

## FirstRate5<sup>®</sup> Guidance Note

### GN01 Wall Builder & Project File Upgrade Process

(version 1.0, 24 March 2014, FR5 v5.1.11)

#### Prior Reading

Before proceeding with this Guidance Note it is essential that you read the following new sections of the FirstRate5 User Manual (this is a PDF document that can be located by going to your Start > All Programs > FirstRate5-5.1.11> FirstRate5-5.1.11 Manual):

Section 8	Wall Types Tab
Section 9	Wall Libraries Tab
Section 12	Upgrade Details

#### Contents

This Guidance Note will demonstrate the following:

Concept.....	1
Using System Walls.....	1
Creating a Custom Wall .....	2
Specifying Bulk Insulation .....	4
Specifying an Air Gap.....	6
Creating a Custom Library .....	8
Adding a Custom Wall to a Custom Library .....	9
Exporting a Library.....	10
Marking a Custom Wall as a Favourite .....	10
Starting a New File and Using Custom Walls .....	11
Upgrading an Existing Project File.....	13
Further Reading.....	14

#### Concept

The new Wall Builder functionality allows FR5 users to create and use Custom Walls where the pre-defined System Wall constructions do not meet their needs. A Custom Wall can be defined by layer and thickness from a fixed list of materials.

FR5 has historically provided a fixed number of pre-defined wall constructions from which to choose. These covered the most commonly used constructions. However, as building technology progresses and the number of bespoke constructions increases, so too does the need for a more flexible approach to wall specification.

The addition of this functionality allows FR5 users the flexibility to create Custom Walls and provides FR5 users with greater transparency into the wall detail contained in the models.

#### Using System Walls

If you have no need to create Custom Walls you can continue to use the System Wall constructions as before. You should note:

1. The names of System Wall constructions are now preceded by *FR5-* in order to distinguish them from Custom Walls.
2. System Wall constructions can be found in the *FR5 : Standard FR5* folder under the *Wall Libraries* tab.

3. When upgrading pre-v5.1.11 project files, users will have to redefine the bulk insulation and air gap properties of each defined wall (see Section 12 Upgrade Details in the User Manual, and further advice below)
4. In order to define air gaps please refer to *Specifying an Air Gap* below.

### Creating a Custom Wall

In order to create a Custom Wall, ensure you have the relevant wall information from the building designer or product manufacturer including:

1. Thickness and material of each layer of the construction from outside to inside.
2. The emissivity properties of each vertical surface facing into an air gap.

In the following example a Custom Wall with the following build up will be created:

#### Externally Insulated Concrete Block

##### *Outside*

5mm External Render

80mm Extruded Polystyrene

190mm Hollow Concrete Blockwork

90mm Cavity to be filled with R1.5 insulation and a minimum 45mm services zone with single sided foil (e = 0.2 from foil manufacturer's product literature) facing the air gap. The building designer has asked for advice on what type of insulation should be used.

10mm Plasterboard

##### *Inside*

- Launch FirstRate5 v5.1.11
- In the *Wall Types* tab, click *New Wall Type*
- Enter a Wall Name. It is recommended that a short name which best identifies the wall be used for ease of selection later. Note that the Wall Code automatically comprises of the initials of the Wall Name. This may be manually overridden if necessary. This name will appear in the *Zoning* tab, *Properties Pane* drop down menu in the *Plan* tab, and the *Certificate* amongst other places.
- Add the wall layers as described above using the Up, Down and Flip buttons if necessary to arrange the layers into the correct sequence from outside to inside. When you come across either an air gap or the location of some bulk insulation simply insert an Insulation Placeholder by clicking *Add Insulation Layer* button.

What is an *Insulation Placeholder* and why are they used?

An insulation placeholder is a location in the wall's construction where insulation (bulk + air gap) can be placed. The placeholder is editable in use which means that a single wall type used in multiple locations throughout a plan each with different insulation properties if necessary.

Untitled - FirstRate

File Edit Help

Project Plan Zoning Wall Types Windows Roof Windows Wall Libraries Optimise Reports

Wall Code	Wall Name	Library	Used Metres
BV	Brick Veneer	FR5	0.0
EICB	Externally Insulat...		0.0
AAC200	AAC Block	FR5	0.0
AAC75	AAC 75mm Panel ...	FR5	0.0
BC	Brick Cavity	FR5	0.0
CBSol	Concrete Block So...	FR5	0.0
CBSolPB	Concrete Block So...	FR5	0.0
CC100	Cast Concrete	FR5	0.0
CC125	Cast Concrete	FR5	0.0
ConcBlock190	Concrete Block H...	FR5	0.0
ConcBlock190CF	Concrete Block 19...	FR5	0.0
ConcBlock90	Concrete Block H...	FR5	0.0
ConcBlock90PB	Concrete Block H...	FR5	0.0
DB	Double Brick	FR5	0.0
DBPB	Double Brick Finis...	FR5	0.0
EPS100	100mm Expanded...	FR5	0.0
EPS50	50mm Expanded ...	FR5	0.0
EPS75	75mm Expanded ...	FR5	0.0
FC	Fibro Clad Framed	FR5	0.0
Int	Internal Plasterbo...	FR5	0.0
Log250HWood	Log Wall 250mm ...	FR5	0.0
Log250HWoodPB	Log Wall 250mm ...	FR5	0.0
Log250SWood	Log Wall 250mm S...	FR5	0.0

