

Material database dialog DELPHIN

6.1.2

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1. Overview

Every DELPHIN project needs material data. There are several ways to import them into a project. Mostly, materials are selected from a database. There are two databases in DELPHIN, a supplied database and a user database. The user database is empty directly after installation and is built up gradually by the user. These materials can be changed and, if necessary, removed again. The supplied database does not allow the user to change, remove or add materials. This database is based on a central system that serves several programmes (DELPHIN, COND, THERAKLES, NANDRAD). Therefore, it also contains materials that can only be used by certain software products. For example, THERAKLES only requires thermal characteristic values for simulation or COND does not require a moisture storage function. As a result, not all materials can be used for every calculation type in DELPHIN. More about this can be found in the chapter ['Filter by Simulation Type'](#).

For the selection of materials from the database, a dialogue exists in DELPHIN. In this tutorial, the dialogue of DELPHIN version 6.1.2 is explained. There are two possibilities to call up this dialogue:

- automatically at the end of the assistant for a new project
- manually from the project material list

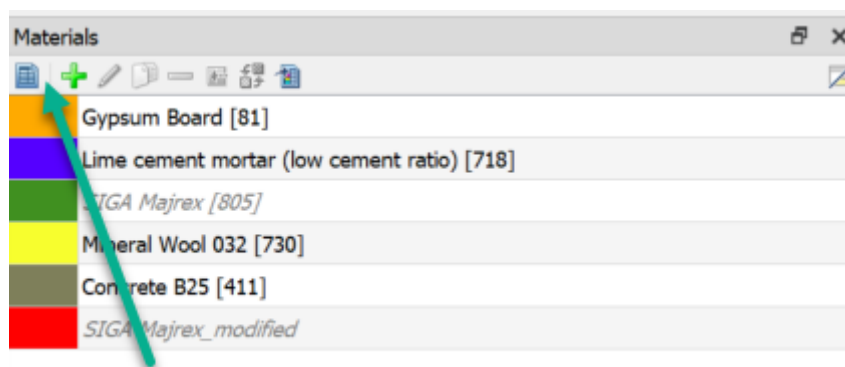


Image 1. Start the material database dialogue from the material list

The database dialogue itself shows all materials of the supplied database and the user database at the start. The user materials are marked in colour (see bitumen in the picture below). Only these can be changed or removed.

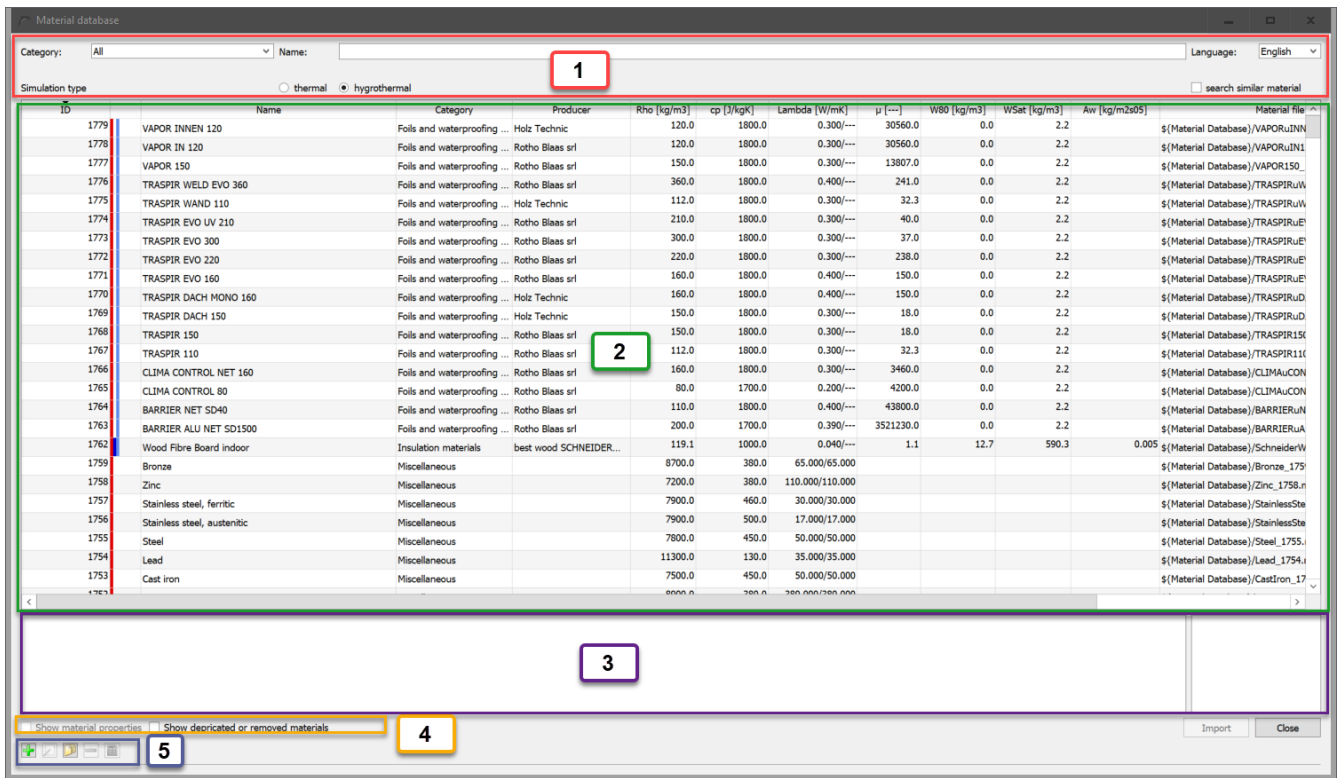


Image 2. View of the material database dialogue with marking of the areas

The image shows the dialogue with marking of the following areas:

1. Filter and language setting
2. Material table
3. Remarks and dates for the selected material
4. Buttons for function graphics and obsolete materials
5. Editing of user materials and material view

2. Filter and language

In the upper part of the dialogue there are input elements for filtering the material table. This can be used to narrow down the selection of materials so that it is easier to select the desired materials.



