



# GENERAL GUIDELINE

## Structural Silicone Glazing with Sikasil® SG Adhesives

01.04.2017 / VERSION 5 / SIKA SERVICES AG

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### General Guideline

Structural Silicone Glazing with Sikasil® SG Adhesives      Sika Services AG  
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## 1 PURPOSE AND GENERAL INFORMATION

This document contains recommendations and hints for the application of Sikasil® SG adhesives in structural bonding applications. This guideline is relevant for the following products:

- Sikasil® SG-500            2-part SG adhesive, ETA and CE certified, complying with ASTM C1184 and VEC
- Sikasil® SG-500 CN      2-part SG adhesive, complying with ASTM C1184 and GB 16776
- Sikasil® SG-550            2-part high-strength SG adhesive, ETA and CE certified, complying with ASTM C1184 and VEC
- Sikasil® SG-18            1-part SG adhesive, complying with ASTM C1184
- Sikasil® SG-20            1-part SG adhesive, ETA and CE certified, complying with ASTM C1184, VEC and GB 16776

The information herein is offered for general guidance only. Since structural sealant glazing is a critical application and conditions as well as substrates may vary greatly, customers and applicators must test the suitability of the product for each specific project and contact Sika for advice.



Sikasil® adhesives in highly demanding and critical applications, such as structural glazing or window bonding, may only be used after a detailed examination and written approval of the corresponding project details by the Technical Department of Sika Industry.

For detailed information about specific silicone products and surface pre-treatment agents please refer to the most recent Product Data Sheets (PDS) and Safety Data Sheets (SDS).

**Safety Instructions**

- Pre-treatment products and adhesives are chemical products. Please follow safety instructions:

- Wear chemical-resistant gloves and safety glasses. Safety Data Sheets and instructions for use (Product Data Sheet) must be strictly adhered to.

Figure 1: General Health and Safety Instructions

## 2 INTRODUCTION

Sikasil® SG adhesives are condensation-curing, one- and two-part silicone products suitable for bonding glass panes or insulating glass units to a support frame (usually: anodized aluminum, polyester powder-coated aluminum, PVDF-coated aluminum or stainless steel). This technique is known as Structural Silicone Glazing (SSG). Sikasil® SG silicone adhesives have structural capabilities in the sense of EN 13022 / EOTA ETAG 002 and ASTM C 1401 or other national requirements and are long-term UV-resistant. They have proven their suitability for Structural Silicone Glazing in thousands of façade projects and under various climatic conditions.

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### 3 DESIGN AND JOINT DIMENSIONING

Joints must be properly dimensioned as changes are no longer possible after assembling and installation or adhesive application, respectively. Basis for calculation of the necessary joint dimensions are the technical values of the adhesive and the adjacent building materials, the exposure of the building elements, their construction and size as well as external loads (wind, snow, temperature, climatic loads, etc.). Sika offers a comprehensive project service package including design reviews and structural joint dimensioning.

For more information please contact the Technical Department of Sika Industry.

### 4 WORKING PLACE CONDITIONS

The working place must be as dust-free as possible. Ideal conditions are 23°C and 50% relative humidity. As these conditions are usually attainable only in laboratory, one shall make the plant conditions as close as possible. Although Sikasil® SG adhesives may be processed within 5°C - 40°C the optimum application temperature of the products is between 15°C and 30°C. These limits apply to the temperature of Sikasil® adhesives, the substrates as well as the ambient air.

The temperature of the substrates to be bonded must always be at least 3° C higher than the dew point temperature of the air to reduce condensation risk.

All substrates and adhesives must never be exposed to direct sun radiation, rain, snow or other direct weathering impacts and must be stored under the same conditions (i.e. 5°C - 40°C) at least 24 hours prior to the application of Sikasil® SG.

### 5 SURFACE PRE-TREATMENT AND MASKING

Surfaces must be clean, dry and free from oil, grease, release agents and dust. Do not contaminate pre-treated surfaces during any phase of production. If contamination occurs, surfaces have to be cleaned again.

