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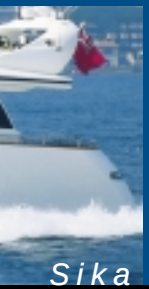

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Bonding and Sealing of organic and mineral "Glass" Windows

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Fax +41 (0) 1 436 45 30 Internet: http://www.sika-industry.com**

Sika® INDUSTRY

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Bonding and Sealing Organic “Glass” Windows

Description of Application

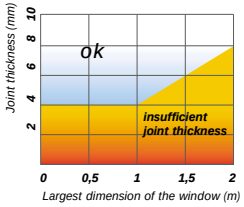
Most of the plastic glazing materials used in boat building are either clear acrylic sheet (PMMA), widely marketed under trade names such as “Perspex” and “Plexiglas” (the latter manufactured by Rohm and Haas), or polycarbonate (PC), marketed by Rohm GmbH as “Makrolon” and by General Electric as “Lexan” or “Margard”.

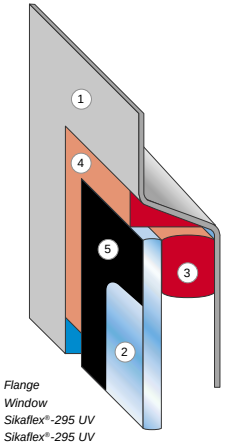
All plastic glazing products possess certain characteristics that must be clearly understood before these products are installed or bonded with adhesives. In general, incorrectly installed plastic glazing panels are prone to stress cracking, which may be aggravated by the use of certain types of adhesives.

Plastic glazing products have a higher coefficient of thermal expansion than conventional glass. Therefore, when designing glazing installations, an expansion gap of at least 10 mm all round the periphery must be incorporated between the window rebate and the plastic glazing panel to accommodate thermal movement. Similarly, any clearance holes for fixing screws must be drilled oversize, i.e. larger than the actual diameter of the screw shank.

To minimize the risk of stress cracking, flat sheets of plastic glazing material should be installed completely flat; they should not be forced to take up a curvature by the use of mechanical fastenings. When the design calls for curved glazing panels, these should be prefabricated to order and properly tempered by a specialist supplier to ensure stress-free installation.

As many varieties of organic glass exist it is recommended to ensure that the specific grade selected is suitable for use with Sikaflex®-295 UV. For further details contact your local Sika Company.





1 *Flange*
2 *Window*
3 *Sikaflex®-295 UV*
4 *Sikaflex®-295 UV*
5 *Sika® UV Shielding Tape*

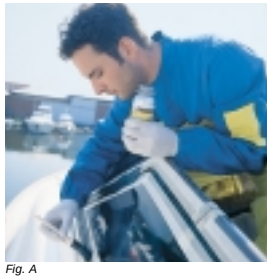


Fig. A


Fig. B


Fig. C

Instructions for Bonding and Sealing Organic “Glass” Windows

Preparation of Substrate

GRP Frame

Slightly abrade the contact area with a very fine sanding pad. Remove dust with a vacuum cleaner.

Clean the substrate with Sika® Cleaner-205, using a clean, lint-free rag or paper towel. Change rag frequently!

Drying time: minimum 10 minutes, maximum 2 hours

Apply a thin, continuous coat of Sika® Primer-206 G+P or Sika® Primer-215, using a clean brush or felt applicator. (Fig. A)

Drying time: minimum 30 minutes, maximum 24 hours

Anodised Aluminium Frame

Clean with Sika® Cleaner-205, using a clean, lint-free rag or paper towel. Change rag frequently!

Drying time: minimum 10 minutes, maximum 2 hours

Apply a thin, continuous coat of Sika® Primer-210 T, using a clean brush or felt applicator. (Fig. A)

Drying time: minimum 30 minutes, maximum 24 hours

PMMA / PC Glazing Panels

Mask off the perimeter of the bond area with masking tape. Abrade bond area with abrasive paper or Scotch-Brite.

Clean the substrate with Sika® Cleaner-205, using a clean, lint-free rag or paper towel. Change rag frequently!

Drying time: minimum 10 minutes, maximum 2 hours

Apply a continuous coat of Sika® Primer-209, using a clean brush or felt applicator. (Fig. A)

Drying time: minimum 30 minutes, maximum 24 hours

Timber or Aluminium Frame Coated with a Two-Part Lacquer or paint

Clean the substrate with Sika® Cleaner-205, using a clean, lint-free rag or paper towel. Change rag frequently!

