SRE Briefing Note – Thermal Bridges

We have prepared this Briefing Note to provide a simple guide to thermal bridging in new dwellings. The Briefing Note describes what thermal bridging is, outlines key construction details of particular significance, provides examples of the ways in which heat loss can be reduced and outlines updates on the recognised construction details that can be followed. Architects should prioritise junction detailing during the design phase as it directly affects the performance of newly constructed homes. Enhancing junction detailing to reduce the impact of non-repeating thermal bridging is one step toward creating low energy, healthy homes that also comply with Building Regulations.



What are Thermal Bridges?

There are two types of thermal bridges in buildings – **repeating** e.g. timber or metal studs in frame construction or mortar joints in masonry construction (accounted for in U-value calculations) and **non-repeating** (PSI-values). This Briefing Note will concentrate on non-repeating thermal bridges. These appear at the junction between building elements, such as a wall and a floor or a window and a wall. Thermal modelling software helps to quantify the thermal bridging across a junction (PSI-value), which are then accounted for separately in SAP calculations.

The Effects of Thermal Bridges

- **Increased Heat Loss** – In a typical new build home, thermal bridges can account for 20-30% of heat loss. As homes become better insulated, thermal bridges become even more significant.
- **Localised 'Cold Spots'** – These can occasionally cause mould growth or a buildup of condensation.

Key Junctions

There are many non-repeating thermal bridges within a dwelling, and the key junctions to focus on are those which have a high PSI-value or occur frequently over significant lengths – these are the junctions that need improving to avoid heat loss and 'cold spots'.

How is Heat Loss Quantified through Thermal Bridging?

In SAP, heat loss is quantified by a combination of U-values and Y-values.



The junction **PSI-value** quantifies the heat loss from each of the junctions where the building elements meet (thermal bridges). Multiplying the junction PSI-value by the junction length gives the total heat loss for that junction.

The sum of the individual junction heat losses divided by the total exposed surface area of the dwelling gives the **Y-value**. The Y-value details the overall heat loss arising from all the building junctions as an equivalent U-value for the dwelling.



Masonry Construction
Design recommendations include:

1. Use a split or thermally broken lintel.
2. Use light aggregate blockwork for inner leaf.
3. Use a PU/PIR cavity closer.
4. Use insulated plasterboard on the inner leaf.
5. Have a window frame overlap of min. 50mm.
6. Increase eaves insulation depth.

Timber Frame Construction
Design recommendations include:

1. Use thermal laminate plasterboard on inside of frame.
2. Use light aggregate footing blocks.
3. Use min. 50mm floor perimeter insulation thickness.
4. Have a window frame overlap of min. 50mm.
5. Use min. 150mm insulation behind rimboard.

Steel Frame Construction
Design recommendations include:

1. Add a thermal break pad where the steel frame comes in contact with the floor slabs.
2. Avoid direct contact of steel fixing with window frames.
3. Always try to wrap steel fixing with insulation to reduce the amount of heat loss.
4. Use thermally broken steel lintels.

Updates

Since the introduction of SAP 10, PSI-values for the MHCLG Accredited Construction Details (ACDs) scheme were deemed inaccurate and not fit-for-purpose based on current building practises, thus have been removed from SAP 10 Assessments.

There has recently been a number of key developments regarding thermal bridging details, specifically with regards to the use of certain junction schemes in SAP 10.

'LABC Registered Construction Details should not be used for Approved Document (AD) L Volume 1 and 2 (21/22 editions) or any subsequent amendments'.

The second edition of BR 497, released in 2016, has not been reflected in the LABC Registered Construction Details. As a result, the details may not be applicable to assessments completed on SAP 10 for England and Wales AD L 21/22 editions.

Consequently, Elmhurst have produced a library of Thermal Bridging Schemes, listing SAP 10 compliant PSI junctions. All schemes/details calculated to the second edition of BR 497 standards can be used in SAP 10 assessments, with any bespoke junctions requiring independent assessment.

How can we help?

If you need to minimise the heat loss of your project, SRE can assist you.

Our building physics specialists can provide Thermal Bridge Calculations to determine specific PSI-values for all required junctions. Thermal Bridge Calculations are becoming a critical component in energy modelling for dwellings Building Regulations compliance.

Please contact us on 01730 710044, email info@sre.co.uk, or visit https://www.sre.co.uk/