The information in Table 1 is offered for general guidance only. Advice on specific pre-treatment methods based on laboratory adhesion tests will be given on request.



With the exception of clear float glass, it is mandatory that the adhesion of structural silicone adhesive is tested on project basis on production-run samples of the original materials before real production starts. With reference to e.g. glass substrates, adhesion tests have to be performed on samples which are equal in terms of coating type, coating edge deletion, edge cutting, etc. The quality of edge deleted glass strongly depends on e.g. grinding wheel type, pressure, revolving speed, etc.

The use of the surface pre-treatment agents recommended in Sika laboratory report is mandatory. Otherwise any guaranty for the adhesion behavior of Sikasil® silicone adhesive isn't valid.

Preliminary surface cleaning by Sika® Cleaner P or Sika Cleaner® G+M is mandatory before application of any primer or activating agent.

If detectable pre-treatment agents are required, luminescent versions of Sika® Aktivators can be used.

With reference to Table 1:

- Sika® Aktivator-110 LUM can be tested as alternative to Sika® Aktivator-100  
Sika® Aktivator-110 LUM must not replace Sika® Aktivator-100 without testing and vice versa.
- Sika® Aktivator-205 LUM can replace Sika® Aktivator-205  
Adhesion results obtained by Sika® Aktivator-205 can be extended to Sika® Aktivator-205 LUM and vice versa.

Table 1: Overview of suitable pre-treatments

| Substrate   | Surface Pre-treatment   |
|---|---|
| Float glass (including tempered, toughened, laminated and tinted types) | Sika® Cleaner G+M or<br>Sika® Cleaner P   |
| Ceramic-coated (enamelled) glass  | Sika® Cleaner P** & Sika® Aktivator-100* or<br>Sika® Cleaner G+M & Sika® Primer-790 |
| Anodized aluminum   | Sika® Cleaner P** or<br>Sika® Cleaner P** & Sika® Aktivator-100*                    |
| Stainless steel   | Sika® Cleaner G+M or<br>Sika® Cleaner P** & Sika® Aktivator-100*                    |
| Polyester powder-coated aluminum or<br>PVDF-coated aluminum             | Sika® Cleaner P** & Sika® Aktivator-205* or<br>Sika® Cleaner G+M & Sika® Primer-790 |

\* Sika® Aktivator-100 and Sika® Aktivator-205 leave a visible film on the pre-treated surfaces and can change the appearance of the pre-treated substrates. If this is not acceptable, use masking tape to protect the visible areas.

\*\* For greasy or oily metal surfaces, Sika® Cleaner G+M is recommended instead of Sika® Cleaner P.

### 5.1 USE OF Sika® Cleaner G+M AND Sika® Cleaner P

Sika® Cleaner G+M and Sika® Cleaner P are solvent-based cleaning agents. For greasy or oily surfaces use Sika® Cleaner G+M which has a better oil/grease removal capability than Sika® Cleaner P. Both cleaners are applied by “wipe on/wipe off method”:

1. Moisten a clean, dry, oil-free and lint-free paper towel with Sika® Cleaner G+M / Sika® Cleaner P and wipe the surface with it. Use fresh paper towel regularly in order to retain the cleansing power and to avoid wiping residues back onto the surface.
2. Then wipe-off the solvent with a clean, dry, oil-free and lint-free paper towel. Wipe off the solvent before it dries.



Never wait until Sika® Cleaner G+M / Sika® Cleaner P has evaporated from the surface because dissolved contaminants would remain behind.

3. Repeat this procedure until the surface is clean.
4. The required minimum drying time at 5°C - 40°C is 2 minutes on non-absorbing substrates.
5. If cleaned parts cannot be bonded immediately, protect them against subsequent contamination.
6. If more than two hours have passed since cleaning, always repeat the cleaning process before bonding.

For more details about Sika® Cleaner G+M and Sika® Cleaner P refer to the actual Product Data Sheets (PDS) and Safety Data Sheets (SDS).