New Wall Type

Wall Builder

1. Give your wall a name and code

Wall Name: Externally Insulated Concrete Block Wall Code: EICB  Retaining Wall

2. Build up your wall layers

← Outside EICB : Externally Insulated Concrete Block Inside →

(mm) 5 0 190 0 10

Plasterboard

Add Layer Delete Layer Up ▲ Down ▼ Flip ⇄ Add Insulation Layer

	Material	Thickness (mm)	R-value
Outside	Plaster (cement:sand 1:4)	5	0.0
	Insulation Placeholder	0	0.0
	Concrete block 190 denseweight (not core-filled)	190	0.18
	Insulation Placeholder	0	0.0
Inside	Plasterboard	10	0.06

3. Add / Edit your wall's default insulation

Edit default insulation

OK Cancel

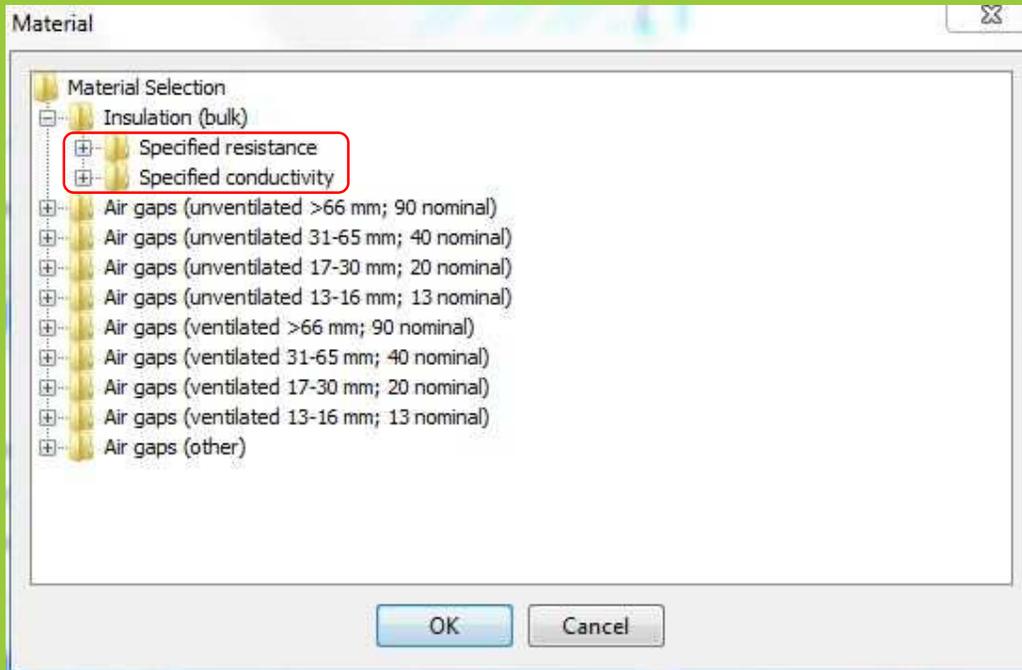
**FirstRate5**  
house energy rating software

- Click on *Edit Default Insulation* to add the bulk insulation and air gap details that the wall type will use by default when used in a plan.
- The outermost insulation placeholder is populated from the specified resistance list of bulk insulating materials.

## Specifying Bulk Insulation

Bulk Insulation is specified in one of two ways:

1. Specified resistance
2. Specified conductivity



*Specified resistance* specifies the bulk insulation by R-value, eg, *Glass fibre batt: R2.5*. Each option has a fixed width, and when selected, this width is automatically entered into the wall construction.

*Specified conductivity* specifies the bulk insulation by k-value, eg, *Glass fibre batt ( $k = 0.044$ , density = 12 kg/m<sup>3</sup>)*. Each option requires the user to define a width before an R-value is displayed. So in this example, if the user defines a width of 110mm, an R-value of R2.5 results.

- The innermost insulation placeholder is more involved, however. The building designer has specified a cavity width of 90mm, a minimum reflective air gap of 45mm, and a bulk insulation value of R1.5. However, he has asked our advice on what type of insulation would meet these space and thermal property requirements.
- Start by asking for a warning if the insulation thickness differs from 90mm.
- Then enter the minimum reflective airspace at 45mm