Image 3. Filter area of the database dialogue

The following filter options are offered:

1. Material category
2. Name and manufacturer
3. Simulation type
4. Materials with similar basic parameters

2.1. Material category

This selection box allows classification into the following categories:

- All - *no filtering*
- Coatings - *paints and similar*
- Plaster and mortar - *also screed*
- Building brick - *all types of bricks*
- Natural stone
- Concrete containing building materials - *concretes and aerated concretes*
- Insulation materials
- Building boards
- Timber
- Natural materials - *not used*
- Soil
- Cladding panels and ceramic tiles
- Foils and waterproofing products
- Miscellaneous - *metals, glass, air, water, etc.*

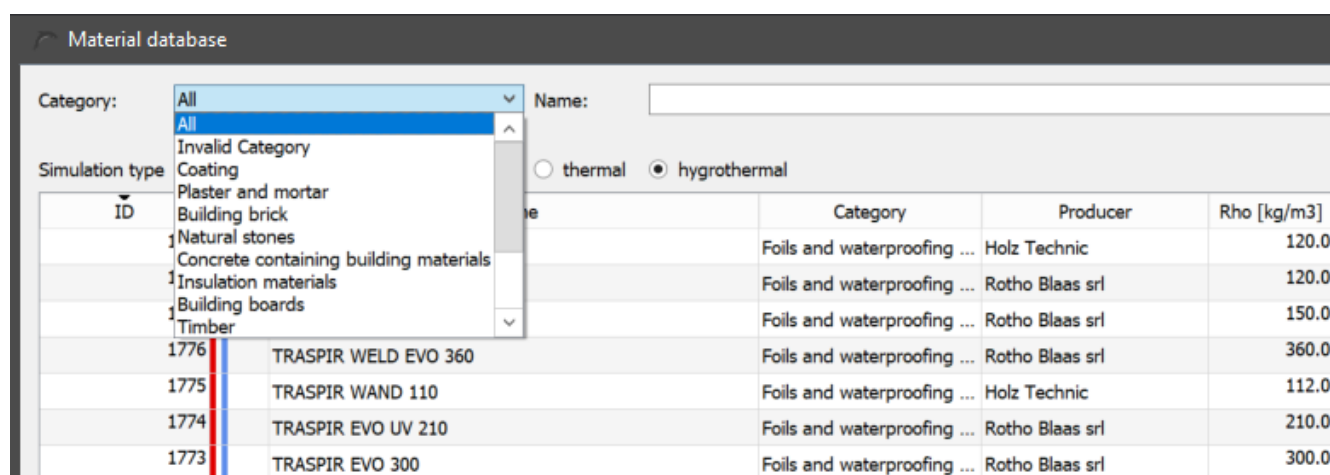


Image 4. Expanded list of categories

Each material can be divided into 3 categories. The first category is to be considered as the

main category. It is shown in the fourth column of the material table. For some materials, an exact classification is difficult. Therefore, up to 2 further categories can be specified for each material. Since version 6.1.2, Delphin filters for all 3 entries. Therefore it can happen that e.g. insulation materials are filtered, but materials of other categories appear in the table. The picture below shows such an example.

ID	Name	Category	Producer	Rho [kg/m3]	cp [J/kgK]	Lambda [W/mK]	μ [---]	W80 [kg/m3]	WSat [kg/...
583	Insulation Loam Cork-Flexboard	Insulation materials	HAACKE Energie-Effizien...	460.4	802.6	0.085/---	19.8	37.9	
582	Dennert Mineral foam Poratec Innen	Insulation materials	poratec GmbH ...	128.4	892.6	0.047/0.045	4.5	5.2	
581	Dennert Mineral Foam Poratec Außen	Insulation materials	poratec GmbH ...	133.1	1133.1	0.049/---	5.2	8.1	
580	Blown-in Cellulose	Insulation materials	CWA Cellulose Werk ...	55.2	2544.4	0.048/0.040	2.0	6.3	
577	Pyrogenic Silica Board (hydrophobic)	Insulation materials	CONFIRA Werkstoff GmbH	20.0	840.0	0.019/0.020	6.2	0.8	
571	Climate Board (until 2001)	Insulation materials	Calstherm Silikatbaustoff...	270.1	1157.9	0.069/---	3.8	4.7	
555	Brick Schlagmann WDF 180mm (Perlite-Filling with brick ...)	Building brick	Schlagmann ...	196.6	777.1	0.048/0.055	5.8	2.6	
554	Brick Schlagmann WDF 120mm (PKS-Filling with brick ...)	Building brick	Schlagmann ...	102.5	850.7	0.041/---	10.3	1.6	
553	Brick Schlagmann WDF 120mm (Perlite filling with brick ...)	Building brick	Schlagmann ...	196.6	777.1	0.048/0.060	5.9	2.6	
515	Wood Fibre Board (measured over width)	Insulation materials	PAVATEX GmbH	196.9	1684.4	0.064/---	12.9	20.7	
516	Wood Fibre Board (measured over thickness)	Insulation materials	PAVATEX GmbH	196.9	1684.4	0.064/---	12.9	20.7	
515	Thermokork	Insulation materials	HAACKE Energie-Effizien...	114.0	2253.2	0.047/---	28.9	9.8	
514	Getifix Insulation Panel	Insulation materials	Getifix GmbH	277.4	1063.5	0.081/---	5.4	12.4	
479	Cellular Concrete Ytong	Concrete containing ...	Xella International GmbH	392.2	850.0	0.095/---	7.4	17.8	
473	Cellular Concrete	Concrete containing ...		414.6	850.0	0.100/---	8.9	17.7	
438	iQ-Therm	Insulation materials	Remmers Baustofftechni...	48.9	1400.0	0.037/0.031	27.0	0.4	
435	Wood Fibre Board	Insulation materials	PAVATEX GmbH	240.0	2100.0	0.050/---	5.0	31.8	
434	Insulation Loam-Polystyrol	Insulation materials	HAACKE Energie-Effizien...	316.0	1208.5	0.075/---	14.1	9.2	
433	Insulation Loam Wood	Insulation materials	HAACKE Energie-Effizien...	299.7	1419.3	0.094/---	6.5	24.1	
432	Insulation Loam with expanded Clay	Insulation materials	HAACKE Energie-Effizien...	483.2	893.5	0.136/---	8.8	3.7	
431	Maxit Light Insulation Plaster G74M	Plaster and mortar	maxit Baustoffwerke ...	820.4	713.5	0.175/---	29.1	58.6	
429	Renocell Cellulose Inside Insulation	Insulation materials	ISOCELL VERTRIEBSGMBH	92.8	2005.1	0.052/0.052	2.4	9.8	
424	Remmers SLP	Insulation materials	Remmers Baustofftechni...	296.8	997.4	0.063/0.063	4.6	22.3	
423	Redstone Masterclima	Insulation materials	redstone GmbH	277.4	1063.5	0.081/---	5.4	12.4	
422	Promat Promasil	Insulation materials	Promat GmbH	257.4	1085.3	0.073/---	4.6	7.2	