### 5.2 APPLICATION OF Sika® Aktivator-100 AND Sika® Aktivator-110 LUM

Sika® Aktivator-100 and Sika® Aktivator-110 LUM are activating agents to pre-treat surfaces to improve adhesion and shall always be applied on substrates after they have been properly cleaned with Sika® Cleaner G+M or Sika® Cleaner P.

Sika® Aktivator-110 LUM contains luminescent pigments that allow detecting its presence after the surface pre-treatment.



Sika® Aktivator-100 and Sika® Aktivator-110 LUM are not simple cleaning solvents but contain a bonding agent which forms an activating film on the substrate surface. On some surfaces this film may be visible and change the substrate appearance. Therefore it is important to apply Sika® Aktivator-100 / Sika® Aktivator-110 LUM like a primer and to use masking tapes in critical (visual) areas, if necessary.

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1. Moisten a clean, dry, oil-free and lint-free paper towel with Sika® Aktivator-100 / Sika® Aktivator-110 LUM and apply it on the surface. Use fresh paper towel regularly in order to avoid wiping any residues back onto the surface.
2. Immediately wipe-off the solvent with a clean, dry, oil-free and lint-free paper towel. Wipe-off the solvent before it dries.
3. The required minimum drying times on non-absorbing substrates are as follows (depending on the temperature in the workshop):
  - $\geq 15^{\circ}\text{C}$ : 10 minutes
  - $< 15^{\circ}\text{C}$ : 30 minutes
 In case of doubt, contact the Technical Department of Sika Industry.
4. If pretreated parts are not bonded / sealed immediately, protect them against subsequent contamination. Adhesives should be applied within 2 hours after the application of Sika® Aktivator-100 / Sika® Aktivator-110 LUM. Otherwise the procedure as described above has to be repeated before bonding. Pre-treating procedure can be repeated once only.

Sika® Aktivator-110 LUM can be visualized by activating the contained luminescent pigments using a light source with a wavelength of  $320 \div 420 \text{ nm}$ . It is recommended to reduce foreign light such as sunlight or artificial light during the detecting process as well during storage before bonding. Exposure of the pre-treated surface to UV light will degrade the active substances on a faster scale. Luminescent effect will degrade with time.

For more details about Sika® Aktivator-100 / Sika® Aktivator-110 LUM refer to the actual Product Data Sheet (PDS) and Safety Data Sheet (SDS).



Sika® Aktivator-110 LUM cannot replace Sika® Aktivator-100 without testing the adhesion of the adhesive on the pre-treated substrate and vice versa.



Tightly re-seal container with the inner plastic liner immediately after each use. Sika® Aktivator-100 / Sika® Aktivator-110 LUM shall only be used within one month after opening the can. Discard any Sika® Aktivator-100 / Sika® Aktivator-110 LUM that has become opaque instead of transparent, has yellowed, gelled or separated.

### 5.3 APPLICATION OF Sika® Aktivator-205 AND Sika® Aktivator-205 LUM

Sika® Aktivator-205 and Sika® Aktivator-205 LUM are activating agents to pre-treat surfaces to improve adhesion and should always be applied on substrates after they have been properly cleaned by Sika® Cleaner G+M or Sika® Cleaner P.

Sika® Aktivator-205 LUM contains luminescent pigments that allow detecting its presence after the surface pre-treatment.



Sika® Aktivator-205 and Sika® Aktivator-205 LUM are not a simple cleaning solvent but contains a bonding agent which forms an activating film on the substrate surface. On some surfaces, for example on certain glossy powder-coated aluminum profiles, this film may be visible and change the appearance of the profile. Therefore it is important to apply Sika® Aktivator-205 / Sika® Aktivator-205 LUM like a primer and to use masking tapes in critical (visual) areas if necessary.

