Maximizing façade transparency with crystal clear silicone spacers

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Extended Abstract

The need for higher transparency in façades has led to the development of jumbo-sized glass. Until now, the almost jointless appearance of large-scale glazing could only be reached with laminated safety glass. However, due to the more stringent energy efficiency requirements imposed to buildings, efforts have been initiated by manufacturers to propose transparent insulating glass units. These new designs have a transparent spacer in the vertical visible glass edge whilst the horizontal edges are typically still using a conventional spacer, including the desiccant needed to guarantee a dry atmosphere within the cavity. The result is a nearly seamless overall view with maximum transparency and the same technical characteristics of the IGU. Glass, PC or PMMA are typical materials used today as spacer, but they have the main disadvantage of being hard and rigid which makes manufacturing complex and time consuming and limits the freedom of shape design.
Dow recently developed a new two-part condensation-cure technology, which enables bulk cure of silicone materials within a few days at room temperature. The new cure system can be formulated without fillers, to produce crystal-clear materials, but the absence of fillers implies a lower strength of the material. It is noteworthy that materials produced with the new cure technology can develop durable adhesion after cure of the product on various substrates. Hence, a new type of flexible, perfectly transparent molded elastomers having the capability to adhere to many substrates can therefore be manufactured.

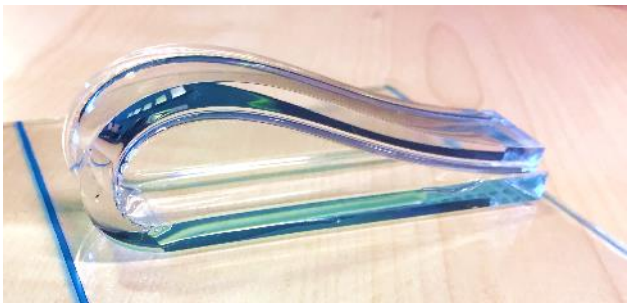

Figure 1: flexible transparent molded silicone adhering on glass post cure

This paper discusses the potential offered by these unique features to produce crystal clear IGU assemblies. The most promising concept inverses the order of the primary and the secondary seal. The transparent silicone is used as a spacer and a secondary seal, as it directly bonds and maintains in position the two glass panes (or other transparent substrates). A primary barrier of 1mm PIB is applied on the edge of the glass panes. As the transparent spacer protrudes by 1mm the alignment of the glass edges, a flat edge is obtained. The complete edge is further protected with an aluminium foil, which is adhering to the PIB and the silicone spacer. The molecular sieve is present in a bag in the cavity between the glass panes.

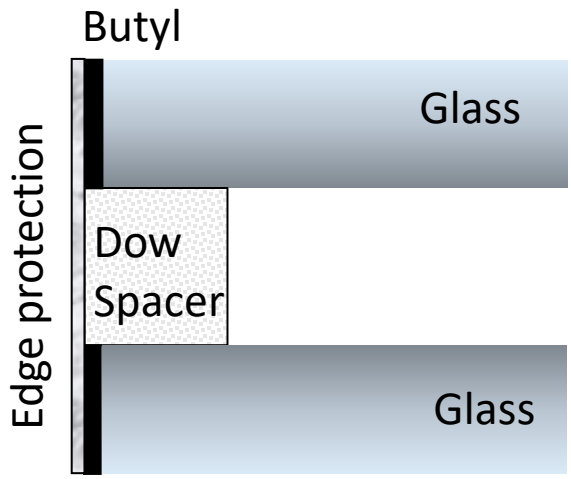

Figure 2: concept of design

Figure 3: IGU realized according to concept of design

Units assembled this concept were exposed to different climatic conditions with varying degrees of temperature and humidity. The service life as a function of the weight of dessicant per linear meter of transparent spacer was predicted and close to industry requirements for commercial IGU.

Whereas the potential offered by this bonding technique to produce crystal-clear IGU has been partially demonstrated, several design elements still need clarification, for example regarding the integration of the desiccant in an elegant way.