Image 5. Material table with filter set for the category **insulation materials**.

The image also shows materials of the categories 'Concrete containing building materials' (aerated concrete), 'Building brick' (highly insulating bricks) and 'plaster and mortar' (insulation plaster), although 'Insulation materials' is selected as category.

2.2. Name and manufacturer

In the input field 'Name' you can enter texts or parts of texts. The dialogue will then filter out all materials where this part of the text appears in the name or in the manufacturer's name. Upper and lower case letters are not distinguished. This filter can be used together with the category filter.

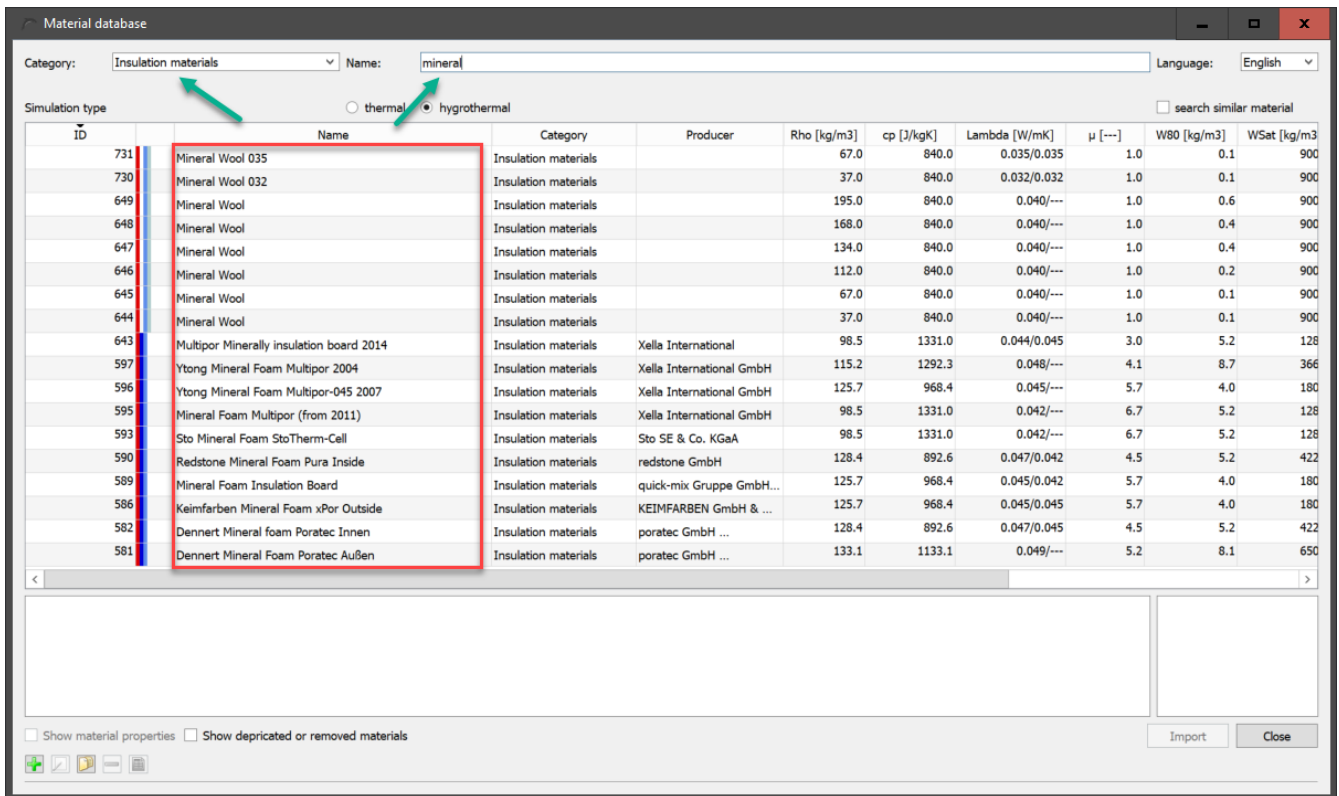


Image 6. Material table with filter for insulation materials and name filter

In the image above, the category filter is set to 'insulation' and the text part 'mineral' is entered in the name filter. This means that all insulation materials containing the text 'mineral' are displayed. In the same way, you can also search for materials from a specific manufacturer by entering its name in the search field.

