Mechanical restraint

Function and certification of the mechanical restraint of the outer sheet in LITE-WALL Insulating glass

Requirements

Mechanical restraint must be demonstrated with a Safety Factor of 1, taking loads and self-weight into account.

Self-weight support

In its installed state, the outer tempered safety glass is bonded on its second surface to the inner laminated safety glass using a silicone seal of DC-3362 HV with a minimum depth of 14 mm. The outer sheet is sealed around its perimeter edge to adjoining units with a weather-seal (e.g. Silicone DC-797). The support of the self-weight of the unit is basically taken through the bond of the edge (secondary) seal.

Even if the seal of the insulated unit completely fails at once, (which is practically impossible) the self-weight of the outer sheet will be transferred to the unit below via the perimeter weather-seal.
A vertical fall of the outer sheet of glass is therefore out of the question.
Mechanical restraint

Wind load support

The behaviour during negative wind pressure on the outer sheet has been evaluated in Test Report M 666/92. **In this particular case, the function of the insulated glass edge seal was removed by using a non-adhesive tape between glass surface 2 and the edge seal.** The so-prepared LITE-WALL Insulated unit was subjected to 1000 load-cycles each of 1500 Pa positive and negative pressure. No changes to the unit were observed. These measured values from the test are proof of the pull-out resistance (with a Safety Factor $\geq 2.0$) of the mechanical restraints under realistic conditions (Report M 545/91).

Glass size positive/negative pressure test

$1600 \times 2600 \text{ mm} = 4.16 \text{ m}^2 \times 1.5 \text{ KN/m}^2 = 6.24 \text{ kN}$

Mean value from Report M 545/91 per clip

$0.78 \times 4 = 3.12 \text{ kN}$

Factor = $6.24 / 3.12 = 2.0$

This Factor results from the condition that the pull-out tests were carried out perpendicular to the glass surface, the test however, simulates real deflections and deformations.

Conclusion

The required proof that a mechanical Safety Factor of 1 under self-weight and wind load, is achieved through the above mentioned tests.