# Response to Approved Document L, 2010

A new version of Part L of the Building Regulations came into effect on 1 October 2010. In addition to a general tightening of standards, revised guidance is provided for avoiding thermal bridging at construction joints.

Clause 5.7 of ADL-2A 2010 requires the designer to demonstrate that reasonable provisions have been taken to ensure continuity of insulation within the building envelope. In order to ensure that the modelled performance of junctions/interfaces is realistic, the calculated linear thermal transmittance may require an adjustment. Clause 5.7 states that ways of demonstrating reasonable provision are:

- To adopt a quality-assured accredited construction details approach in accordance with a scheme approved by the Secretary of State. If such a scheme is utilised then the calculated linear thermal transmittance can be used directly in the BER calculation,

- To use details that have not been subject to independent assessment of the construction method. In this case the linear thermal transmittance should be calculated in the appropriate way, and then the value increased by 0.02 W/mK, or 25 per cent whichever is greater, before being used in the BER calculation,

- To use unaccredited details, with no specific quantification of the thermal bridge values. In such cases the generic linear thermal bridge values as given in IP 1/06 increased by 0.04 W/mK or 50 per cent whichever is the greater must be used in the BER calculation.

Currently there are no accredited construction detail schemes for non-domestic construction and so there is no choice other than to adjust the linear thermal transmittance as required above.

There are two situations where the linear thermal transmittance is calculated, and their treatment is different. These situations may be defined as standard details and bespoke details.

## Standard details

A standard detail is one which is integral to a system, such as a window or curtain wall frame. The linear thermal transmittances can be anticipated, such as that between the frame and the glazing, or due to a window insert in a curtain wall frame, as shown in Figure 1.

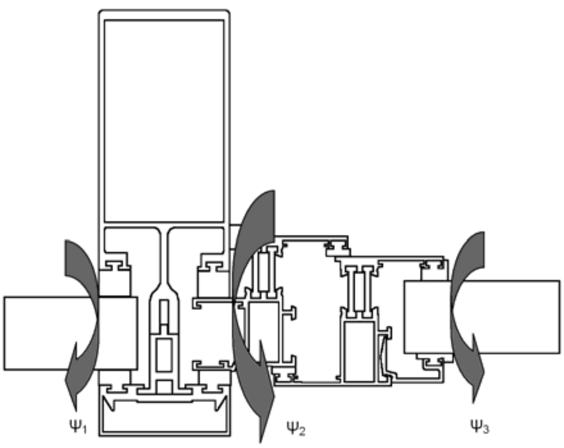


**Figure 1 – typical linear thermal transmittances within a standard detail**

Calculation methods are given in Appendix C of 'The thermal assessment of window assemblies, curtain walling and non-traditional building envelopes'. These details are not dependant on workmanship. Due to their standard and repeatable nature there is no need to add any additional factors to the linear thermal transmittances calculated.

**Bespoke details**

Bespoke details are those which are unique to a particular project, such as the design of the interface between a zone of curtain walling and rainscreen system or a window and a wall system, as shown in Figure 2.

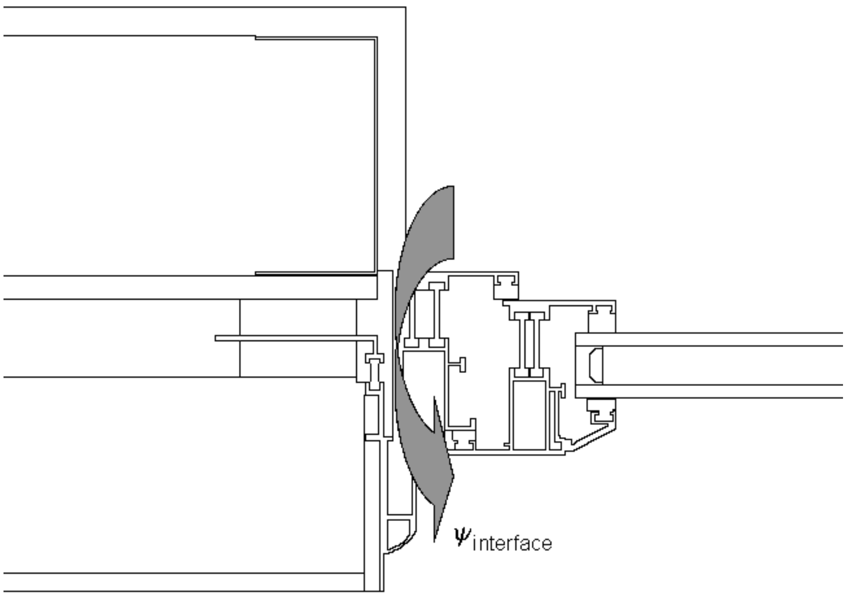


**Figure 2 – interface between a window and a wall system**

Due to the nature of most projects these details are often modified on site to overcome problems of fit and coordination, and as such the performance may differ from that which was calculated at the design stage. Therefore for such situations it is necessary to adjust the calculated ψ value, according to the robustness of the design, as set out in ADL-2A.

**Envelope zone**

A schematic of the calculation method for a zone of building envelope consisting of an area of curtain walling and the interface to a different construction is shown in Figure 3.