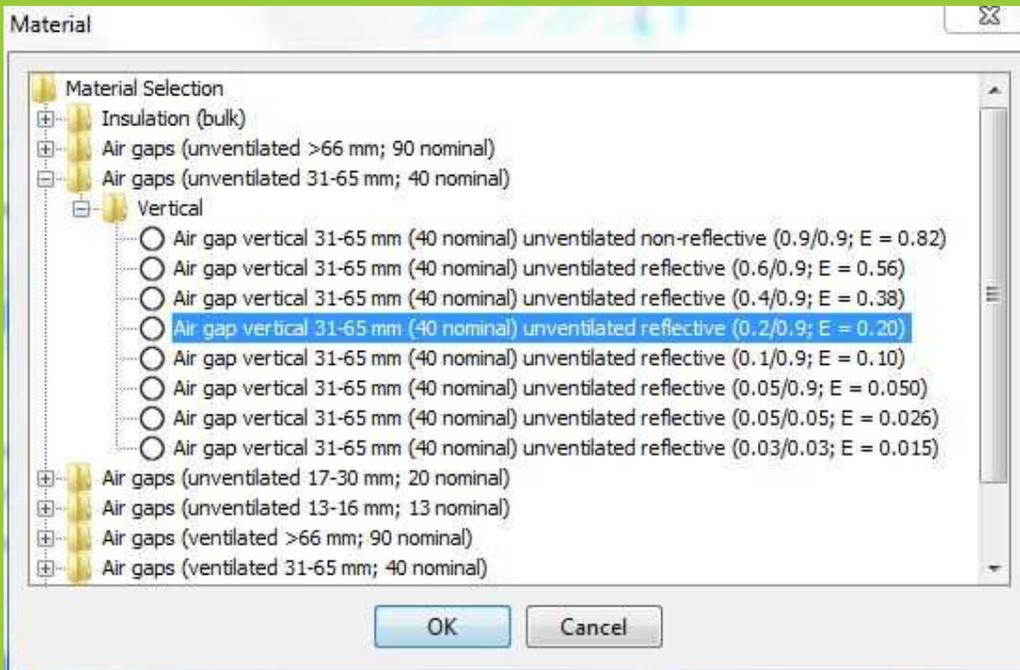


## Specifying an Air Gap

In earlier versions of FirstRate5 the user specified the number and type of reflective foils rather than an air gap. However, the calculation engine deals in air gaps rather than foils, so FR5 made certain assumptions, which were not displayed to the user, in order to convert one to the other. In order to remove these assumptions and provide the user with a better understanding of what is being modelled, the user now specifies the air gap directly.

Each air gap within a wall construction has a thermal resistance. This varies based on a number of criteria. To specify an air gap the user selects from a list of options each of which is described by the following criteria:

1. **Orientation** - in walls this will be *vertical*;
2. **Width** – select an appropriate range for the width of your air gap, eg, pick “31-65mm; 40 nominal” for a 35mm wide airspace. The width of your air gap should be specified on the drawing set;
3. **Air movement** – if the air gap in your wall is open to the attic space above, the sub-floor space below, or the inner or outer leaf is fitted with an air vent, then select *ventilated*. If the airspace is enclosed then select *unventilated*.
4. **Emissivity** (e) of the surfaces on either side of the air gap and effective Emissivity (E) of the air gap - Emissivity (e) ranges from 0.9 for common non-reflective building materials to 0.03 for the shiniest reflective foil products. These figures are expressed as follows, eg, “0.2/0.9; E = 0.2”, where “0.2/0.9” refers to the emissivity of each of the two vertical surfaces facing into the air gap (in this case one surface is 0.2, for example, an anti-glare coated foil, and the other 0.9, a normal building material), and “E = 0.2” refers to the effective Emissivity of the air gap taking into account the surfaces on either side. Users should match the Emissivity (e) of the surfaces to the options provided. For common non-reflective building materials select 0.9, for foil products refer to the manufacturer’s data sheet for the Emissivity (e) of the surface of the product which will face the air gap.



- Finally check the R1.5 bulk insulation options in the *Specified resistance* list. *Glass fibre batt: R1.5* is tried first.

Wall Builder - Insulation Editor

← Outside **EICB : Externally Insulated Concrete Block** Inside →

(mm) 5 80 190 111 10

R1.5 RAG 1 AG 0

Retaining Wall

**Wall Construction**

	Material	Thickness (mm)	R-value
Outside	Plaster (cement:sand 1:4)	5	0.0
	Insulation Placeholder	80	2.86
	Concrete block 190 denseweight (not core-filled)	190	0.18
Inside	Insulation Placeholder	67	1.91

**Insulation Layers**

Warn me if my insulation thickness differs from  (mm)

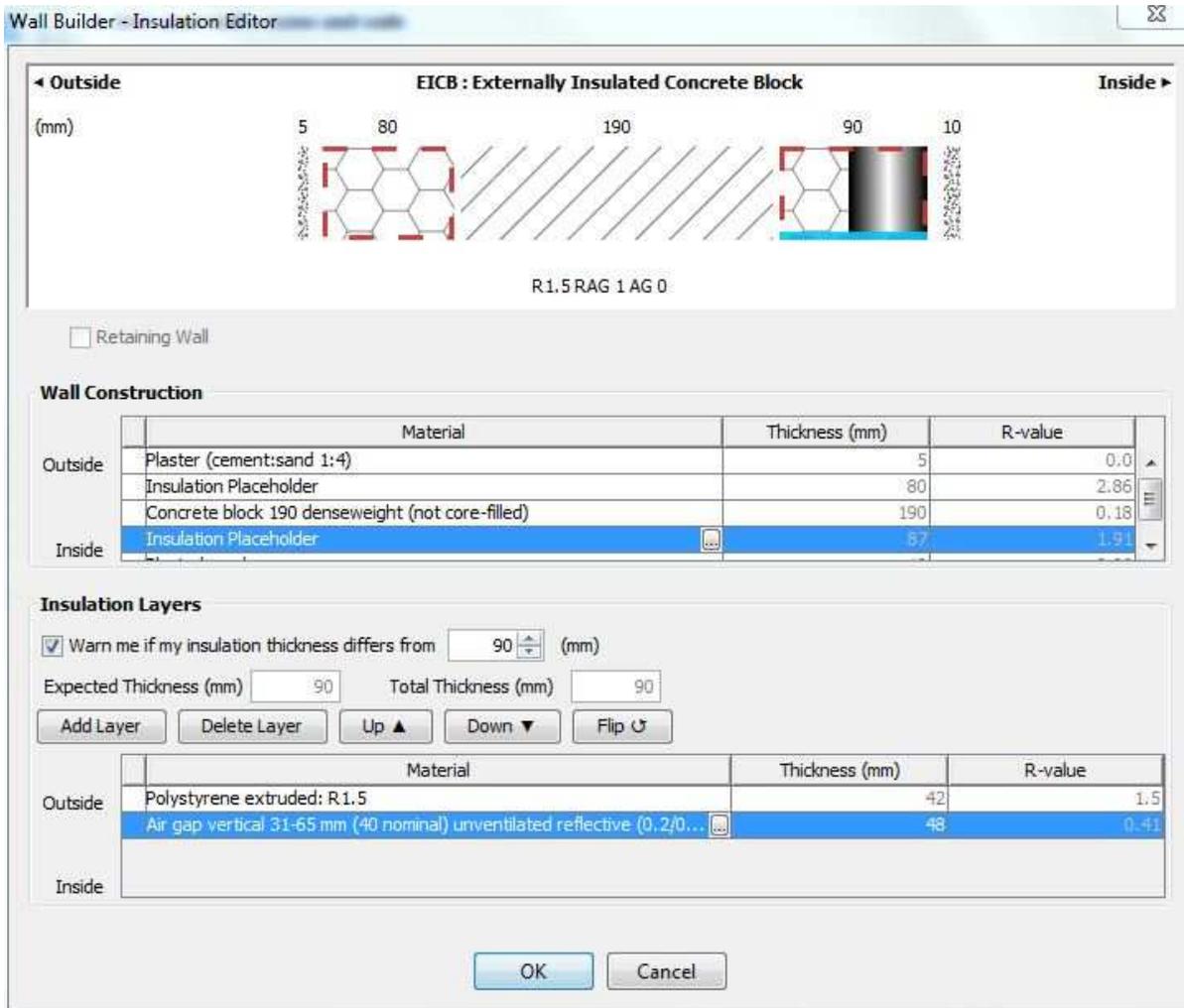
Expected Thickness (mm)  Total Thickness (mm)  **Total thickness does not match expected thickness**