2.3. Simulation type

Here you can distinguish between two types of simulation, purely thermal and hygrothermal calculations. The simulation type currently set in the project is not queried here. Depending on the setting, only the materials that are valid for this simulation type are displayed. In this case, valid means that all necessary transport and storage parameters are available. The database also contains materials, especially from standards such as ISO 10456, which only contain parameters for purely thermal transport. In most cases, the moisture storage function is missing. Such materials are then only listed for the simulation type 'thermal'.

2.4. Materials with similar base parameters

In practical projects it is often the case that only a few parameters of the materials used in the construction are known. In order to simplify the search for such materials, it is possible with this filter to carry out a similarity search by entering a few base parameters. Only materials that are sufficiently similar then appear in the list. The other filters are also taken into account. To activate this filter, the checkbox 'search similar material' must be checked. The following

dialogue will appear.

Image 7. Filter to search for materials with similar parameters

Data for 6 basic parameters can be entered:

- Rho in $[\text{kg/m}^3]$ - bulk density
- Lambda in $[\text{W/mK}]$ - thermal conductivity of the dry material
- μ in $[-]$ - Vapour diffusion resistance factor of the dry material (dry cup)
- Aw in $[\text{kg/m}^2\text{s}^{0.5}]$ - water uptake coefficient
- W80 in $[\text{kg/m}^3]$ - water content at 80% relative humidity
- WSat in $[\text{kg/m}^3]$ - water content at effective saturation

In the field 'Min. number' a minimum number of materials to be found can be set. With the button 'Update' the list is rebuilt based on the current setting. This also happens if you click on any other dialogue element. If there is a 0 in one of the parameter fields, this value is not taken into account.

ID	Name	Category	Producer	Rho $[\text{kg/m}^3]$	cp $[\text{J/kgK}]$	Lambda $[\text{W/mK}]$	μ $[-]$	W80 $[\text{kg/m}^3]$	WSat $[\text{kg/m}^3]$	Aw $[\text{kg/m}^2\text{s}^{0.5}]$	Material
501	Old Building Brick Dresden ZM	Building brick		1719.6	917.4	0.642/---	19.1	4.1	338.9	0.117	\$(Material Database)/Altb
665	Lime-Sandbrick	Building brick		1704.6	890.9	1.188/---	18.7	10.5	238.5	0.311	\$(Material Database)/Lime
497	Old Building Brick Dresden ZI	Building brick		1736.4	881.3	0.456/---	21.3	17.1	320.1	0.034	\$(Material Database)/Altb
495	Old Building Brick Dresden ZG	Building brick		1715.2	920.2	0.543/---	22.2	6.9	322.1	0.137	\$(Material Database)/Altb
512	Normal Brick	Building brick	Wienerberger AG	1786.3	888.7	0.548/---	18.0	13.4	319.4	0.199	\$(Material Database)/Brick
513	Ceramic Brick	Building brick		1952.2	862.6	0.961/---	19.4	1.2	239.0	0.142	\$(Material Database)/Cera

Image 8. Example of filtering when searching for a similar material

In the image above, we searched for bricks (category filter set to 'building bricks') with a density of about 1700kg/m^3 and a μ -value of about 20. The minimum number set was 5. The filter picked out 6 materials with similar characteristic values. The background colour of the materials is adapted to the similarity to the entered characteristic values. The more similar the material is, the darker the background.

2.5. Language

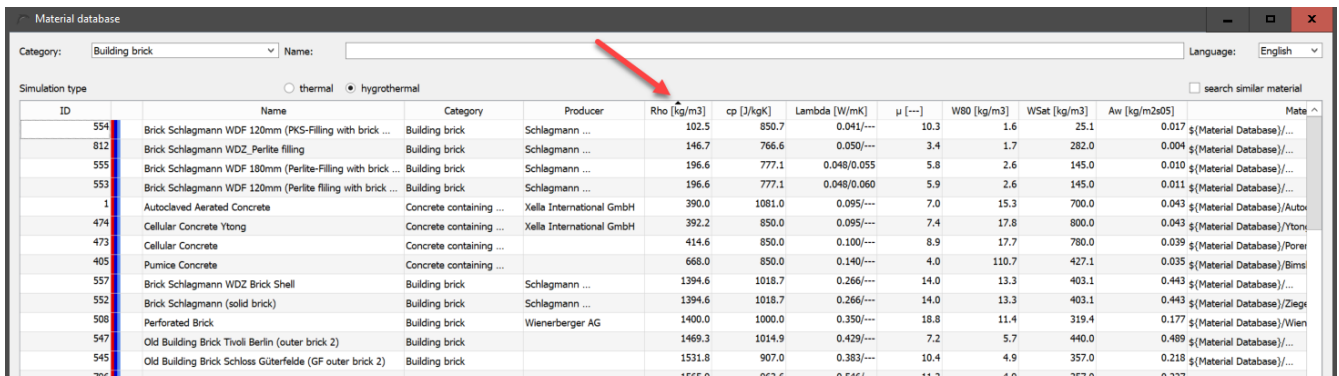
At the top right of the dialogue there is also a selection field for the language. By default, the set language is used for the dialogue as well as for the material list. However, there are fewer languages available for the material database than for DELPHIN itself. If the database does not support the language, the list is displayed in English. With this dialogue box you can adjust this setting. However, this only affects the material names, the manufacturer names and the remarks. Currently the languages German, English and Italian are available.

3. Material table

The material table shows the materials according to the set filters. The following data is displayed in the corresponding columns:

1. Material ID
2. Colour code
3. Name
4. Category
5. Manufacturer
6. Density in kg/m^3 (Rho)
7. Heat capacity in J/kgK (cp)
8. Thermal conductivity in W/mK (lambda)
9. Vapour diffusion resistance factor (μ)
10. Water content at 80% humidity in kg/m^3 (W80) .
11. Water content at effective saturation in kg/m^3 (WSat)
12. Water uptake coefficient in $\text{kg/m}^2\text{s}^{0.5}$ (Aw)
13. Path to the material file

You can sort by any data type except the path by clicking on the corresponding column header. Another click on the same column header reverses the sort order. Which column is currently sorted by is indicated by a small black triangle in the column header. In the picture this is e.g. the density.