Drying time: minimum 10 minutes, maximum 2 hours

For preparation of other substrates, please refer to the Primer Chart for Sika Marine Applications.

Application of Sikaflex®-295 UV Adhesive

Place spacers in position. Depending on the size of the glazing panel, the thickness of the spacer should be chosen accordingly; approximately 30 Shore A hardness (see diagram). Avoid interruption of the bead by the spacers.

Apply Sikaflex®-295 UV to the frame rebate or glazing panel using a triangular nozzle. Bead width 10 mm minimum. (Fig. B)

Assemble components within 20 minutes of applying the adhesive.

To prevent slip down of vertical glazing panels, distance blocs (wood or plastic) must be placed in the lower rebate during installation. After curing, these must be removed. The rebate gap must be a minimum of 10 mm (see diagram).

Clamps and other fastening aids can be removed after 24 hours. After this time, the expansion gap between glazing panel and rebate can be filled and sealed with Sikaflex®-295 UV. This should be done only when the glazing adhesive has reached full cure. This sealant joint can be tooled to a smooth finish using Sika® Tooling Agent N. This must be carried out before skinning of the sealant.

Traces of uncured Sika adhesives or sealants may be removed with Sika® Remover-208. On no account should other cleaning agents or Sika® Cleaner-205 be used for this purpose.

Apply Sika® UV Shielding Tape to cover the bondline in accordance with Sika recommendation. (Fig. C)

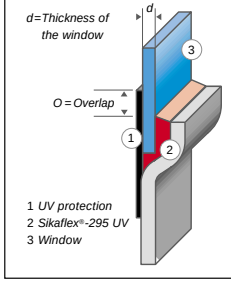
Important:

Please refer to the current Sika Technical Data Sheets and Safety Data Sheets obtainable through your local Sika Company.

Protection of the Bond

As with conventional glass, plastic glazing panels generally do not protect the adhesive face from damage by UV radiation. Therefore, the bondline must be protected from direct sunlight via one of the methods recommended.

Minimum Recommendations for UV Protection of the Bond



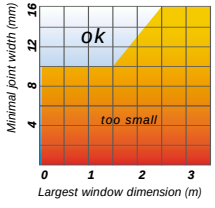
1 UV protection
2 Sikaflex®-295 UV
3 Window

Sika Rule
O = 2 x d
Example: if d = 8 mm, the overlap should be at least 16 mm.

- Plastic window with a low transmission (<0,5%) in UV range.
- External cover strip of appropriate dimensions
- Sika® UV Shielding Tape of appropriate dimensions

Edge Sealing of Window

Commonly, the edge of the window will be cosmetically finished with Sikaflex® materials. The preparation of the surfaces must be identical to that used for bonding. Edge sealing both ensures the prevention of standing water on or near the bond and helps cosmetically finish the window. Fill up joint completely, avoid space between adhesive bead and joint. For plastic window panels Sikaflex®-295 UV must be used in accordance with the diagram.



Description of Application

The direct glazing of mineral glass (toughened security glass) 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. For insulation glass, total bonding consistency must be ensured through the use of Sikaflex® adhesives and sealants for all the installation. We recommend glass qualities especially developed for the marine industry, e.g. Formglas Spezial by H. J. Tilse GmbH Ind. und Schiffstechnik.
The polyurethane adhesive bond face must also be protected against UV radiation. This may be achieved with several materials:

Using a black, ceramic coated border with a light transmission of less than 0,01%. Or by using an overlapping trim with a width twice that of the glass thickness (plastic or metal).

For glass without a black, ceramic coated border or without the overlapping trim Sika® UV Shielding Tape should be used for proper protection of the bond line (plastic or metal).

Note: Local and international rules for maritime constructions and appropriate legislation must always be observed.

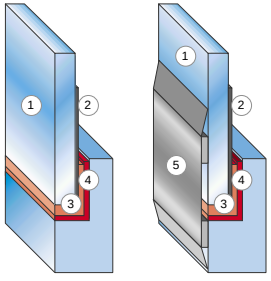
Fig. D

Fig. E1

Fig. E2

Dimensioning of Adhesive and Sealant

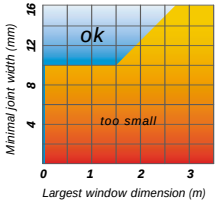
The dimensioning of the adhesive and the joint geometry must be carried out in accordance with Sika's basic rules of calculation. If deck movement is negligible the following dimensions are recommended. At all times recommendations from classification societies must be respected.