Add Layer Delete Layer Up ▲ Down ▼ Flip ⇄

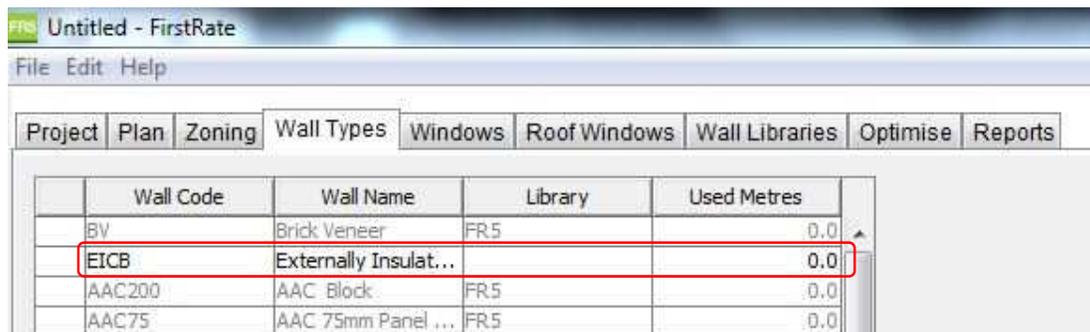
	Material	Thickness (mm)	R-value
Outside	Glass fibre batt: R1.5	66	1.5
	Air gap vertical 31-65 mm (40 nominal) unventilated reflective (0.2/0...	45	0.41
Inside			

OK Cancel

- After trying all 8 options it is clear that only two options, *Polystyrene extruded: R1.5* and *Polyurethane rigid foamed aged: R1.5*, achieve a width of less than 90mm (87mm in both cases). The former is chosen (as it matches the insulation type in the outermost placeholder) and the air gap width is adjusted to achieve a cavity width of 90mm.



