Thermally improved spacers

Part 2
Determination of the equivalent thermal conductivity by means of measurement

Contents

Foreword

As set out by the window product standard EN 14351-1 clause 4.12, one of the methods to determine the thermal transmittance U_W of windows is by calculation as per EN ISO 10077-1. The quantities required for this calculation are the thermal transmittances of the frame and the glazing, U_f and U_g, respectively as well as the linear thermal transmittance Ψ. The Ψ-value describes the heat lost by the glazing installed in the frame. The Ψ-value depends largely on the type of spacer inserted in the insulating glass unit. In this context we distinguish between ‚conventional' and thermally improved spacers. The definition of a thermally improved spacer is included in EN ISO 10077-1 and has again been summarised in the scope of this Guideline.

The Ψ value is determined by calculation in accordance with EN ISO 10077-2. This requires the exact geometrical cross section of the spacer, and details of the thermal conductivity of the materials used.

Some data for thermal conductivity can be found in the relevant standards. However, if new materials are used their thermal conductivity needs to be determined. For this purpose, accredited bodies use a range of different measuring methods, some of which yield very diverging results. It would therefore appear necessary to specify suitable measuring methods for the different materials and finishes. However, studies and investigations carried out in the past revealed a number of serious problems.

Another option would be to determine an ‘equivalent thermal conductivity’ of the complete spacer system, rather than the thermal conductivity of all the materials used. This approach avoids the problems above, simplifies the process and promises other advantages.

Once the equivalent thermal conductivity $\lambda_{eq,2B}$ has been determined, it can be used to calculate the linear thermal transmittance Ψ of a spacer in a specific application. In this case, the ‘dummy spacer’ of the two-box model replaces the detailed spacer of the respective application. This usually makes it possible to prevent errors in calculating the Ψ-value caused by the modelling. In addition, the time needed for modelling the system is reduced significantly.