March 2023

Correctly defining constructions in iSBEM

The iSBEM methodology contains three different ways to define the properties of different constructions within a building and thereby introduce their thermal properties into the model.

These are:
1. Manually introduced values;
2. Library imported values; and
3. Values from inference procedures.

There is a common misconception amongst some groups of non-domestic assessors that these options are interchangeable and can be used at will. This, simply, is not the case, never has been and reflects a poor level of training and understanding of the SBEM assessment process.

BRE publish the iSBEM User Guide and SBEM Technical Manual for each version of the software released. The Technical Manual contains the technical definitions used within assessment calculations. Meanwhile, the User Guide is typically published in three parts and defines the correct use and inputs for the software. Construction definitions are dealt with in Section 3.2.2 of the Technical Manual and Part 2 of the User Guide. Further relevant guidance is provided on p28 of the current User Guide.

Choosing the correct data source

Choosing the correct data source is primarily driven by the amount of information and detail available to the assessor.

"In iSBEM, there are default values included for various parameters. For example, there are default seasonal efficiencies for HVAC systems and default constructions for envelope elements so that you can select them when defining the envelopes of a zone when learning how to use the tool. These default values are not generous (i.e., usually pessimistic), should be checked by the user, and, if appropriate, changed or added to." **[User Guide Part 2 Section 3.1]**

Therefore, in order of preference:

1. Manually Introduced Values –

The ideal source of information to define a construction is a specific calculation completed by a competent person giving the U-value (W/m2K) and the Km value (renamed from Cm value) (kJ/m2K). This is the usual source of information for an off-plan project where the "As Built" specifications are available. However, in practice, this information is rarely available for an existing building and cannot be obtained through a non-invasive visual site inspection.

2. Library Imported Values –

The next best option is to import the details directly from the library. If it is not already selected, you need to click on the "Import one from the library" radio button. Then, in the library drop-down menu(s), choose the construction that most closely matches the one you are trying to define, from your knowledge of what has been found in the building or is specified on drawings or schedules. With the exception of "internal" constructions (partition and party envelopes) for which further guidance is supplied below, use of library options requires demonstrable knowledge of the exact building construction details. Library options should only be used when specific construction details are available to support their selection, usually from "As Built" drawings and plans. These details must be supplied to support any quality assurance audit which may be called. Again, these details are not usually available for existing buildings and cannot usually be obtained through a non-invasive visual site inspection.

3. Use Inference Procedures –

The final option (although correctly commonly used) is to apply the inference procedures to obtain the most likely values for the element. This option is intended for use when certifying existing buildings, when you may not have the drawings or schedules which specify the construction types used in the building. The inference procedures will help you to select construction types on the basis of non-technical information you may have on the building. To use this option, you need to click on the "Help with Inference procedures" radio button and then in the inference drop-down menus, choose the options that most closely describe your construction. For example, for a wall, you may be able to choose a construction based on the sector, the building regulations year with which you think it would be compliant, and a general description.

Partition and Party Envelopes

A partition envelope is a physical barrier separating two parts of the building being assessed. A party envelope is a physical barrier separating the building being assessed from another part of the physical structure. In either case, they may take the form of a wall, floor or ceiling (but not a roof, window or door as these features are always external). Both partition envelopes and party envelopes are treated the same with regard to defining them as constructions.

ISBEM takes a special approach to these features defining them with fixed properties within the construction library. As such, inference procedures should never be used to define these constructions and so, in the absence of manually introduced values, the correct library definitions should be used. Over the years, these have been revised and a number of values are still listed from older versions of the methodology which must no longer be used. The list of available options has also recently been extended with the intention that the internal layout characteristics of the building can be better defined. In the latest software versions (6.1) the current definitions are:

1. For partition and party walls:

Construction Description	Category	Library Option
Cavity wall with evidence of insulation	Partition wall	Internal wall - Cavity - Insulated
Cavity wall without evidence of insulation	Partition wall	Internal wall - Cavity - Uninsulated (or unknown)
Glass separating panels (not internal windows)	Partition wall	Internal wall - Internal glazing as wall (not internal windows)
Light (often modular) partition panels	Partition wall	Internal wall - light partitioning
Solid wall with evidence of insulation or dry lining	Partition wall	Internal wall - solid- Insulated or dry lined
Solid wall without evidence of insulation or dry lining	Partition wall	Internal wall - solid- Uninsulated (or unknown)
Stud wall with evidence of insulation	Partition wall	Internal wall - Stud partition – Insulated
Stud wall without evidence of insulation	Partition wall	Internal wall - Stud partition - Uninsulated (or unknown)

2. For partition and party floors and ceilings:

Construction Description	Category	Library Option
Concrete floor or ceiling without evidence of insulation	Internal floor or internal ceiling	Intermediate floor/ceiling (concrete) - Uninsulated
Timber floor or ceiling with evidence of insulation	Internal floor or internal ceiling	Intermediate floor/ceiling (timber) - Insulated
Timber floor or ceiling without evidence of insulation	Internal floor or internal ceiling	Intermediate floor/ceiling (timber) - Uninsulated
Light plaster ceiling below concrete floor	Internal floor or internal ceiling	Light plaster ceiling below not timber floor
Suspended tiled ceiling below concrete floor with evidence of insulation	Internal floor or internal ceiling	Suspended tiled ceiling below concrete floor - Insulated
Suspended tiled ceiling below concrete floor without evidence of insulation	Internal floor or internal ceiling	Suspended tiled ceiling below concrete floor - Uninsulated
Suspended tiled ceiling below timber floor with evidence of insulation	Internal floor or internal ceiling	Suspended tiled ceiling below timber floor - Insulated
Suspended tiled ceiling below timber floor without evidence of insulation	Internal floor or internal ceiling	Suspended tiled ceiling below timber floor - Uninsulated

NB: The appropriate match for light plaster ceilings below timber floors is the appropriate timber floor or ceiling option. Similarly, the presence of insulation in a "light plaster ceiling below not timber floor" would improve the U-Value and reduce the K_m value therefore "Intermediate floor/ceiling (timber) – Insulated" is the closest match which should be used.

Being internal constructions, the conditioning attached to these options should only be:

1. Conditioned adjoining space;
2. Unheated adjoining space;
3. Strongly ventilated spaces; or
4. Same space.

If the adjacent conditioning is either "Exterior" or "Underground" the construction is not a partition or party envelope and none of these definitions nor any of the now redundant internal definitions still listed in the software can be used to define it.

Defining Constructions – Best Practice

Whilst it is possible to define the conditioning of a construction at envelope level, this often leads to input errors and is now considered bad practice.

It is considered best practice to define each type of construction, together with its adjacent conditioning with the project database for ease of reference.

Each construction and conditioning combination should be given a clear identifying name. Examples may include:

1. "Cavity Wall (Underground)"
2. "Cavity Wall (Exterior)"
3. "Stud Partition (Conditioned)"
4. "Stud Partition (Unheated)"
5. "Solid Partition (Same Space)"
6. "Solid Partition (Strongly Ventilated)"