1. Moisten a clean, dry, oil-free and lint-free paper towel with Sika® Aktivator-205 / Sika® Aktivator-205 LUM and apply it on the surface. Use fresh paper towel regularly in order to avoid wiping any residues back onto the surface.
2. Different from ordinary cleaning agents or Sika® Aktivator-100 and Sika® Aktivator-110 LUM, the surface treated with Sika® Aktivator-205 / Sika® Aktivator-205 LUM must not be dried subsequently with a paper towel.
3. The required minimum drying times are as follows (depending on the temperature in the workshop):

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- 5 - 10°C: 10 minutes
- 10 - 15°C: 5 minutes
- > 15°C: 2 minutes

In case of doubt, contact the Technical Department of Sika Industry.

4. If pretreated parts are not bonded / sealed immediately, protect them against subsequent contamination. Adhesives should be applied within 2 hours after the application of Sika® Aktivator-205 / Sika® Aktivator-205 LUM. Otherwise the procedure as described above has to be repeated before bonding. Pre-treating procedure can be repeated once only.

Sika® Aktivator-205 LUM can be visualized by activating the contained luminescent pigments using a light source with a wavelength of 320 ÷ 420 nm. It is recommended to reduce foreign light such as sunlight or artificial light during the detecting process as well during storage before bonding. Exposure of the pre-treated surface to UV light will degrade the active substances on a faster scale. Luminescent effect will degrade with time.

For more details about Sika® Aktivator-205 / Sika® Aktivator-205 LUM refer to the actual Product Data Sheet (PDS) and Safety Data Sheet (SDS).



Tightly re-seal container with the inner plastic liner immediately after each use. Sika® Aktivator-205 / Sika® Aktivator-205 LUM shall only be used within one month after opening the can. Discard any Sika® Aktivator-205 / Sika® Aktivator-205 LUM that has become opaque instead of transparent, has gelled or separated.

#### 5.4 APPLICATION OF Sika® Primer-790

In very rare cases if the use of Sika® Aktivator-100 / Sika® Aktivator-110 LUM or Sika® Aktivator-205 / Sika® Aktivator-205 LUM was not sufficient for a durable adhesion, Sika® Primer-790 could be used instead. Sika® Primer-790 shall always be applied after the surfaces have been properly cleaned by Sika® Cleaner G+M or Sika® Cleaner P.

Ideal application and surface temperature ranges between 15°C and 25°C.

1. Apply one thin but covering coat of Sika® Primer-790 with a clean, dry, oil-free and lint-free paper towel or foam applicator. Make sure that this single application gives adequately dense coverage.
2. Let the primer dry for a minimum time of 20 minutes.
3. If pretreated parts are not bonded / sealed immediately, protect them against subsequent contamination. Adhesives shall be applied within 2 hours after the application of Sika® Primer-790.

For more details about Sika® Primer-790 refer to the actual Product Data Sheets (PDS) and Safety Data Sheets (SDS).



Apply Sika® Primer-790 once only. Priming process must not be repeated!

Tightly re-seal container immediately after each use. Sika® Primer-790 shall only be used within one month after opening the can. Discard any primer that has gelled or separated.

#### 5.5 MASKING OF AREAS ADJACENT TO THE JOINTS

To assure neat bond lines and protect areas adjacent to the structural joint, use a masking tape.



The tape must not touch the pre-treated surface areas to which the silicone has to adhere. Remove the masking tape immediately after tooling the SG joint. Do not wait longer than 5 minutes. Otherwise joints might be damaged.

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## 6 PROCESSING AND PRODUCT APPLICATION

### 6.1 TWO-COMPONENT STRUCTURAL SILICONE ADHESIVES

#### 6.1.1 PREPARATORY WORK

Sikasil® SG-500 / SG-500 CN / SG-550 A-part as well as B-part have a paste-like consistency. To process the two components, a pump system with follower plate is required.



As part of the quality control for the incoming materials, before putting any new drum/pail of A-part or B-part under the pump, it is recommended to check the snap time of the mixed materials (see Section 8.5) taking them directly from drum/pail.

