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Trial Support Material

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ApacheSim:
Construction Database
(APcdb)

Construction Database (APcdb) Creation And Assignment

The Apache Constructions Database (APcdb) is accessed directly through the icon at the top of the screen, or the bottom of the BTM screen for Constructions, or the top of the Tabular BTM screen for all template types other than MacroFlo Openings, or through the **Tools** menu when in Apache, as **APcdb**.

Accurate construction data is critically important for the integrity of the thermal model. The function of the Constructions Database is to facilitate the process of setting up and checking this data.

A construction defines the thermal properties of a building element such as a wall, ceiling or window. It consists of a number of layers of different materials, together with thermal properties of the materials, surface properties and other attributes used in thermal analysis.

When you first enter the Constructions Database with a new project you will see a list of default constructions, together with any additional constructions that have been brought into the project via templates.

The Constructions Database facilities allow you to add to and edit these constructions so that they accurately reflect the thermal properties of the elements in the building.

It presents all the construction data in a modeless, tabular form.

It is better not to delete any constructions while you are still learning IES, as the simulation will not run if they were assigned somewhere.

There are two main thermal classes of construction, Opaque and Glazed, with different parameter sets.

For more info, go to *https://help.iesve.com/ve2019/constructions_2.htm#*

Create an Opaque Construction

To create a new construction, select the appropriate category of construction from the tabs at the bottom.

– Usually it's easiest to create a new construction by duplicating an existing construction and then editing it.
  Right-click on a similar construction and select **Duplicate Construction**.

– The new construction will appear on the tab for that construction type, eg. external walls.
  Note, it will not appear on the first (default) tab of assigned constructions, as it has not yet been assigned.

Whether you chose create new, or duplicate, you can now edit the construction.

Either right click and select **Edit construction**, or double-click on the construction ID to open the window for editing.

The first item is a description for the construction: edit this name to suit, so that it will be easier to find and assign later on.

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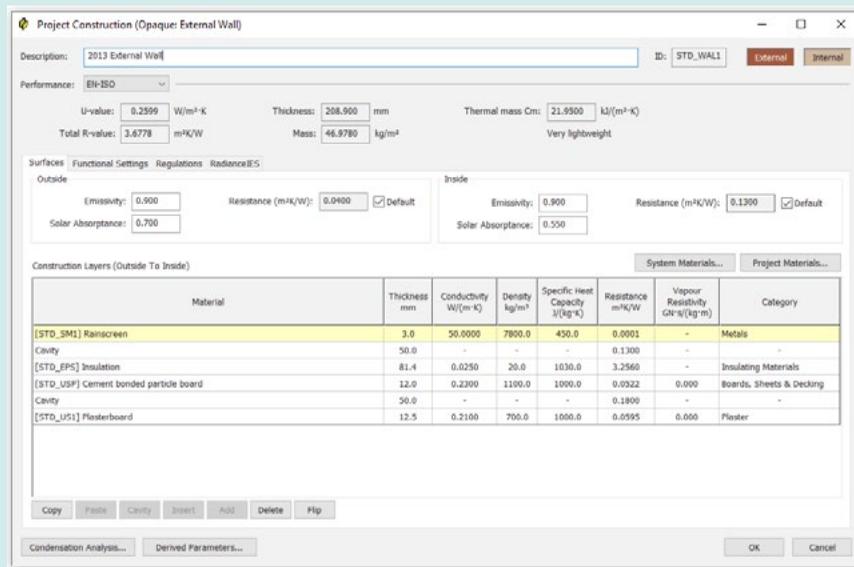
The next section of the window is grey – it shows performance data for the composite construction and cannot be edited, although you can use the drop-down menu to select which calculation methodology is used to calculate this.

The main section has different tabs, depending on the construction type, including:

– Surfaces

– Functional Settings

– Regulations (only displayed if you have a licence for a relevant compliance application)

– Frame (for windows)

– Radiance IES

The **Surfaces tab** is where you create and edit your construction. Materials are listed in order from outside to inside.

Click on **System Materials** to open a library of reference materials, sorted by category, or on **Project Materials** to select a material already being used in the project.

Find the material you would like to add and right click, then select **copy material**.

Return to your construction, and either:

– right click on the line where you want this material, then choose **Paste Layer**

– right click on the line below where you want this material, then choose **Insert Layer**

– right click anywhere, then choose **Add Layer** and the material will be added at the bottom of the list

– You can also **Copy Layer** or **Delete Layer** as required.

– Or you can right click on the line below where you want a cavity, then choose **Insert Cavity**

Once you have the correct materials, listed in the correct order, check that they are also the appropriate thickness.

If you have mistakenly listed the materials from inside to outside, click on the **Flip** button to reverse the order.

You can also edit the other columns if you have information from the supplier.

While a material is selected, you can also un-tick the **default box** should you wish to edit the inside or outside resistance of the material.

General Information: Constructions

If the construction belongs to the Ground Floor, External Wall or TSC Wall categories, you will have the option to switch to the Functional Settings Tab, where you can perform a ground-contact U-value adjustment. For the purposes of Part L2 of the UK Building Regulations, these parameters must be correctly set.

For more info, go to *https://help.iesve.com/ve2019/opaque_constructions___tabs___ground_contact_adjustment.htm#*

Similarly, a construction categorised as a door, will also have a **Frame tab**, to set the doorframe properties.

The **Regulations tab** has some additional options such as metal cladding or curtain wall on a wall construction, and a drop-down list of types on a glazed construction. These do not need to be set for dynamic thermal simulations, but are required if you are using the application for VE compliance in the UK and Ireland.