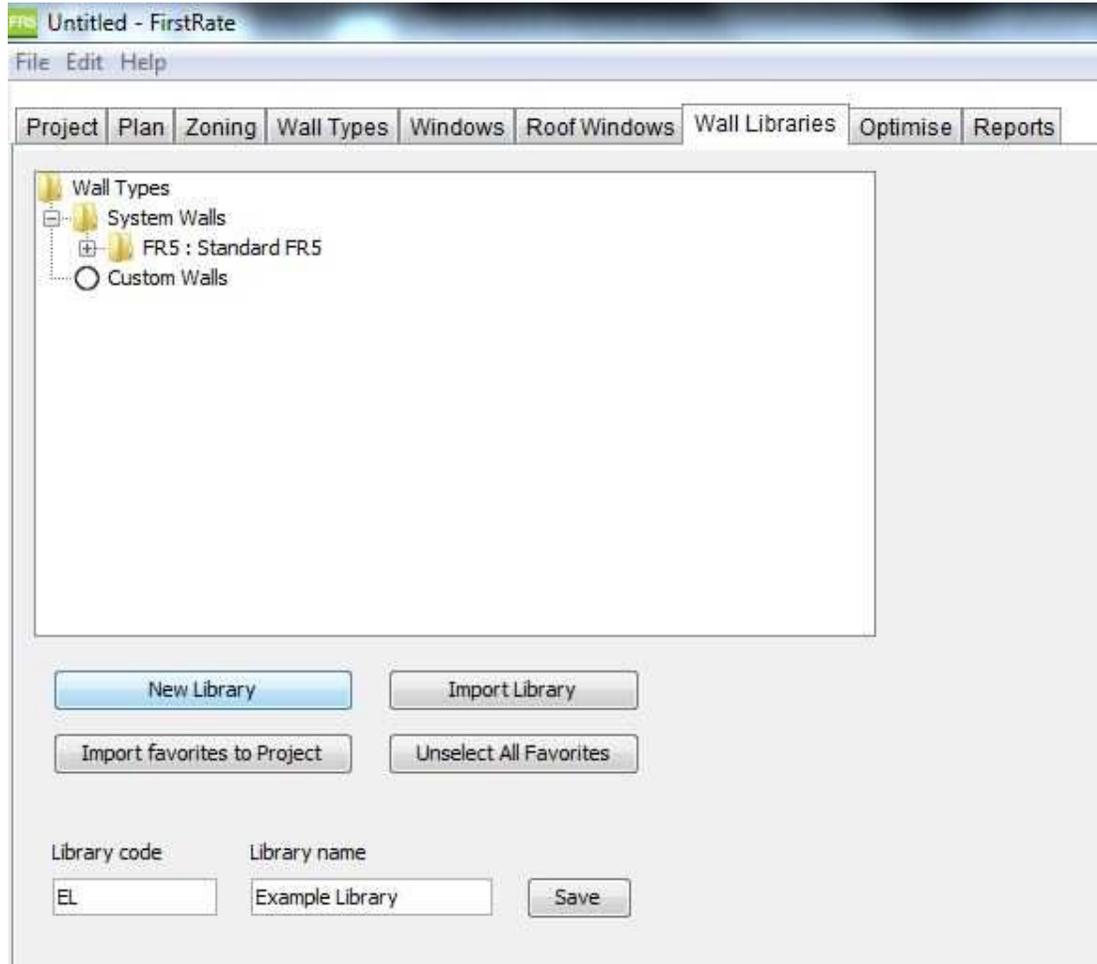
- A Custom Wall has now been created. It exists in the project file only and has not been saved to a library. (Note a Custom Wall can also be created through the Wall Libraries tab by right clicking on a Custom Library and selecting New Wall Type. In this case the Custom Wall would be created directly in the Custom Library)



### Creating a Custom Library

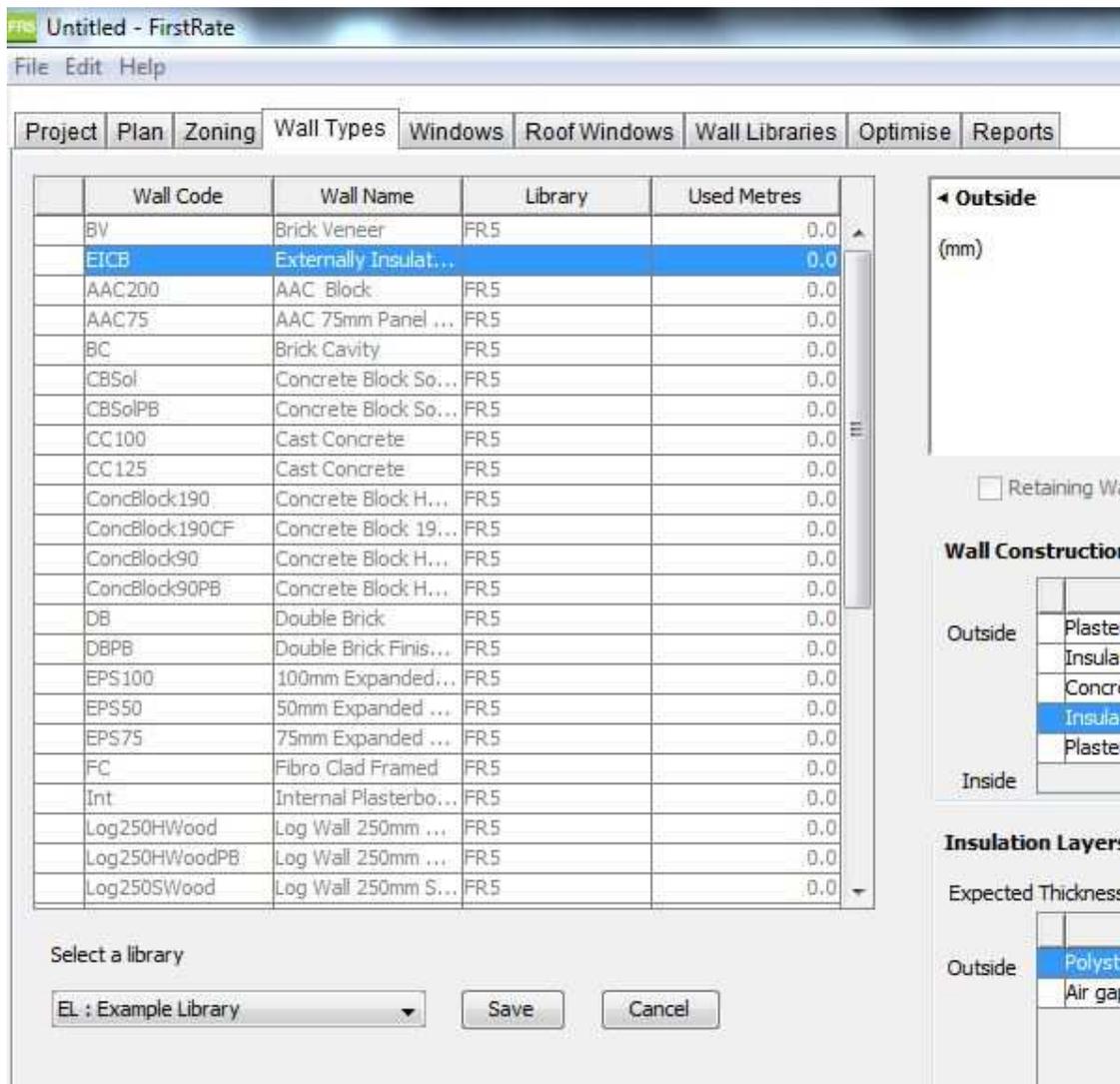
Users modelling non-standard walls can create Custom Walls using the Wall Builder. In order to be able to copy this Custom Wall into future project files, or share with other users, it should be saved to a Custom Library.

