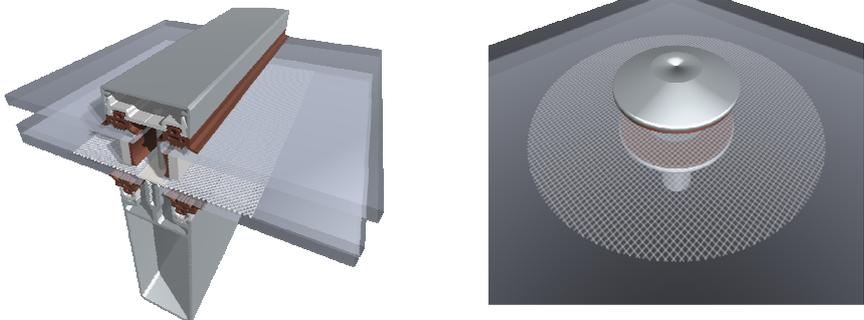
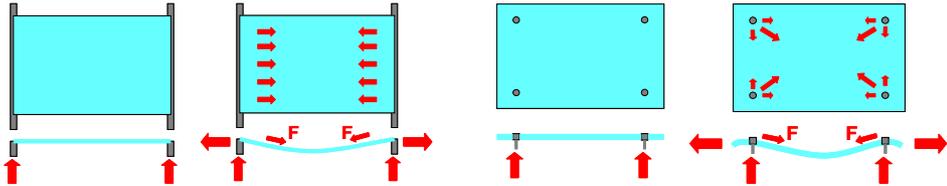


Project datasheet COST Action TU0905	
Research project :	Remaining load bearing capacity
Images :	
Keywords :	remaining load bearing capacity, broken glass, laminated safety glass
Researchers involved :	- NEUGEBAUER Jürgen
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Time span :	2003 - ongoing
Description :	<p>A requirement of overhead glazing constructions is that they have a minimum remaining bearing capacity. Remaining bearing capacity is defined as the resistance against a complete collapse of a broken system. In glass technology this definition is used in connection with the carrying behavior of laminated safety glass, which is already destroyed by load effect or spontaneous break of one or more glass panels. Wide spanned broken simply supported laminated safety glass has a risk of falling down. At the supports membrane forces result. These forces tend to pull the glass out of the supporting system. With discrete supported glass panes, the stress maxima are concentrated in the range of the glass fittings. At the moment of the fracture of the glass there is a change in carrying behavior, a change from small to large deformations and from pure bending moment to bending moment and traction. These membrane forces result in a ring of tractions around the hole, which causes an expansion of the hole. If the deformations at the edges of the hole are too large, the broken glass panel can slide out of the glass fittings.</p> 

	<p>The principal concept for increasing the residual bearing capacity is the fixation of the broken laminated safety glass (LSG) with a fabric to the substructure. A fabric is embedded into the PVB-interlayer between the glass panes near the edges, and one side of the fabric protrudes of the glass. The projecting fabric is cast into a plastic fastening border, or is brazed to the stainless steel profile. Into that fastening profile holes for the screws are drilled, and with these screws the connecting element is fastened to the support profile. In order to handle thermal deformations and tolerances the holes of the fastening element must be bored with a larger diameter.</p> <p>In the case of a discrete supported glass pane with glass fittings through holes in the glass, the function of the fabric is similar to that in reinforced concrete. The expansion of the broken glass hole due to the membrane forces is hampered by the reinforcement. A round fabric is embedded into the PVB-interlayer between the glass panes around the hole of the glass. The fabric is cast into a plastic hollow shaft or brazed to a metal hollow shaft. The height of this core is smaller than the total thickness of the structure and the outside diameter is slightly smaller than the diameter of the hole. The inside diameter of the hole results from geometry of the glass fitting. In order to handle all movements of the glass cladding a fixation without any pressure for the intact glass pane must be ensured.</p>
Most important publications :	<ul style="list-style-type: none"> <li>- NEUGEBAUER, Jürgen <i>Methods to increase the residual bearing capacity of glass</i> 5th International PhD Symposium in Civil Engineering, University of Delft Niederlande, 2004</li> <li>- NEUGEBAUER, Jürgen <i>Broken laminated glass has a risk of falling down</i> Conference - Glass in Buildings 2, Centre for Window &amp; Cladding Technology, University of Bath UK, 2005</li> <li>- NEUGEBAUER, Jürgen <i>A special fixation with which the broken laminated safety glass is prevent from falling down</i> Glass Processing Days 2005 - The 9th International Conference on Architectural and Automotive Glass, Tampere Finland, 2005</li> </ul>
Working group :	WG 4. Novel glass assemblies
Task Group :	TG10. Connections
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