The **RadianceIES** tab lets you control the properties on the basis of external, mid and internal, just as you would in RadianceIES, but conveniently grouped here with all other material properties. If you render an image in Radiance, then the internal colour is what you will "see" on the inner surface of the wall, while the external colour will is what you will "see" on the outer face of the wall in the rendered image.

Set the surface properties for the material: input component reflective colours, or pick a colour, and set the specularity and roughness, or choose from the list of pre-defined materials.

At the bottom of the window, you will see 2 further options, for **Condensation Analysis** and **Derived Parameters**.

Before condensation analysis can be carried out, all layers of the construction must be assigned a vapour resistivity.
You will be prompted to supply any missing values. Find out more at *https://help.iesve.com/ve2019/condensation_analysis.htm#*

Derived Parameters are derived from the current construction's data. These include U-values, CIBSE admittance parameters and optical properties of glazed constructions. The derived parameters are dynamically updated in response to edits made to the construction.

Find out more at *https://help.iesve.com/ve2019/derived_parameters_1.htm#*

Press OK to return to the APcdb. Save any changes if asked.

Create a Glazed Construction

All transparent constructions of whatever material, including transparent doors, should be defined as glazed constructions.
To create a new glazed construction, start as with the opaque construction.
The performance statistics now note that the Net U-value will include the frame, while the U-value is for glass only.

Shading Device: this lets you add a shading device, and in the case of shutters, louvres and internal shading, you can also specify an operational profile. The results of the shading calculations performed for these shading devices are combined with those carried out by SunCast.

You can input the relevant parameters by clicking on the '?' next to your chosen shading.
- Internal: curtains, blinds
- External: shutters, louvres, brise soleil
- Local: side-fins, overhangs, balconies, window recesses

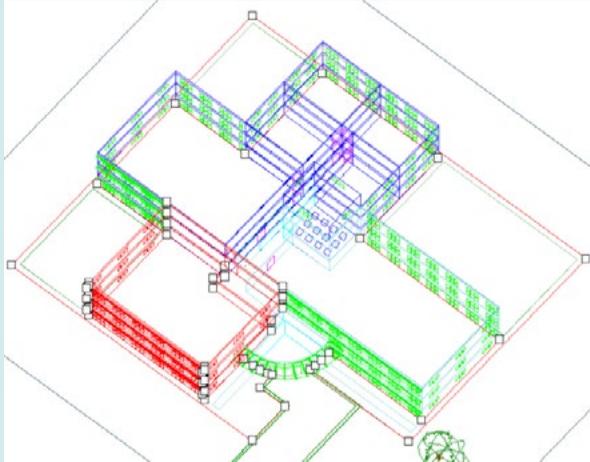More information at *https://help.iesve.com/ve2019/shading_devices.htm#*

Electrochromic Control Tab: These parameters determine the controller for an electrochromic glazed construction.
This tab is only displayed if the glazed construction contains an Electrochromic layer.

More information at *https://help.iesve.com/ve2019/editing_a_glazed_project_construction.htm#*

Assign Constructions

Having created and saved a new construction, it can be applied by returning to Apache:

3. Click **Assign Constructions** (small yellow button, centre-top) and select the desired construction category in the top box on the new window.

For example, external wall

1. Go to an axonometric view – this makes it easier later.

2. Select the geometry to which you wish to apply the construction
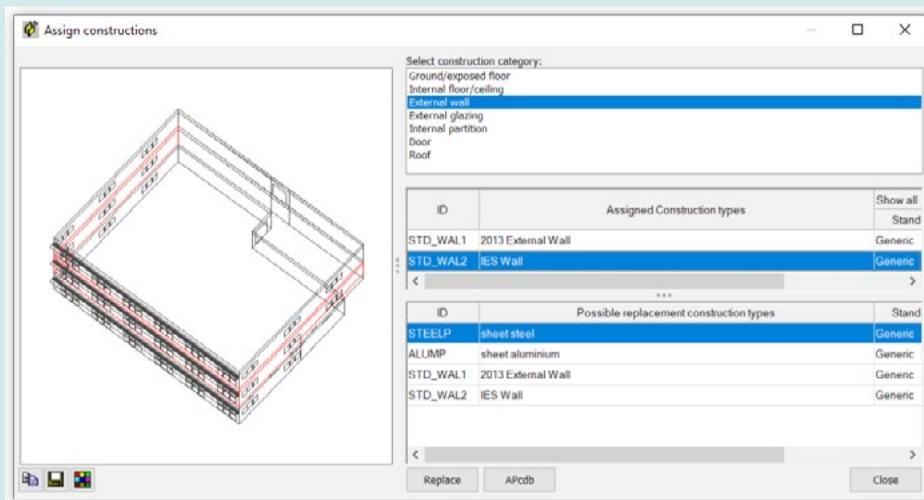
4. Select the currently assigned construction type in the middle box, and all instances where this construction type is currently assigned in the model will appear red in the wire frame preview model shown in the window on the left.

5. Select the replacement construction type (your new construction) in the bottom box, and click on **replace**.
This will only replace the construction for those areas shown in red in the wireframe model.

6. To check the assignment of constructions, in the same window, if you select the new material under 'assigned construction types' (in the middle box), then the items you have just selected, and any others to which you have previously assigned this construction type, should appear red in the wireframe preview.

Note: this methodology can be used at any level of deconstruction, from the full model, to selected spaces, to a single surface in one space.

7. We will look at Input Data Visualisation later as another means of visually checking what has been assigned where.