- In the *Wall Libraries* tab click *New Library* and enter a unique *Library code* and *Library name*, and then *Save*. A new Custom Library has been created and is saved within your FR5 program files on your computer.



### Adding a Custom Wall to a Custom Library

- In the *Wall Types* tab, right click on the Custom Wall, click on *Add To Library*, select our new *Custom Library* from the list and then *Save*.



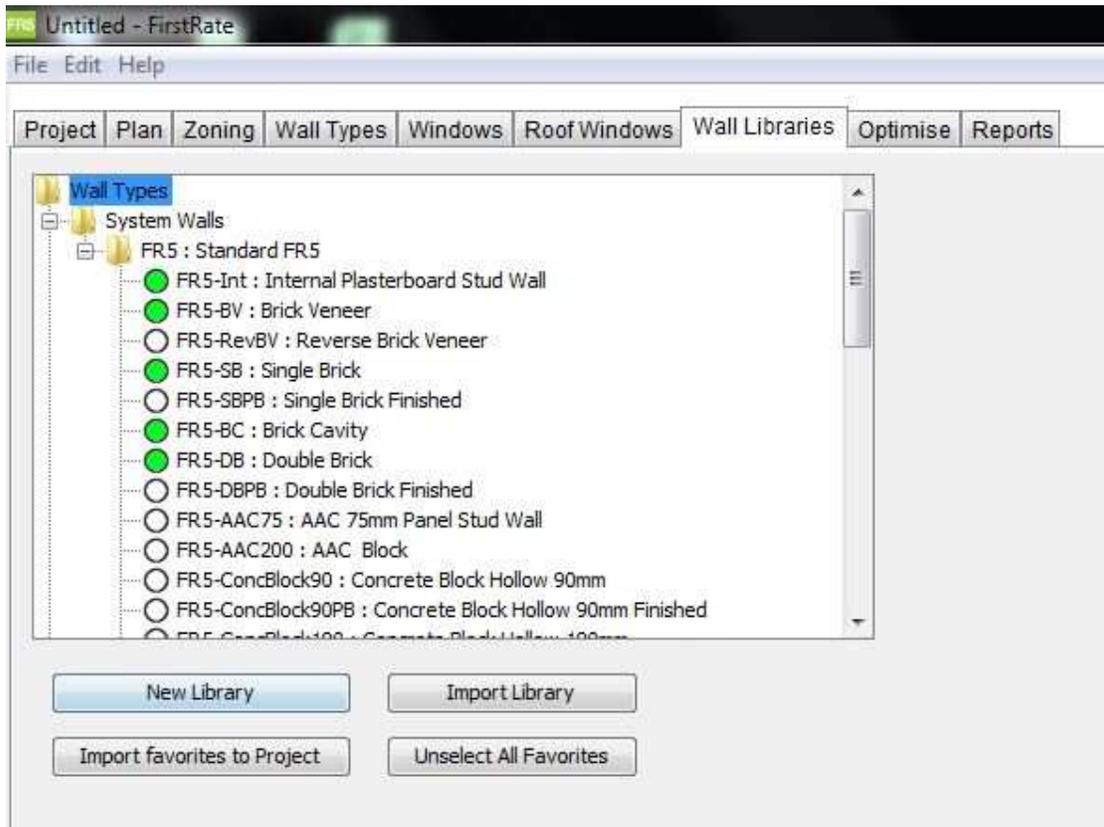
- A copy of the new Custom Wall has now been saved in the new Custom Library.

### Exporting a Library

- In the *Wall Libraries* tab, right click on the *Custom Library* and *Export Library*.
- Note, do not include a colon (":") in your file name. It will be saved as a FirstRate5 Library file (.flib). This can be shared with another FR5 user who can import it into their FR5 program files on their computer using the *Import Library* button in their *Wall Libraries* tab.