1. After opening the 200 liter drum containing the A-part (base) remove all the plastic cover sheets and place the drum under the follower plate.
2. After opening the pail containing the B-part (catalyst) cut the foil in a diameter of approx. 150 mm. Remove cut foil and any crust or oil from the surface. Place the pail under the follower plate.



Neither the A-part nor the B-part require stirring because both components show very little tendency to separate. In the very unlikely case of oil separation of more than 1 cm on the B-part contact the Technical Department of Sika Industry before use.

Due to its reactivity with atmospheric moisture, the B-part of all Sikasil® SG products must not be exposed to air for more than 5 minutes. Should a thin layer of a resinous material have developed on top, it has to be removed with a spatula or a similar tool before installing the container under the pump.

3. Start operations carefully following the instructions of the equipment supplier.

For more details about Sikasil® SG-500 / SG-500 CN / SG-550 refer to the actual Product Data Sheets (PDS) and Safety Data Sheets (SDS).



For the application of Sikasil® SG-550 a hydraulic pump is required. Pneumatic pumps are not suitable for Sikasil® SG-550 as they are too weak for a proper application speed. For detailed guidance please contact the Technical Department of Sika Industry.

#### 6.1.2 MIXING

To obtain the ultimate physical properties indicated in the corresponding Product Data Sheets, Sikasil® SG-500 / SG-500 CN / SG-550 2-part silicone adhesives have to be thoroughly mixed by a 2-part silicone mixing and dispensing equipment with static or dynamic mixers. For recommendations contact the Technical Department of Sika Industry.

For mixing ratio by weight and volume, refer to the corresponding Product Data Sheet. Only small deviations of  $\pm 10\%$  from the mixing ratio indicated in the Product Data Sheet are tolerated. For a proper adjustment of the mixing ratio refer to the manual of the pump equipment. If further assistance is required, contact the equipment manufacturer. Lot matching of Sikasil® SG-500 / SG-500 CN / SG-550 catalyst and base is not required.

The mixer open time, which is the time the material can remain in the mixer without flushing or extrusion of the product, is significantly shorter than the snap time (pot life) indicated in the Product Data Sheets. If the alarm time is set too long cured rubber particles are visible in the extruded material. In order to maintain a long life time of the mixer, the alarm on the equipment has to be set to the values shown in Table 2.

The mixer lifetime and condition can be checked by performing both butterfly test and snake test described in Section 8.3 and 8.4 respectively.

Table 2: Mixer-open times and alarm times of 2-part Sikasil® SG adhesives at 23°C

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| Product            | Mixer open time*    | Alarm time equipment* |
|--------------------|---------------------|-----------------------|
| Sikasil® SG-500    | approx. 7 - 9 min   | approx. 6 min         |
| Sikasil® SG-500 CN | approx. 10 - 12 min | approx. 9 min         |
| Sikasil® SG-550    | approx. 9 - 11 min  | approx. 8 min         |

\* Above mentioned times significantly vary with ambient temperature and pump and mixer set-up and must be verified by tests under actual conditions.

It is recommended to check the mixer open time by butterfly test (see Section 8.3). The mixer open time is the maximum time the material can remain in the mixer without flushing or extrusion, which ensures no visible wrinkles and cured rubber particles in the butterfly test. The alarm time shall be set shorter than the measured mixer open time.

During shutdown, it is recommended that the dispensing and mixing equipment is purged with non-catalyzed base (A-component) in order to retard the curing of the adhesive. Usually, the necessary amount of A-part to purge corresponds to the threefold volume of the mixing system (for systems with a static mixer).

Alternatively, a freezer can be used for downtimes up to 24 hours at a temperature of -40°C or below. However, the reaction will not stop at -40°C but will only be slowed down.

During prolonged production breaks additional flushing with a cleaning agent such as Sika® Mixer Cleaner is recommended. Cleaning the mixer by burning the silicone residues is not advisable.