Material database

Category: Building brick Name: Language: English

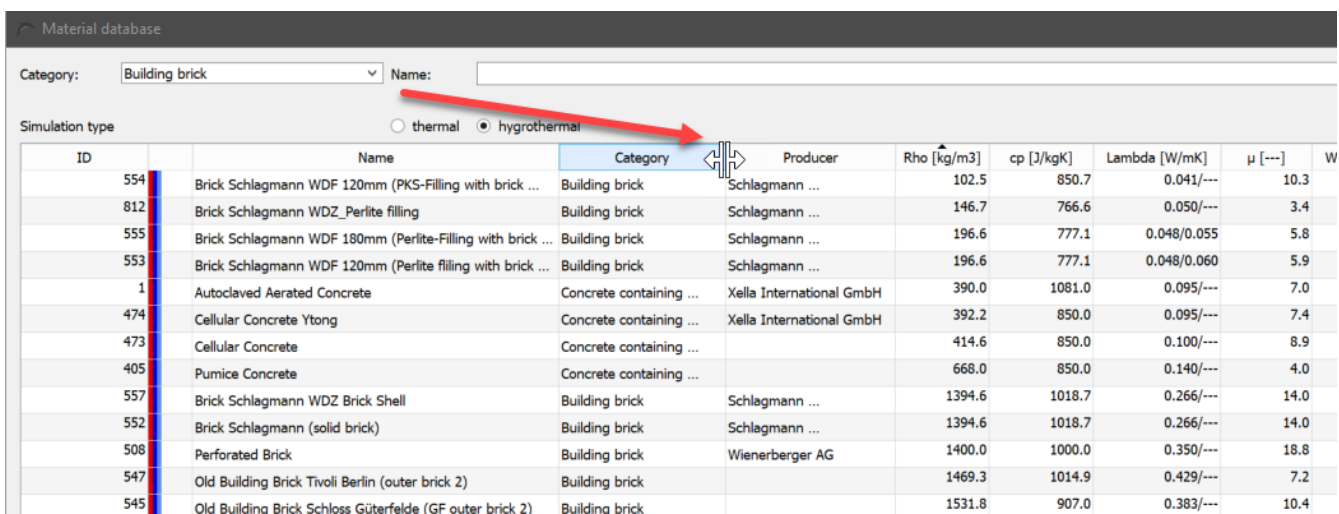
Simulation type: ☐ thermal ☒ hygrothermal

search similar material

ID	Name	Category	Producer	Rho [kg/m³]	cp [J/kgK]	Lambda [W/mK]	μ [---]	W80 [kg/m³]	WSet [kg/m³]	Aw [kg/m²a05]	Mat
554	Brick Schlagmann WDF 120mm (PKS-Filling with brick ...)	Building brick	Schlagmann ...	102.5	850.7	0.041/---	10.3	1.6	25.1	0.017	\$(Material Database)/...
812	Brick Schlagmann WDF Perlite filling	Building brick	Schlagmann ...	146.7	766.6	0.050/---	3.4	1.7	282.0	0.004	\$(Material Database)/...
555	Brick Schlagmann WDF 180mm (Perlite-Filling with brick ...)	Building brick	Schlagmann ...	196.6	777.1	0.048/0.055	5.8	2.6	145.0	0.010	\$(Material Database)/...
553	Brick Schlagmann WDF 120mm (Perlite filling with brick ...)	Building brick	Schlagmann ...	196.6	777.1	0.048/0.060	5.9	2.6	145.0	0.011	\$(Material Database)/...
1	Autoclaved Aerated Concrete	Concrete containing ...	Xella International GmbH	390.0	1081.0	0.095/---	7.0	15.3	700.0	0.043	\$(Material Database)/Auto
474	Cellular Concrete Ytong	Concrete containing ...	Xella International GmbH	392.2	850.0	0.095/---	7.4	17.8	800.0	0.043	\$(Material Database)/Yton
473	Cellular Concrete	Concrete containing ...		414.6	850.0	0.100/---	8.9	17.7	780.0	0.039	\$(Material Database)/Pore
405	Pumice Concrete	Concrete containing ...		668.0	850.0	0.140/---	4.0	110.7	427.1	0.035	\$(Material Database)/Birni
557	Brick Schlagmann WDF Brick Shell	Building brick	Schlagmann ...	1394.6	1018.7	0.266/---	14.0	13.3	403.1	0.443	\$(Material Database)/...
552	Brick Schlagmann (solid brick)	Building brick	Schlagmann ...	1394.6	1018.7	0.266/---	14.0	13.3	403.1	0.443	\$(Material Database)/Ziege
508	Perforated Brick	Building brick	Wienerberger AG	1400.0	1000.0	0.350/---	18.8	11.4	319.4	0.177	\$(Material Database)/Wien
547	Old Building Brick Tivoli Berlin (outer brick 2)	Building brick		1469.3	1014.9	0.429/---	7.2	5.7	440.0	0.489	\$(Material Database)/...
545	Old Building Brick Schloss Güterfelde (GF outer brick 2)	Building brick		1531.8	907.0	0.383/---	10.4	4.9	357.0	0.218	\$(Material Database)/...

Image 9. Material table sorted by density

The column widths can be changed by moving the mouse to the line between two columns in the column header. The mouse cursor then changes as shown in the picture below. Then hold down the left mouse button and move the width of the column. DELPHIN remembers the widths set in this way for the next call.



