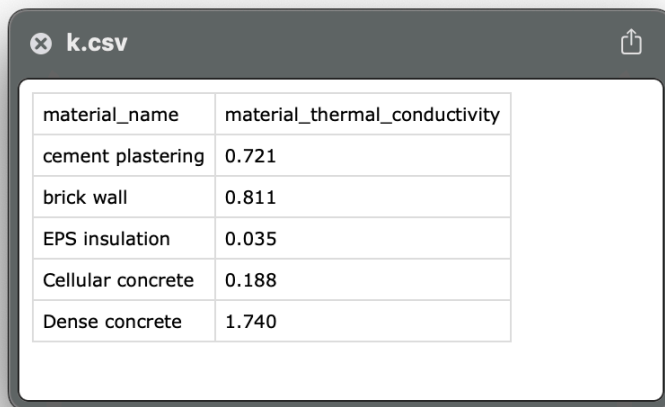
A "Calculate" button is located to the right of the U-value field.

What's the interesting, this software could support you load your own material-thermal conductivity and Floor U-value table files.

Click the 'File' Menu and select 'Open another K-value file'

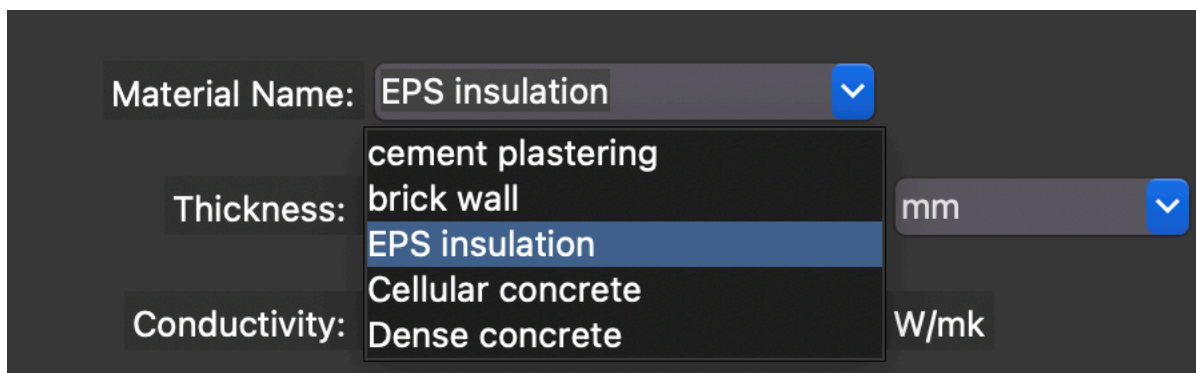


Where the K-value table files should be a '.csv' file look like



material_name	material_thermal_conductivity
cement plastering	0.721
brick wall	0.811
EPS insulation	0.035
Cellular concrete	0.188
Dense concrete	1.740

Selected the preset file and it will be loaded into the software.(The old material presets will not be covered)

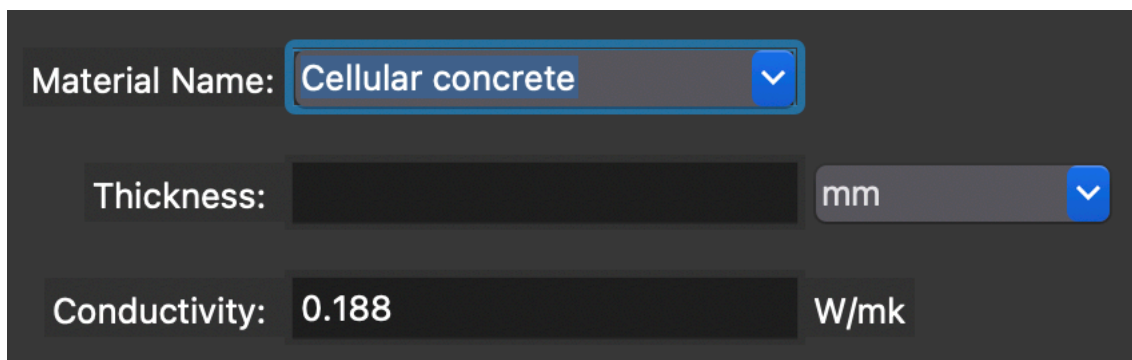


Material Name: EPS insulation

Thickness: cement plastering, brick wall, EPS insulation, Cellular concrete, Dense concrete

Conductivity: mm, W/mk

All the materials will be loaded into the Combobox when click the material, the conductivity values will be changed automatically.

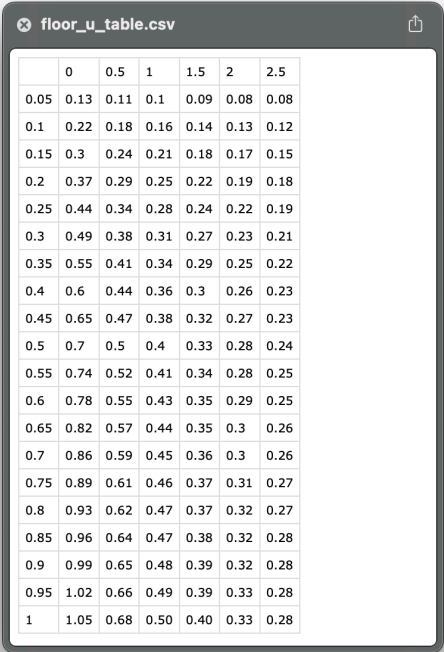


Material Name: Cellular concrete

Thickness: mm

Conductivity: 0.188 W/mk

In the same way to load the new U-value database for the floor structure calculation.
U-value file is also a '.csv' file which looks like



The image shows a screenshot of a CSV file named 'floor_u_table.csv'. The table contains 17 rows and 7 columns. The first column represents floor thickness (d) in meters, ranging from 0.05 to 1.0. The next six columns represent thermal conductivity (k) in W/mK, with values 0, 0.5, 1, 1.5, 2, and 2.5. The table provides U-values for various combinations of these parameters.

	0	0.5	1	1.5	2	2.5
0.05	0.13	0.11	0.1	0.09	0.08	0.08
0.1	0.22	0.18	0.16	0.14	0.13	0.12
0.15	0.3	0.24	0.21	0.18	0.17	0.15
0.2	0.37	0.29	0.25	0.22	0.19	0.18
0.25	0.44	0.34	0.28	0.24	0.22	0.19
0.3	0.49	0.38	0.31	0.27	0.23	0.21
0.35	0.55	0.41	0.34	0.29	0.25	0.22
0.4	0.6	0.44	0.36	0.3	0.26	0.23
0.45	0.65	0.47	0.38	0.32	0.27	0.23
0.5	0.7	0.5	0.4	0.33	0.28	0.24
0.55	0.74	0.52	0.41	0.34	0.28	0.25
0.6	0.78	0.55	0.43	0.35	0.29	0.25
0.65	0.82	0.57	0.44	0.35	0.3	0.26
0.7	0.86	0.59	0.45	0.36	0.3	0.26
0.75	0.89	0.61	0.46	0.37	0.31	0.27
0.8	0.93	0.62	0.47	0.37	0.32	0.27
0.85	0.96	0.64	0.47	0.38	0.32	0.28
0.9	0.99	0.65	0.48	0.39	0.32	0.28
0.95	1.02	0.66	0.49	0.39	0.33	0.28
1	1.05	0.68	0.50	0.40	0.33	0.28

You could extend the value range add more points to this function curve to make the values more precision if it is necessary.