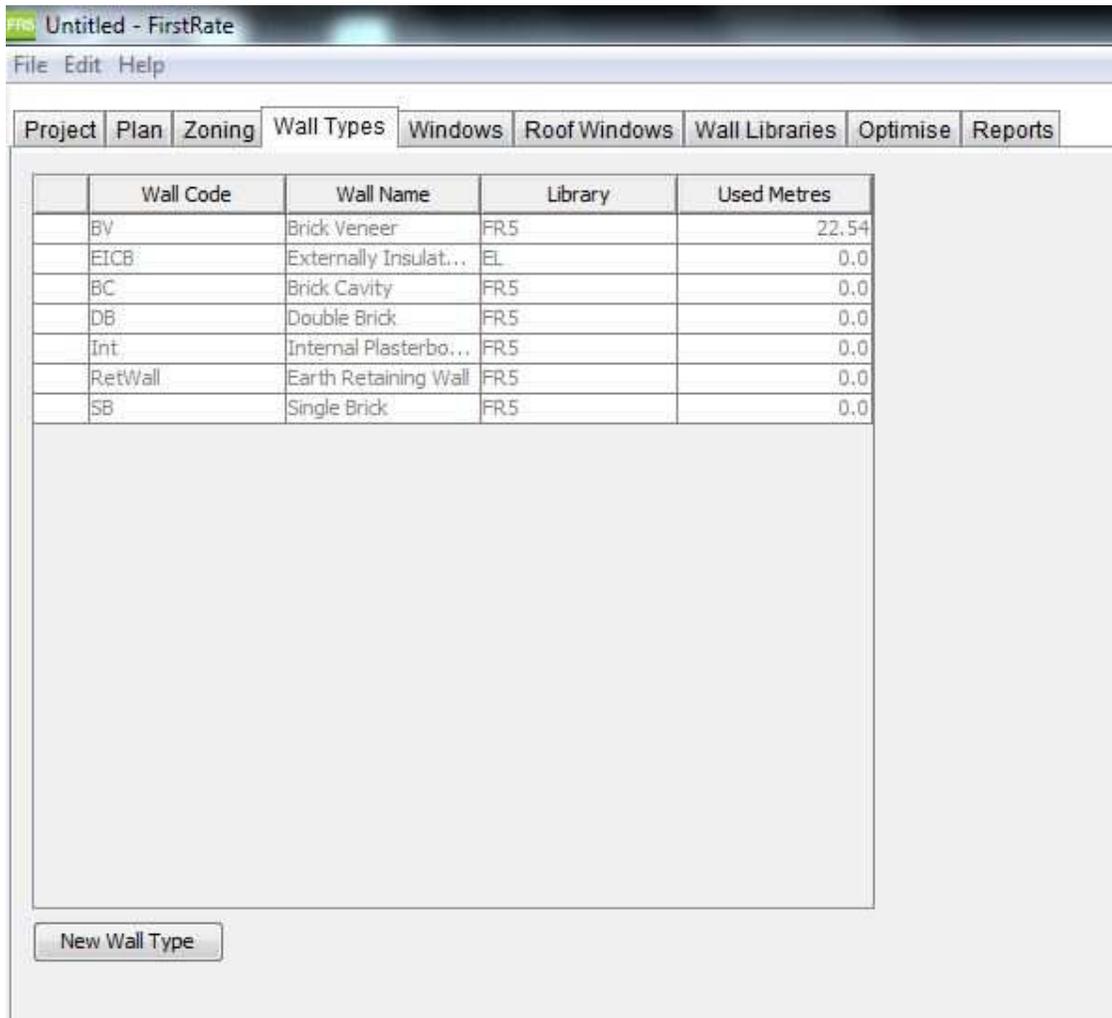
### Marking a Custom Wall as a Favourite

- In the *Wall Libraries* tab mark on the System and Custom Walls that you will use most often as favourites. This can be done by clicking on the item until the circle turns green.

