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A Guide to Thermal Bridging in SAP

With the changes in Building Regulations and SAP in force since April 2014 the impact of thermal bridges on dwelling performance has increased significantly.

What is a Thermal Bridge?

A Thermal Bridge is caused wherever insulation is 'bridged' by a non-insulating material. There are two types of thermal bridges considered in SAP, repeating and non-repeating. An example of a repeating bridge would be the studs in a traditional timber frame wall and an example of a non-repeating bridge would be a lintel bridging the cavity over a window.

How does SAP assess them?

SAP accounts for the effect of repeating thermal bridges in the U-Value calculations. Non-repeating thermal bridges are accounted for in one of two ways, either through a default Y-Value of 0.15W/m^{2}K or by calculating the Ψ-Value of all junction details and multiplying them by their lengths (the process of using the Ψ-Values and their lengths will produce a guide Y-Value in the SAP software).

What difference does this make to a SAP?

The effect is considerable. A Y-Value of 0.15W/m^{2}K adds a value of 0.15 to all the U-Values on a property - so for a roof insulated in the joists with 300mm of mineral wool this effectively doubles the U-Value. For an average detached property built to the 2010 Part L requirements a Y-Value of 0.15W/m^{2}K accounts for around 30% of the building's heat demand. This therefore requires a much higher building spec to offset this.

How can performance be improved?

By using calculated Ψ-Values for junctions. You can use Accredited Construction Details and Enhanced Construction Details. However, a suitably qualified person can calculate the Ψ-Value for an individual detail using specialist software which can further reduce the overall building specification. Although this latter option can be expensive, it often produces better results as actual product information can be used rather than generic data.

What are the advantaaes of Ψ-Values?

- Using Accredited Construction Details on a average detached dwelling can result in a Y-Value of around 0.08W/m^{2}K. This can reduce the DER by around 8-10% over the default 0.15W/m^{2}K.
- Using product specific calculated Ψ-Values on an average detached dwelling can result in a Y-Value of around 0.04W/m^{2}K. This can reduce the DER by around 14-16% over the default 0.15W/m^{2}K, reducing the need for expensive renewables.
- A lower Y-Value improves a property's Fabric Energy Efficiency (FEE), assisting in achieving compliance with the TFEE, which is a requirement of the 2013 Part L. A lower FEE can also enable additional credits to be gained in ENE2 of the Code for Sustainable Homes.
- Where specific details have been calculated optimising them to reduce bridging can make a significant difference. For example, adjusting the position of windows within a cavity wall can halve the heat loss though the sill and jambs. For a 3 bed mid-terrace house this can equate to around a 1% difference in the DER.
- Calculating non-standard details for a client on a mid-size development has improved the SAP performance sufficiently to allow the removal of the specified solar thermal systems. This has saved around £40-50,000.

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