Solution I
1 *Mineral glass*
2 *Ceramic coating*
3 *Sikaflex®-296*
4 *Flange*

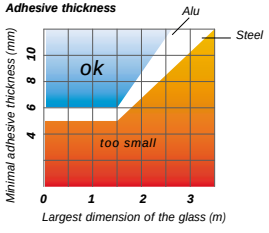
Solution II
1 *Mineral glass*
2 *Ceramic coating*
3 *Sikaflex®-296*
4 *Flange*
5 *Edge Protection*

Glass Window Dimensioning
Joint width

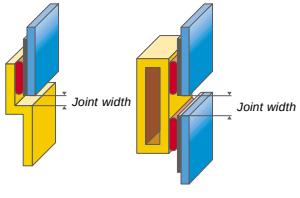


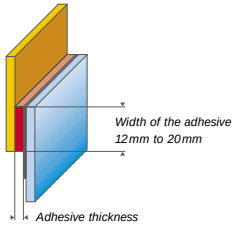
Largest window dimension (m)

Glass Window Dimensioning
Adhesive thickness



Largest dimension of the glass (m)





Instructions for Bonding and Sealing Mineral Glass Windows

Preparation of Substrate

Glass (with external UV protection) or with Black Ceramic Glass Border (transmission <0,01%)

Clean the substrate with Sika® Activator, using a clean, lint-free rag or paper towel. Change rag frequently! (Fig. D)

Drying time: minimum 10 minutes, maximum 2 hours

Glass with black Ceramic Glass Border (transmission >0.01%)

Clean the substrate with Sika® Activator, using a clean, lint-free rag or paper towel. Change rag frequently! (Fig. D)

Drying time: minimum 10 minutes, maximum 2 hours

Apply a thin, continuous coat of Sika® Primer-206 G+P, using a clean brush or felt applicator.

Drying time: minimum 30 minutes, maximum 24 hours

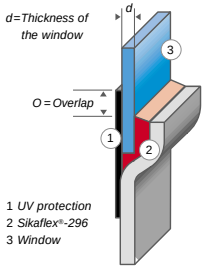
For the preparation of the frame, please refer to the Primer Chart for Sika Marine Applications.

Protection of the Bondline

Conventional glass does not protect the adhesive face from damage by UV radiation. Therefore, the bond face must be protected from direct sunlight via one of the materials recommended below.

- External cover strip of appropriate dimensions
- Sika® UV Shielding Tape of appropriate dimensions
- Ceramic coated glass border with a light transmission value of <0,01%

Minimum Recommendations for UV Protection of the Bond



Sika Rule
O = 2 x d
Example: if d=8mm, the overlap should be at least 16mm.

Application of Sikaflex®-296 Adhesive

Place spacers in position. The thickness of the spacer should be a minimum of 5 mm approximately 30 Shore A hardness (according to diagram). Avoid interruption of the bead by the spacers.

Apply Sikaflex®-296 to the frame rebate or glazing panel using a triangular nozzle of bead width 10 mm minimum. (Fig. E1)

Assemble components within 20 minutes of applying adhesive.

To prevent slip down of vertical glazing panels, distance blocs (wood or plastic) must be placed in the lower rebate during installation. After curing, these must be removed. The rebate gap must be a minimum of 10mm. (see diagram)

Clamps and other fastening aids can be removed after 24 hours. After this time, the expansion gap between glazing panel and rebate can be filled and sealed with Sikaflex®-296 or Sikaflex®-295 UV (Fig. E1, E2). This should be done only when the glazing adhesive has reached full cure. This sealant joint is tooled to a smooth finish using Sika® Tooling Agent N. This must be carried out before skinning of the sealant. Fill up joint completely, avoid space between adhesive bead and joint.

Traces of uncured Sika adhesives or sealants may be removed with Sika® Remover-208. On no account should other cleaning agents or Sika® Cleaner-205 be used for this purpose.

Service of the vessel can be resumed after one week.

Important: Please refer to the current Sika Technical Data Sheets and Safety Data Sheets obtainable through your local Sika Company.