

Q & A

Constructive Details Limited, Thermal Bridging and Thermal Modelling

1. What is Constructive Details Limited?

Constructive Details Limited (CDL) is a joint venture by the British Board of Agrément (BBA) and Robust Details Ltd (RDL). As two of the most well known and respected organisations in the construction industry, the two companies joined forces to provide solutions on the increasingly complicated, technical and often confusing issue of linear thermal bridging. The company was officially registered in the UK in August 2010, where the two company Directors Dave Baker, Chief Executive of RDL and Greg Cooper, Chief Executive of the BBA signed a common understanding and goals in delivering an accredited thermal bridging scheme, as described in Approved Document L1A (dwellings, section 5.12) and L2A (non-dwellings, section 5.7), published in April 2010.

2. What is thermal bridging?

Thermal bridging occurs in all construction types. It is created when an element passes through insulation or where there is reduced insulation. Thermal bridges occur in junctions between elements or where the building structure changes.

There are two categories of thermal bridges:

Repeated thermal bridge i.e. studs in a timber frame wall. This is taken into account in U value calculations.

Non-repeated thermal bridge i.e. a steel section in a timber frame wall.

This leads to variable and reduced internal surface temperatures and increased heat loss compared to the un-bridged part of the structure. All these could lead to an increased risk of condensation. The term "temperature factor" is used to describe this potential risk of condensation.

3. What is a psi-value?

The heat loss associated with the thermal bridges is called linear thermal transmittance or psi-value or ψ -value (pronounced 'si'). This is the rate of heat flow per degree per unit length of the thermal bridge that is not accounted for in the U value of the plain elements defining the thermal bridge.

4. What do we mean by Thermal Modelling/Simulation?

Thermal modelling or Thermal Simulation refers to the use of numerical calculation methods according to BS EN ISO 10211-1 or computer modelling using finite element modelling software. In all the cases, the geometry, the materials and the boundary conditions must be specified. Most of the numerical modelling is done in 2 dimensions but in some cases 3D modelling is required. This is true when one of the elements contains repeated thermal bridging i.e. balcony connectors.

The BBA uses THERM, BISCO and TRISCO for their thermal modelling calculations.

Documentation relevant to thermal modelling is:

- BR 497 : 2007 *Conventions for calculating linear thermal transmittance and temperature factors*
- Ward T I. *Information Paper IP 1/06 Accessing the effects of thermal bridging at junctions and around openings*
- BS EN ISO 10211 *Thermal bridges in building construction-Heat flows and surface temperatures-Detailed calculations.*

5. Where is Thermal Modelling used?

Thermal modelling is used to calculate the heat loss in buildings and in this case we are focusing on psi-values and heat loss associated with junctions. These calculated psi-values are then entered into a SAP (or SBEM) model which provides a calculation of the emissions ratings of buildings.

- SAP stands for Standard Assessment Procedure and it is the calculation tool for CO₂ emission rates in new dwellings in England and Wales and Scotland under Section 6. There are a number of different companies that develop this software, such as Elmhurst and NHER, while the methodology is developed by BRE.
- SBEM stands for Simplified Building Energy Model and it is used by calculating the annual energy use for a proposed building and comparing it with the energy use of a comparable 'notional' building. This is used in new non dwellings. This software is developed and maintained by BRE for DCLG. The methodology behind it is called the NCM (National Calculation Method).

Both methods produce Energy Performance certificates which are a regulatory requirement.

6. What are the ACD's?

ACD's stands for Accredited Construction Details and can be found in the <http://www.planningportal.gov.uk/buildingregulations/approveddocuments/partl/bcassociateddocuments9/acd/>. These details have psi-values attached to them that can be found in Appendix K of the document SAP 2009 or they can also be found in IP 1/06 *Assessing the effects of thermal bridging at junctions and around openings*. There are also the Accredited Construction Details (Scotland) 2010 publicly available.

When the ACD's are used, the individual that prepares the SAP assessment can claim a y-value of 0.08, which represents the total heat loss due to thermal bridging as accounted for in a SAP calculation. (The y-value is the sum of each psi-value multiplied by the length of each junction; this figure would be calculated automatically by software).

7. I am a manufacturer. How can I get my product/system recognised as a Constructive Detail? How much will it cost to begin with and on-going?

You need to contact CDL on enquiries@constructivedetails.co.uk with the following information:

- the type of details you want approved and ideally provide a set of drawings for the junction details
- the number of junction details
- any thermal modelling you may have done already stating the thermal modelling package you used for the work.

After accessing this information a contract will be offered for a number of appropriate details, indicating assumptions and limitations.

Most calculated psi-values are better than the values quoted in Accredited Construction Details (ACD's) and manufacturers can use this information to promote their product to Designers and Builders. It can also help promote lesser used or more innovative products.

8. I am an architect. What happens if I do not use Constructive Details on my projects?

The alternative would be to use the ACD's but they currently offer an unfavourably high y-value. Another route would be to accept values from another provider; however you need to be confident that the psi-values were calculated by someone competent.

You can input psi-values in SAP or SBEM calculations in the design stage to calculate emission ratings. Lower psi-values can contribute to minimising the heat loss from the building fabric, in the same manner as U values.

9. I am a builder. What happens if I do the same?

The CDL handbook offers the benefit of including all the details required for a new built home, and therefore there is no need to look for other thermal bridging values elsewhere.

It has checklists that can be used on site for training and ensuring delivery of the required thermal performance as stated in the handbooks.

The 2010 targets in Part L require a 25% improvement on the thermal performance of a building. Improving the psi-values is an important part of improving the building fabric and ensuring the real performance is close to the design values.

10. Where can I find Constructive Details and how much do they cost?

All Constructive Details are available free of charge of the CDL website. You can view them in an easy e-book or as an individual PDF files after a simple registration process.

11. What sort of details will the CDL system cover?

CDL aims to cover all types of construction, from traditional construction to innovative solutions, focusing on the buildability of the details.

12. I am a building control officer. How can I use the information to ensure regulatory compliance?

Individual thermal bridging details are now used as part of SAP 2009 assessments. Therefore building control may be called upon to approve proposals and evidence such as clear drawings and associated psi-values for the thermal bridging junctions. Any guidance from an accredited organisation would be helpful in the decision making process.

13. Why is the handbook needed?

Since October 2010 there has been confusion in the market on who is competent to prepare thermal bridging calculations, where to find appropriate thermal bridging calculations and who, if anyone is accredited to deliver a thermal bridging details scheme. There is no competency or other approval currently in place for thermal bridging calculations.

14. Why are some of the psi-values provided in the handbooks different from the ACD's?

Unfortunately a direct comparison between the ACD's and Constructive Details is not possible. The ACD's do not provide the U value of the plain elements or the thickness/ thermal conductivity value of the materials in order to be able to make a direct comparison, and due to the generic approach used to produce the CDL handbook, different or higher psi-values are likely.

15. Why can't I mix and match details between different handbooks?

The CDL handbooks have been prepared as a complete solution and if a junction detail is covered by them, then you need to use the CDL version. If you mix the psi-values with different junctions it is likely that the numbers are not comparable as they may have been prepared under different protocols. The best option in the case a detail is not covered by CDL would be to use the ACD's as they are conservative numbers.

Constructive Details Ltd

Bucknalls Lane,
Watford
Hertfordshire WD25 9BA

t: + 44 (0)1923 665300

f: + 44 (0)1923 665301

e: enquiries@constructivedetails.co.uk

w: www.constructivedetails.co.uk



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