Technical Update No 5

Building Regulations Approved Document L2 (England and Wales) - showing compliance of curtain walls

The UK Building Regulations will change on 1 April 2002 with the implementation of the new Part L. Approved Documents L1 – Dwellings and L2 – Buildings other than dwellings set tougher standards for thermal performance of buildings and require both better-insulated and more airtight construction.

Overview

Approved Document L2 does not refer directly to curtain walling but refers to the CWCT publication 'Guide to good practice for glazing frame U-values' and 'Guide to good practice for assessing heat transfer and condensation risk for a curtain wall'. These are two of a quartet of documents describing thermal performance of curtain walling. The second edition of these will be published by April 2002.

This Technical Update discusses the changes to Approved Document L2 of concern to curtain wall designers. Points from the second edition of the CWCT Guides that may be beneficial to designers of buildings comprised wholly or partly of curtain walling are also included. Words given in italics are direct quotes from the documents. The procedures provide a way of demonstrating reasonable provision for the conservation of fuel and power and they have the recognition of the DTLR.

U-values

Approved Document L2 offers three methods for demonstrating compliance:

- An Elemental Method
- A Whole Building Methods
- A Carbon Emissions Calculation Method

When calculating the average U-value of a curtain wall you can adopt the exact method as described in the CWCT Guide to good practice as follows:

> *'The average U-value for the façade should not exceed that of a façade of conventional design that complies with the Elemental U-values and opening area. The appropriate U-value for openings is that for metal framed windows (2.2 W/m^2/K) and for opaque components is 0.35 W/m^2/K. The permitted area of openings for an office building is 40% of the façade.*
>
> *For a façade complying with the above, there is additional heat loss due to thermal bridging around openings etc. As discussed in BRE IP 17/01 this is around 10% for non-domestic buildings. The detailed calculations undertaken include all effects of thermal bridging, and so an equitable comparison with the Elemental Method as set out in Approved Document L2 will be an average U-value that is 10% higher than that obtained without consideration of the thermal bridging. The average U-value that the façade should achieve is thus:*

$$\overline{U}_{notional} = (0.60 \times 0.35 + 0.40 \times 2.2) x 1.10 = 1.20 \quad W/m^2K \quad '$$

Approved Document L2 allows trade-off between U-values of different building components but limits the U-value of the opaque parts of a wall to a maximum of 0.37 W/m^{2}K by paragraph 1.16b. However:

> *'Glass is an integral part of a curtain wall. Trade-off between glass panels and opaque panels is not the same as trade-off between windows and walls as described in clause 1.16b of Approved Document L2. The following trade-off is only allowable for curtain walls.'*

And the overall U-value of the opaque parts of the curtain wall may be greater than 0.37 W/m^{2}K. This consideration does not extend to other forms of cladding and the overall U-value of the wall must enable the building as a whole to comply with all other aspects of Approved Document L2.

Condensation

Approved Document L2 sets a poorest acceptable U-value for any part of a wall to reduce the risk of condensation forming. Clearly mullions and transoms in curtain walls have U-values in excess of 0.7 W/m^{2}K. A successful condensation risk assessment using the procedures described in the CWCT Guide to good practice will overcome any concern about condensation forming.

> *'The Elemental Method of Approved Document L2 requires (Table 3) that no part of the wall shall have a U-value greater than 0.70 W/m^{2}K. This cannot be applied to curtain walling at the component (transom or mullion level). The requirement is included in Approved Document L2 to reduce the risk of condensation on internal surfaces. Where a condensation risk assessment has been performed successfully in accordance with this Guide to good practice U-values of curtain wall components may exceed 0.70 W/m^{2}K provided that the overall U-value of the curtain wall complies with the requirements of Approved Document L2.'*

Air leakage

Approved Document L2 requires that air leakage measured through the whole building envelope should not exceed 10m^3/hr m^2 at 50 Pa pressure difference (internal positive). For buildings with floor area greater than 1000m^2 Approved Document L2 suggests this should be demonstrated by test. For buildings with smaller floor area the suggested approach is to show that air leakage has been limited by good design and workmanship.

Walls that meet the requirements of CWCT 'Standard and guide to good practice for curtain walling' will have air leakage rates less than 0.45 m^3/hr m^2 at 50 Pa. However, interfaces with other forms of construction such as roofs and adjacent walls require particular attention to detailing in order to achieve compliance.