



MARINE DIRECT GLAZING SYSTEMS

GLASS BONDING SYSTEMS FOR MARINE

Traditional glazing methods are not common anymore as they have mayor limitations such as glass size, risk of glass breakage and structural integrity. Modern glazing can be done with different types of “glass” like laminated mineral glass, organic glass, insulating glass and special glasses (bullet-proof etc.). The latest manufacturing techniques allow windows of superlative performance to be produced in almost any shape,

size and curvature. The traditional role of glazing as protection against the elements whilst allowing light and vision to pass through has been extended to include the extra benefit of structural part.

Direct glazing systems from Sika have become the primary method of installing windows due to the extensive list of benefits.



BENEFITS

- Better protection against the elements than framed windows
- Significantly improved design and styling capabilities for the marine architect by elimination of trims, frames and screws
- Reduction of the natural frequencies and vibrations, leading to an improved ride comfort for both passengers and crew
- Improved aerodynamics with reduced wind noise
- Better bridging of tolerances which has the advantages of quicker assembly and reduced requirement for accuracy
- Improved safety in operation during building process
- Increasing glass surface area

TWO SUBSTRATES - DIFFERENT DEMANDS

The global Marine industry is a dynamic and challenging environment. Ship owners demand very individual designs combined with reliability, durability and safety. One key element of the design are the different shapes and sizes of the individual windows used from the hull up to the flybridge or wheelhouse. Traditionally, mineral glass is used where big size windows are required, which is the case for cruise ships, ferries and other commercial vessels. The use of organic glass polycarbonate (PC) and polymethylmetacrylate (PMMA) is more common in the yacht and leisure boat production if the design requires extreme curvatures or smaller glasses are used.

ORGANIC GLASS

Organic glass is mostly used for smaller ships such as sailing and motor yachts but as well on commercial vessels such as cruise ships, ferries and river boats. Organic or composite glass is not common for flybridges, bulkhead windows and hatches. When using organic glasses special attention towards stress cracking and protection of the bond lines is mandatory.

MINERAL GLASS

The use of mineral glass is most common on large vessels such as ferries or cruise ships but as well on luxury yachts. Due to the very large size of the glasses, appropriate bonding systems must be used. Calculation of the different loads and stresses is mandatory considering heavy wind loads and structural movements of the ship body.



SEALING AND BONDING OF ORGANIC GLASS

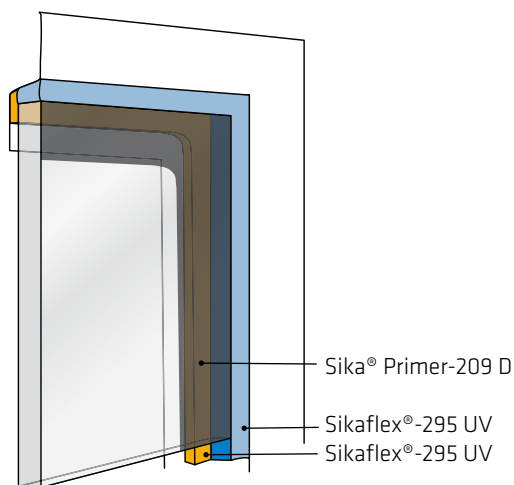
Most of the organic glazing materials used in ship building are either clear acrylic sheet (PMMA), or polycarbonate (PC). In general, incorrectly installed plastic glazing panels are prone to environmental stress cracking (ESC). To minimize the risk of stress cracking the material should be installed stress-free.

Stress cracking can be aggravated by the use of the wrong adhesive or pretreatment system. As many varieties of organic window exist, it is recommended to ensure that the specific grade selected is suitable for use with Sikaflex®-295 UV.