The overall U-value for the zone below would be;

$$U_{zone} = \frac{U_{CW} A_{CW} + \psi_{interface} l_{interface}}{A_T}$$

Where:

$U_{zone}$ is the overall U-value of the zone, in $W/m^2K$,

 

$U_{CW}$ is the U-value of the curtain wall, including the linear thermal transmittances between components within the system, in $W/m^2K$,

$A_{CW}$ is the area of the curtain wall, in $m^2$,

$\Psi_{interface}$ is the linear thermal transmittance of the interface between the curtain wall and the adjacent construction, increased according to Clause 5.7 of ADL-2A as appropriate, in W/mK,

$l_{interface}$ is the length of the interface, in m,

$A_T$ is the total area of the zone, in $m^2$.

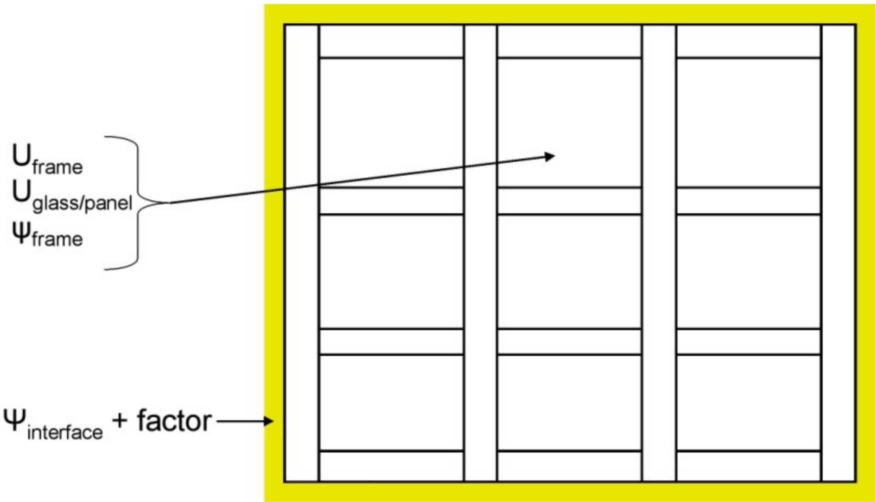


**Figure 3 – Schematic of the calculation method for an envelope zone**

## Input to building energy models

Building energy models such as SBEM require walls to be input as if they are traditional walls comprising windows and opaque wall. It is important that non-traditional walls are correctly represented when using such models.

The correct area of glass has to be input as the models will calculate total solar energy transfer and transmission of daylight. However the U-values of windows and walls do not need to be the correct values provided the overall U-value of any zone is correct. The following procedure may be applied:

The building energy model will assume either a framing fraction ($F_f$) or a transmission factor ($T_f$) for the windows and factor the window area to obtain an area of glass. The framing fraction is the area of window represented by the glazing frame and the normal default value is fifteen or twenty per cent (which is high for a curtain wall). The transmission factor is the fraction of light transmitted through the window and includes the obstruction of the glazing frame as well as additional shading devices. Either the framing fraction should be given the value zero, or the transmission factor should be calculated only taking account of additional shading devices. Where default values are used the window area should be taken as:

$$A_{windows} = \frac{A_{glass}}{1 - F_f} \quad \text{or,} \quad A_{windows} = \frac{A_{glass}}{T_f}$$

The U-value of the windows may be assumed to be a nominal $U_{window}$ = 2.0 $W/m^2K$ and the nominal thermal transmittance through the windows calculated as:

$$Q_{windows} = A_{windows} \times U_{window}$$

The nominal U-value of the wall (opaque parts) can now be calculated to give a correct U-value for the zone as a whole. However, most software will make a correction for linear thermal bridges by calculating linear thermal bridges using $\psi$-values or applying a factor ($\alpha_{tb}$) to the simple U-value calculation.

The inclusion of additional thermal bridges in the building energy model by using $\psi$-values should be nullified by setting the $\psi$-values to zero in the building energy model and using $\alpha_{tb}$ = 0 in the equations below.

The appropriate U-value of the opaque parts of the envelope may then be calculated from:

$$A_{zone}U_{zone} = (1+\alpha_{tb})[A_{windows}U_{windows} + A_{opaque}U_{opaque}]$$

$$U_{opaque} = \frac{[A_{zone}U_{zone}/(1+\alpha_{tb}) - A_{windows}U_{windows}]}{A_{opaque}}$$

$$A_{opaque} = A_{zone} - A_{windows}$$

Where $U_{zone}$ is the zone U-value as described in ‘The thermal assessment of window assemblies, curtain walling and non-traditional building envelopes.

**References**


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|---|---|
| HM Government | The Building Regulations 2010, Approved Document L2A, Conservation of fuel and power in new buildings other than dwellings, NBS, 2010, ISBN 978-1859463260 |
| CWCT | The thermal assessment of window assemblies, curtain walling and non-traditional building envelopes, CWCT, 2011 |
| BRE | Information Paper IP 1/06, Assessing the effects of thermal bridges at junctions around openings in the external element of buildings, BRE, 2006, ISBN 978 1 86081 904 9 |