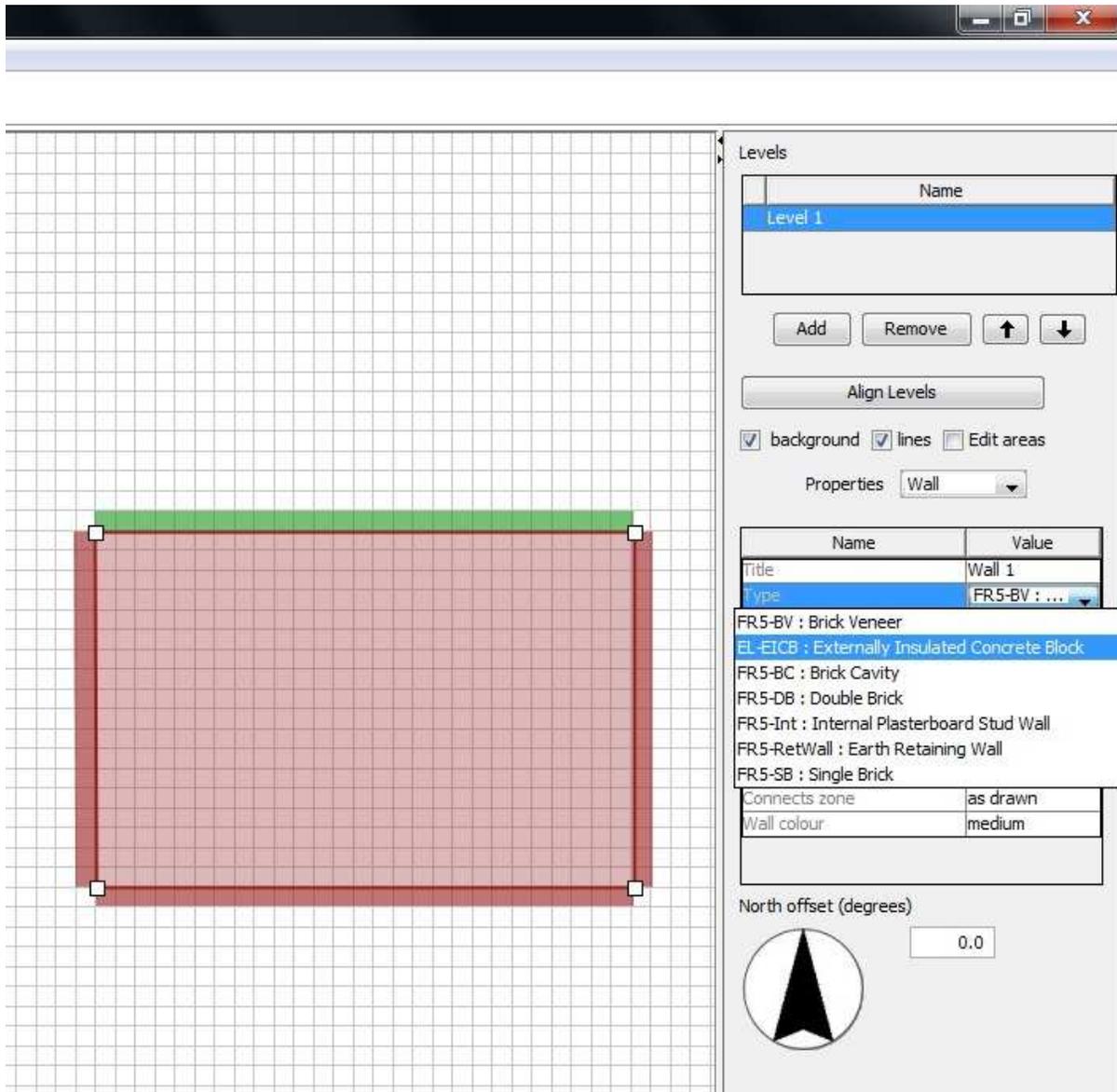


### Starting a New File and Using Custom Walls

- Create a new project file. Notice in the Wall Types tab that only your favourites are displaying.



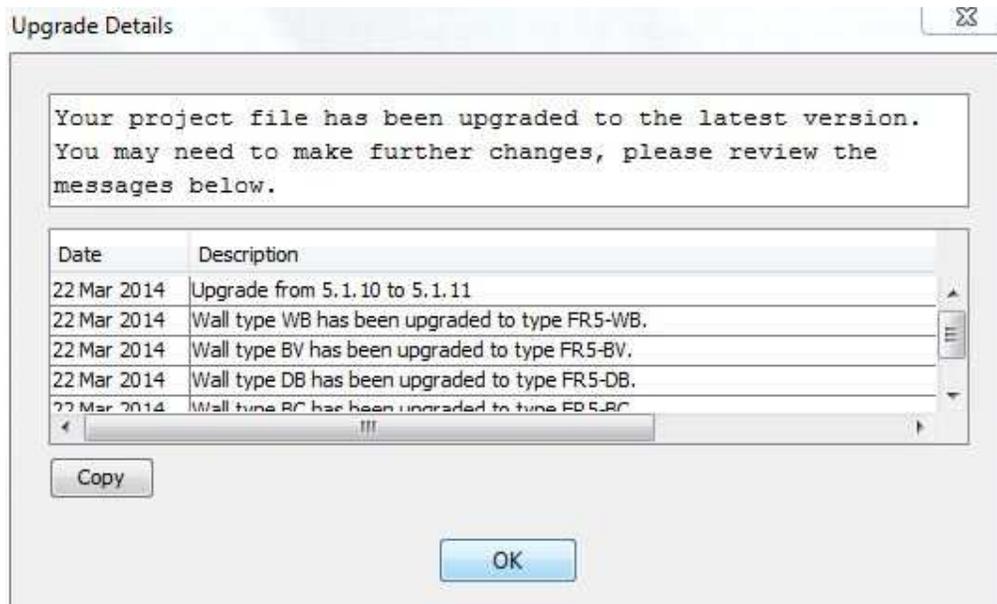
- In addition, in the Plan tab when selecting a Wall Type to assign to a newly drawn wall, only your favourites are displaying allowing a more rapid search and select.



## Upgrading an Existing Project File

When an older project file is opened in v5.1.11 it will go through an automatic upgrade process with any modifications made by this process presented in a message box to the user.

- In this case we opened a v5.1.10 project file describing a one room model with four different wall types each with bulk and air gaps specified. The following dialogue box is displayed.



- Once you click *OK* the message will disappear and will not be retrievable. The *Copy* button will copy the contents of the dialogue box to the clipboard, which can be pasted into a text document, see contents below.

22 Mar 2014 Upgrade from 5.1.10 to 5.1.11  
 22 Mar 2014 Wall type WB has been upgraded to type FR5-WB.  
 22 Mar 2014 Wall type BV has been upgraded to type FR5-BV.  
 22 Mar 2014 Wall type DB has been upgraded to type FR5-DB.  
 22 Mar 2014 Wall type BC has been upgraded to type FR5-BC.  
 22 Mar 2014 Important: All wall insulations have been removed during the upgrade process. Please review and update walls' insulation.

- The first item is self-explanatory.
- The next four items advise the user that the System Walls in v5.1.10 have been upgraded to the corresponding System Walls in v5.1.11. In general the only difference is the addition of "FR5-" as a prefix in order to distinguish these System Walls from Custom Walls.
- The final item advises that any wall insulation included in v5.1.10 has not been carried over to v5.1.11. This is due to the fundamentally different way v5.1.11 deals with walls compared to earlier versions where not all information is possible to be carried over. The user should specify the bulk insulation air gap details again as described earlier in this Guidance Note.
- If you want to retain a copy of the v5.1.10 project file SaveAs a modified file name as soon as you dismiss the Upgrade Dialogue Box.

## Further Reading

- Please refer to the FR5 User Manual (v5.1.11) for further detail. The FR5 User Manual is a PDF document that can be located by going to your Start > All Programs > FirstRate5-5.1.11> FirstRate5-5.1.11 Manual.
- Please also refer to FAQs on the FirstRate5 website ([www.fr5.com.au/faqs](http://www.fr5.com.au/faqs))