Material database

Category: Building brick Name: Language: English

Simulation type: ☐ thermal ☒ hygrothermal

ID	Name	Category	Producer	Rho [kg/m³]	cp [J/kgK]	Lambda [W/mK]	μ [---]	W
554	Brick Schlagmann WDF 120mm (PKS-Filling with brick ...)	Building brick	Schlagmann ...	102.5	850.7	0.041/---	10.3	
812	Brick Schlagmann WDF Perlite filling	Building brick	Schlagmann ...	146.7	766.6	0.050/---	3.4	
555	Brick Schlagmann WDF 180mm (Perlite-Filling with brick ...)	Building brick	Schlagmann ...	196.6	777.1	0.048/0.055	5.8	
553	Brick Schlagmann WDF 120mm (Perlite filling with brick ...)	Building brick	Schlagmann ...	196.6	777.1	0.048/0.060	5.9	
1	Autoclaved Aerated Concrete	Concrete containing ...	Xella International GmbH	390.0	1081.0	0.095/---	7.0	
474	Cellular Concrete Ytong	Concrete containing ...	Xella International GmbH	392.2	850.0	0.095/---	7.4	
473	Cellular Concrete	Concrete containing ...		414.6	850.0	0.100/---	8.9	
405	Pumice Concrete	Concrete containing ...		668.0	850.0	0.140/---	4.0	
557	Brick Schlagmann WDF Brick Shell	Building brick	Schlagmann ...	1394.6	1018.7	0.266/---	14.0	
552	Brick Schlagmann (solid brick)	Building brick	Schlagmann ...	1394.6	1018.7	0.266/---	14.0	
508	Perforated Brick	Building brick	Wienerberger AG	1400.0	1000.0	0.350/---	18.8	
547	Old Building Brick Tivoli Berlin (outer brick 2)	Building brick		1469.3	1014.9	0.429/---	7.2	
545	Old Building Brick Schloss Güterfelde (GF outer brick 2)	Building brick		1531.8	907.0	0.383/---	10.4	

Image 10. Change column width

The background colour and font may also vary. Materials from the standard database have a white or light grey background. For user materials, the background is yellow. If the font of a material is grey, then it is an deprecated material. In this case, the ID of the material that replaces it is also displayed in the material name. If the font is grey and striked through, then this material has been marked as removed. Both material types should no longer be used. They are only included for reasons of compatibility with old projects. The visibility of such materials can be adjusted with the [checkbox](#) at the bottom left of the dialogue.

Simulation type <input type="radio"/> thermal <input checked="" type="radio"/> hygrothermal						
ID	Name	Category	Producer	Rho [kg/m³]	cp [J/kgK]	
554	Brick Schlagmann WDF 120mm (PKS-Filling with brick ...	Building brick	Schlagmann ...	102.5	850.7	
164	Minerally insulation board - replaced by material with ID ...	Insulation materials	Xella International	110.0	1290.0	
283	Minerally insulation board - removed	Insulation materials	Xella International GmbH	125.7	968.4	
812	Brick Schlagmann WDF Perlite filling	Building brick	Schlagmann ...	146.7	766.6	
556	Brick Schlagmann WDF Perlite filling - replaced by ...	Building brick	Schlagmann ...	146.7	766.6	
553	Brick Schlagmann WDF 120mm (Perlite filling with brick ...	Building brick	Schlagmann ...	196.6	777.1	
555	Brick Schlagmann WDF 180mm (Perlite-Filling with brick ...	Building brick	Schlagmann ...	196.6	777.1	
1	Autoclaved Aerated Concrete	Concrete containing ...	Xella International GmbH	390.0	1081.0	
474	Cellular Concrete Ytong	Concrete containing ...	Xella International GmbH	392.2	850.0	
473				414.6	850.0	

Image 11. Material table with obsolete or removed materials

The **material ID** is a number that uniquely identifies each material record. This number is assigned by the central administration tool of the software manufacturer. Even if materials are removed from the database, this number is retained. This enables a precise allocation even for older projects.

The **colour code** shows the transport options available for the material. They have the following meaning:

- red** Heat transport
- dark blue** Liquid water transport
- blue** Vapour transport
- light blue** Air transport

The **name** and the **manufacturer name** are displayed in the language set in the dialogue. The **category** is always displayed in the language of the system.

Columns 6 to 12 show a selection of basic parameters to give an impression of the properties of the material.

4. Comments and dates

Directly below the table are two areas containing comments and dates for the currently selected material, if these are stored with the material.