When restarting production after shutdown, mixed silicone must be purged until obtaining a homogeneous mixture. Depending on the equipment, minimum 1 liter of Sikasil® SG-500 / SG-500 CN / SG-550 is needed for that purpose if static mixers are used. The quality of mixing and the correctness of the mixing ratio must be checked (see marble test, butterfly test, snake test and mixing ratio by weight in Chapter 8, "Quality Assurance").

### 6.1.3 APPLICATION

Sikasil® SG-500 / SG-500 CN / SG-550 2-component silicone adhesives must be applied evenly and free of air bubbles. The joint bite for 2-part Sikasil® adhesives is limited to 50mm in one curing step. Deeper joints can be applied in more steps. After complete vulcanizing of the first part, the next joint segment of SG adhesive can be applied.

Tooling of the joint should be carried out as soon as possible after adhesive application but not later than half the pot life (snap time) indicated in the relevant Product Data Sheet.

It must be ensured that the joint is completely filled and that the joint dimensions correspond to the calculated values.



Treatments with detergent, soap and water or any sort of untested tooling agents are not allowed for tooling SG joints.

## 6.2 ONE-COMPONENT STRUCTURAL SILICONE ADHESIVES

### 6.2.1 PREPARATORY WORK

Working from drums or pails:

1. Before installing the drum or pail into the pump equipment, cured material under the follower plate have to be removed thoroughly.
- 2a Pails: After opening the pail cut the foil in a diameter of 150 mm. Remove cut foil from the surface.
- 2b Drums: After opening the drum cut the foil along the welding line. Pull the bag over the drum rim and tape it tightly. Remove the foil from the surface.
3. Put container under the pump and start application according to pump manufacturer's instructions.

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All 1-component Sikasil® SG adhesives cure with atmospheric moisture. These products must not be exposed to air for more than 5 minutes.

#### **Working from cartridges or unipacks:**

Follow the instructions given by the gun manufacturer.

For more details about Sikasil® SG-18 / SG-20 refer to the actual Product Data Sheets (PDS) and Safety Data Sheets (SDS).

#### **6.2.2 APPLICATION**

Sikasil® SG adhesives are applied by equipment with a metering pump, or manually directly from cartridge or unipack.

The adhesive must be applied evenly and free of air bubbles. The 1-component products form a skin after a certain time (skin time, skin-over time), which varies with ambient humidity and temperature. The joint bite for 1-part Sikasil® SG adhesives is limited to 15 mm in one curing step. Deeper joints can be applied in more steps, e.g. a 25 mm deep joint can be filled in the first step with 10 mm. After vulcanizing of the first part, the next 15 mm of Sikasil® SG adhesive can be applied.

Tooling and smoothing of joints should be carried out as soon as possible after the adhesive application and not later than half of the skin time indicated in the relevant Product Data Sheet.

It must be ensured that the joint is completely filled and that the joint dimensions correspond to the calculated values.



Treatments with detergent, soap and water or any sort of untested tooling agents are not allowed for tooling SG joints.

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### 6.3 ENCAPSULATION OF STRUCTURAL GLAZING ADHESIVES

In some construction details it is requested to encapsulate the applied structural glazing adhesive with a weather seal or gasket etc. (see Figure 2). The minimum time between the adhesive application and encapsulation depends very much on the type of adhesive and the gasket material (see Table 3).



Figure 2: Encapsulated adhesive

Table 3: Encapsulating Sikasil® SG adhesives

| SG Adhesive A   | Spacer B*  | Encapsulation C*   | Time before applying encapsulation C  |
|-----------------|--|--|---|
| 1-part Adhesive | All materials  | All materials  | Only after complete curing of SG adhesive, proven by samples with original dimensions and curing at the same conditions as SG units |
| 2-part Adhesive | Open-cell PU tapes:<br>Sika® Spacer Tape HD<br>Norton Thermalbond® V-2100 and V-2200 | Silicone gaskets<br>EPDM gaskets                             | Immediately after adhesive application  |
| 2-part Adhesive | Open-cell PU tapes:<br>Sika® Spacer Tape HD<br>Norton Thermalbond® V-2100 and V-2200 | Neutral weather sealant                                      | > 24 h, or consult the Technical Department of Sika Industry  |
| 2-part Adhesive | Closed-cell tapes<br>Silicone gaskets<br>EPDM gaskets                                | Silicone gaskets<br>EPDM gaskets<br>Neutral weather sealants | > 24 h, or consult the Technical Department of Sika Industry  |

\* Only materials with proven compatibility to Sikasil® SG adhesives are permitted.