Bonding System

Grinding	Primer	Adhesive
Abrasive pad very fine	Sika® Primer-209 D	Sikaflex®-295 UV

APPLICATION RULES AND GUIDELINES



APPLICATION GUIDELINES

When installing organic glass windows, thermal expansion and stress cracking characteristics must be taken into account. The thermal expansion ratio of PMMA is higher than other typical materials used in yacht building. Therefore, the adhesive and backfilling sealant has to allow displacements caused by temperature changes. The minimum gap between frame and window as well as bond line thickness shall be defined according to Sika guidelines.

Stress cracking occurs when PMMA or PC is assembled under stress or material is under permanent stress because of thermal expansion. Curved windows shall be moulded in production phase so that the geometry fits with the frame without additional bending. The use of enough flexible adhesive and backfilling ensures free thermal expansion. The UV-protection of the bond line has to be carried out as well in accordance to the Sika guidelines.



SEALING AND BONDING OF MINERAL GLASS

The direct mineral glazing into frames or directly into the hull or deck requires a full understanding of all the important principles involved. It is essential that the glass meets all the demands and standards required for the intended application, such as IMO resolutions or other regulations.

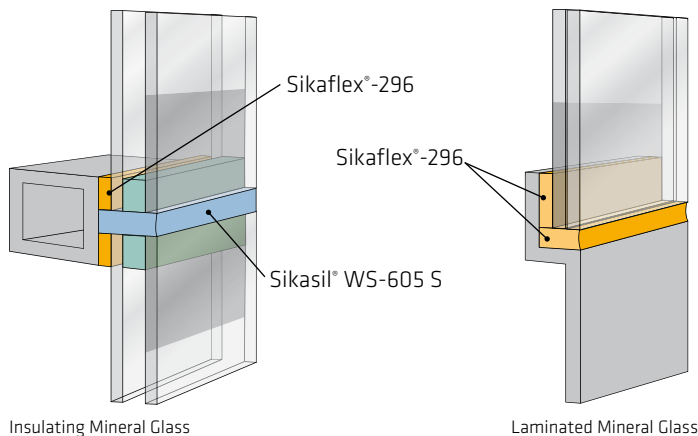
For insulation glass, total bonding consistency must be ensured by using Sikaflex® adhesives and sealants for the entire installation. The adhesive bond line must be protected against UV-radiation.

Bonding System

	Cleaner	Primer	Adhesive	Sealant
Laminated Mineral Glass	Sika® Aktivator	Sika® Primer-206 G+P	Sikaflex®-296	Sikaflex®-296
Insulating Mineral Glass	Sika® Aktivator	Sika® Primer-206 G+P	Sikaflex®-296	Sikasil® WS-605 S

Sika® Primer-206 G+P can be eliminated if proper UV-protection of the bond line is ensured.