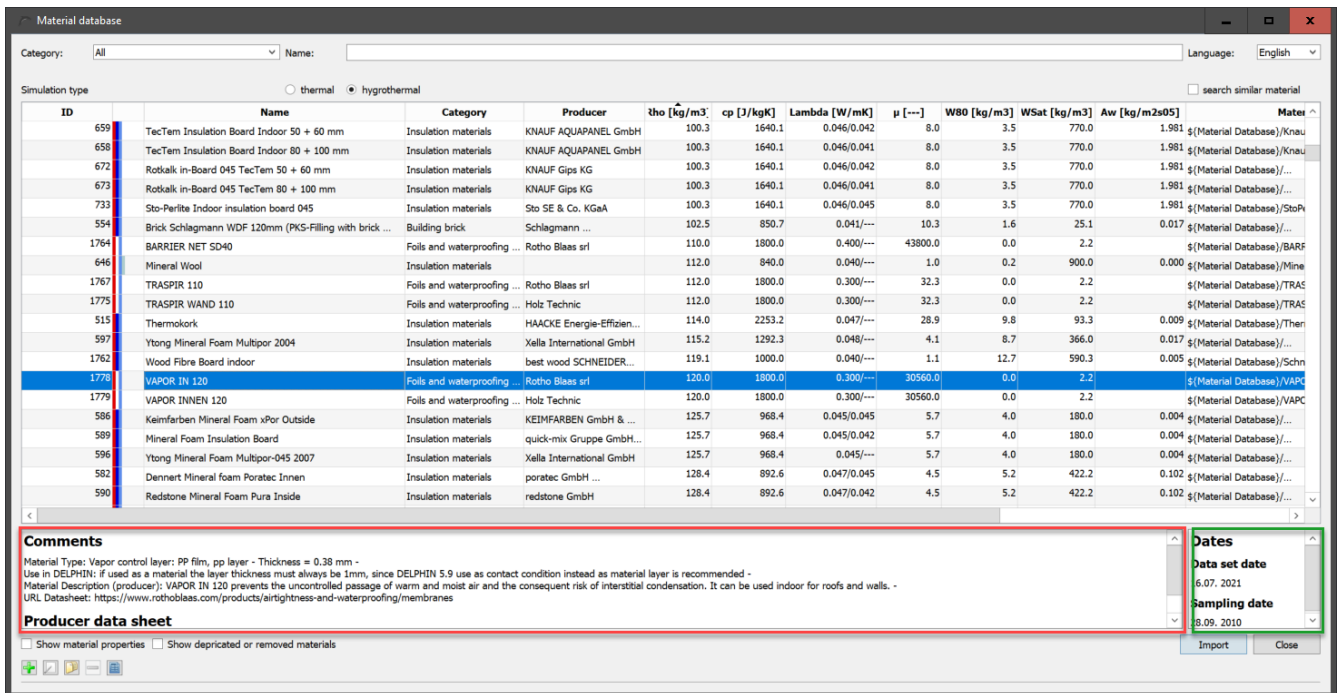


Image 12. Display of notes and dates for the selected material (silty clay)

The text in the comments is adapted to the language selected in the dialogue. This area can also contain a link to the manufacturer's data sheet, if this is stored in the material. There are 3 options for the dates on the right:

- **Data set date** - Date on which the data set (material file) was created.
- **Sampling date** - Date on which the material samples were taken.
- **Production date** - date on which the material was produced

5. Checkboxes for function graphics and deprecated materials

At the bottom left of the dialogue there are two checkboxes.

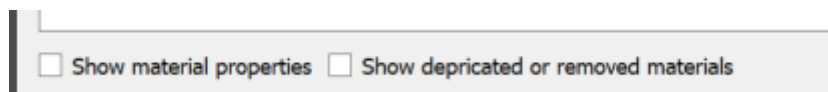


Image 13. Checkbox for charts and deprecated materials

With the left selection box you can make a view of selected material functions visible for the selected material. The view then changes as shown in the picture below.

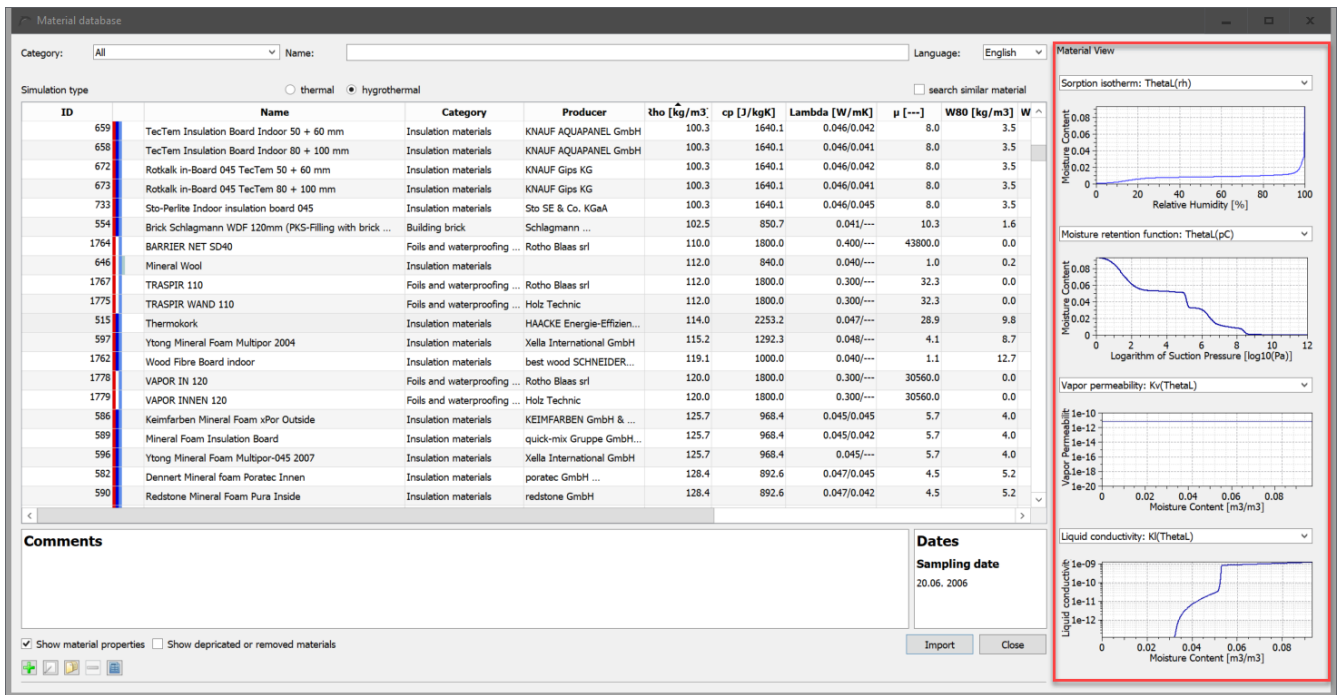


Image 14. Material list with material functions

The following material functions are shown by default (from top to bottom):

- Sorption isotherm
- moisture storage function
- Vapour conduction function
- Liquid water conduction function

For a more detailed display, the [material view](#) should be used.

The second checkbox can be used to change the view of obsolete or removed materials. An explanation of this can be found [here](#).

6. Editing user materials and material view

The buttons for editing the user materials and for the material view are located at the bottom left.

Buttons User Materials and View image::user_materials_1_en.png[user_materials_1_en]

1. Add new user material
2. Edit selected user material
3. Copy selected material and add it to the user database
4. Delete selected user material

5. Show material data for selected material (all databases).

The buttons are only visible when a material is selected. For button 4 (Remove), the selected material must be a user material. The procedure for clicking on one of the buttons is shown below:

6.1. New user material

Immediately after the click, a hint window is displayed with instructions on how to design the file name. Then a file selection dialogue opens in which the directory of the user database is already open. Now the file name must be entered and confirmed.

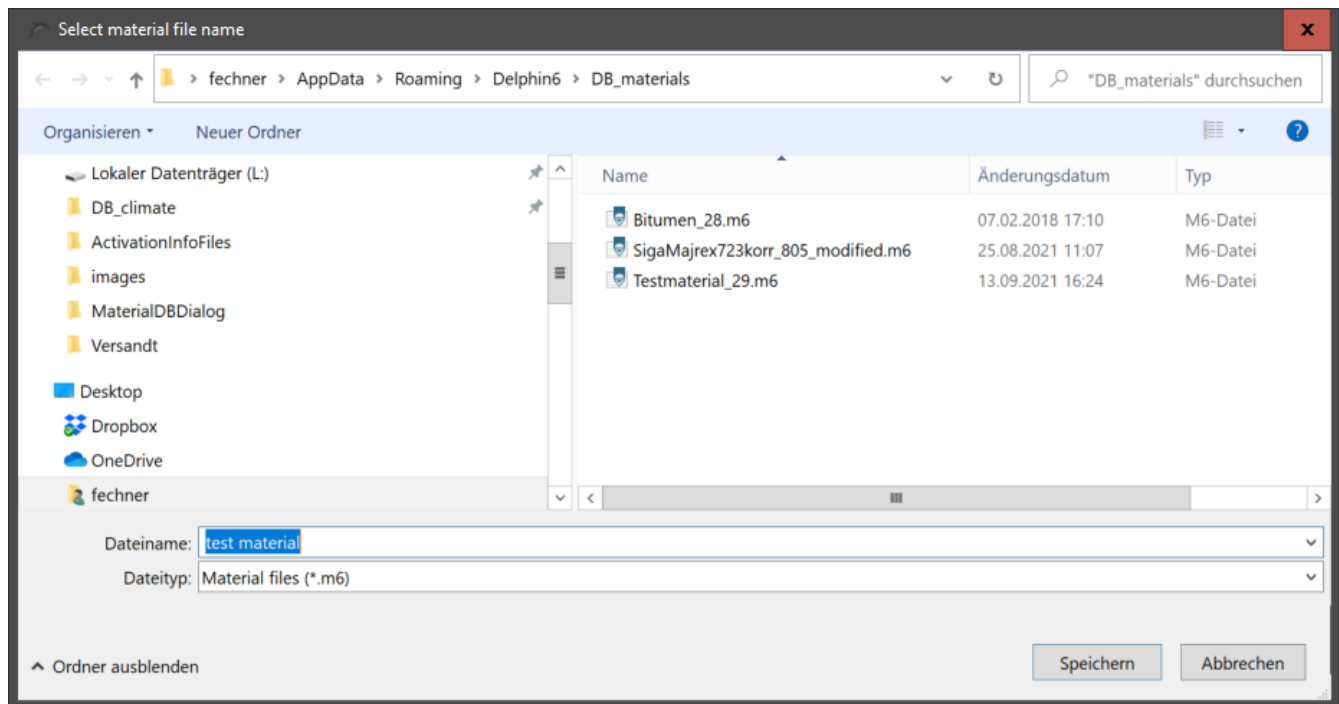


Image 15. Creation of a new user material - selection of the file name

After clicking on 'Save' the material file is created and then the editor is called up. First there is another hint box.

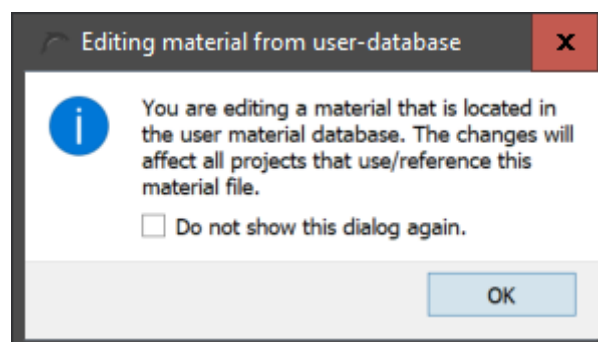


Image 16. Hint box for the material editor

These hints can also be switched so that they do not appear the next time. To do this, simply

tick the checkbox '*Do not show this dialogue again*'. After confirming the hint box, the material editor opens with an empty material. All necessary information must now be entered here. Notes on the material editor can be found here:

www.bauklimatik-dresden.de/delphin/2nd/doc/DELPHIN6_1_MaterialEditor_de/MaterialEditor_en

6.2. Edit selected material

When you click on this button, the further process depends on whether a user material or a material from the built-in database is selected. If it is a user material, the material editor is simply opened with this material. In the other case, you are first asked whether the selected material should be copied. If yes, a new material file is created, which can then be edited.

6.3. Copy selected material

The procedure here is similar to creating a new material. Here too, a new material name is first defined and then the material editor is opened. In this case, however, the data of the previously selected material is already available and only needs to be changed. This simplifies the material creation somewhat compared to the complete new creation.

6.4. Delete user material

This button is only active if the selected material is a user material. After clicking, there is only a short query whether the material should really be deleted.

6.5. Material view

After clicking on this button the material editor is opened with the data of the selected material. However, it is not possible to edit the data here.