APPLICATION RULES AND GUIDELINES



APPLICATION GUIDELINES

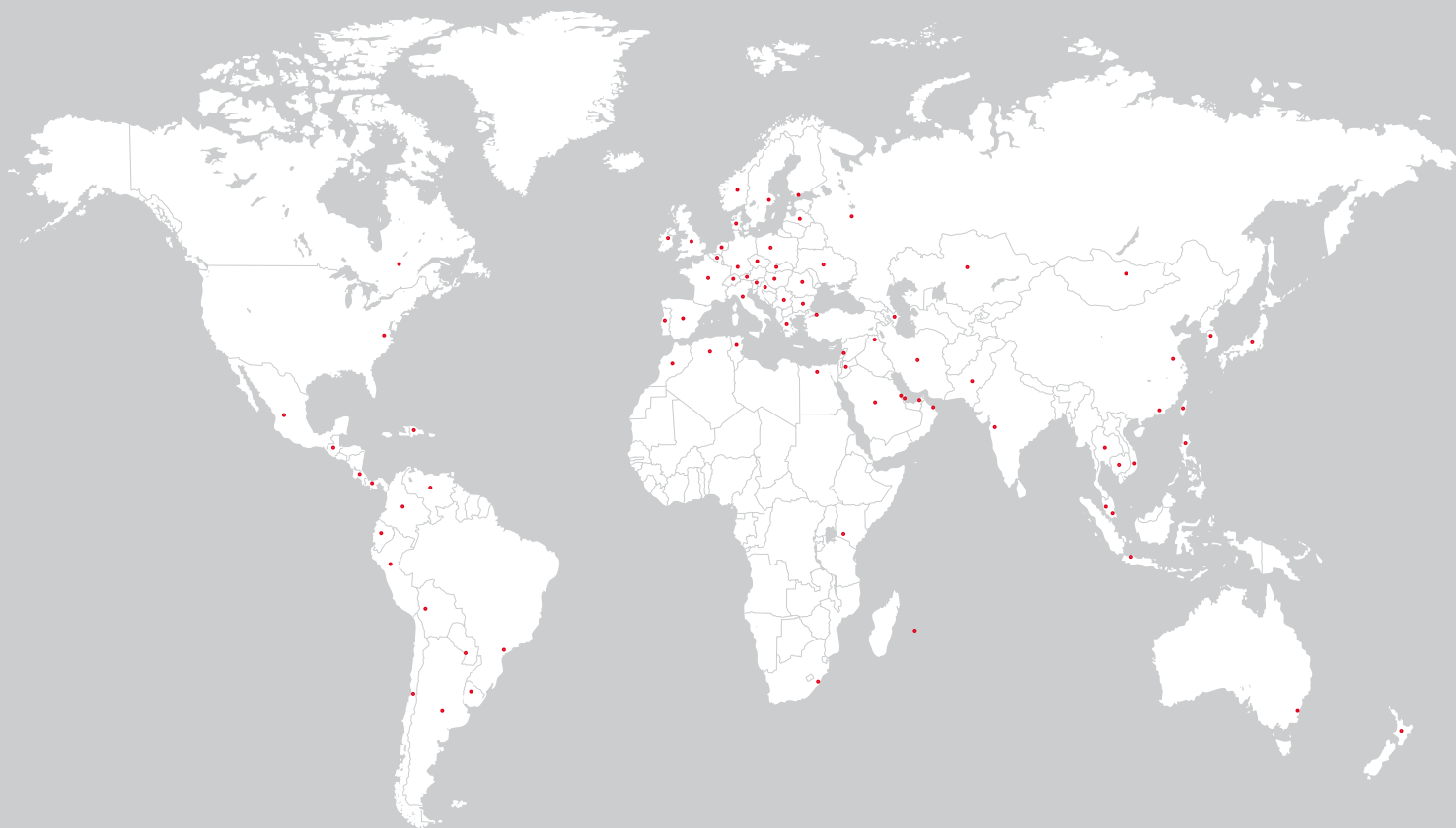
Bonding of insulated glass windows shall be carried out as described in the Sika Marine Application Guide. Minimum bond line thickness and width of the backfilling sealant has to be defined based on window dimensions.

There are different products used for secondary sealing of insulated glass windows. Adhesion and compatibility between secondary sealing and backfilling material shall be ensured to avoid problems because of adhesion loss. Water tightness is essential to avoid standing water and corrosion. UV-protection of the bond line shall fulfil Sika requirements and shall be positioned so that adhesive will be protected properly.

For detailed application guidelines and instructions please contact our local Technical Service Department or refer to the Sika Marine Application Guide.



GLOBAL BUT LOCAL PARTNERSHIP



FOR MORE MARINE INFORMATION:



www.sika.com/marine

WHO WE ARE

Sika AG, Switzerland, is a globally active specialty chemicals company. Sika supplies the building and construction industry as well as manufacturing industries (automotive, bus, truck, rail, solar and wind power plants, facades). Sika is a leader in processing materials used in sealing, bonding, damping, reinforcing and protecting loadbearing structures. Sika's product lines feature high-quality concrete admixtures, specialty mortars, sealants and adhesives, damping and reinforcing materials, structural strengthening systems, industrial flooring as well as roofing and waterproofing systems.

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