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## 7 MOVEMENT OF BONDED ELEMENTS

Bonded units shall not be exposed to stress until certain strength has developed. Since adhesion and strength build-up depend on the adhesive used, environmental conditions and the substrates, respectively, only general recommendations regarding the storage time are given in Table 4. If the situation is ambiguous temporary mechanical supports, retaining devices or Sika® Spacer Tape HD shall be used to prevent loads acting on the joint during storage, transportation and installation.

For more information please contact the Technical Department of Sika Industry.

Table 4: Storage time of bonded façade units\*

| Step                                       | Conditions                                      | Time after applying 1-part adhesives**   | Time after applying 2-part adhesives |
|--|---|--|--------------------------------------|
| Initial curing and adhesion build-up       | Store units stress-free in horizontal position  | till full curing                         | 24 hours                             |
| Strength-build up and increase of adhesion | Store units with dead load support vertically   |  | 3 days                               |
| Further strength and adhesion increase     | Transportation of units vertically with support | after full curing, see corresponding PDS | 4 days                               |
| Ultimate strength and adhesion reached     | Installation of Elements                        |  | > 7 days                             |

\* Times can be reduced with the use of Sika® Spacer Tape HD (see Figure 2, B). For details consult the Technical Department of Sika Industry.

\*\* Depends on joint dimension and ambient conditions.



The structurally glazed units must not be moved to the job site until the adhesive has fully cured and it can be demonstrated through quality control testing that the adhesive has achieved full adhesion.

Transportation of elements is possible earlier than stated in Table 4 if tensile adhesion tests on H-specimens (see chapter 8, "Quality Assurance") kept under the same conditions as the bonded elements give a value of  $\geq 0.7 \text{ N/mm}^2$  ( $\geq 1.0 \text{ N/mm}^2$  for Sikasil® SG-550) and the failure mode is  $\geq 95\%$  cohesive.

Depending on the factory conditions and organization of the production process, different times for movement of bonded elements can be agreed upon. This requires an audit of the customer's production by the Technical Department of Sika Industry.

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## 8 QUALITY ASSURANCE

Perfect results require carrying out each processing step perfectly. Sika therefore recommends that structural glazing applicators install a strict quality control system. Quality control is the primary responsibility of the processor but Sika will assist customers in setting up a comprehensive program and train staff to carry out the mandatory tests.

The following sections describe quality procedures and a schedule when to run these tests. Local and regional regulations such as EOTA ETAG 002 ("Guideline for European Technical Approval for Structural Sealant Glazing Systems [SSGS]") may require a different quality control scheme.

Sika provides a lab case containing all tools required for the QC procedures described in these guidelines. Figure 3 shows the tools in the lab case. The figures are indicated in the guideline text behind in square brackets.



- [1] Meteorological station for temperature & air humidity
- [2] Balance (max. 500 g)
- [3] Timer (4 individual times)
- [4] Cups for pot life test
- [5] Wooden spatulas
- [6] Doctor blade for peel test samples
- [7] Scraper for peel test
- [8] Mold for H-specimens
- [9] Shore A meter (Durometer)
- [10] Digital measuring slide
- [11] Meter (3 m)
- [12] Magnifier
- [13] Protective gloves
- [14] Nozzle cutter
- [15] Shore A pad

Figure 3: Lab case for quality control

Please contact the Technical Department of Sika Industry for further information.

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## 8.1 TESTING THE MIXING RATIO (2-PART PRODUCTS ONLY)

The easiest and recommended way to check the mixing ratio is by weight.

1. In normal mixing and metering systems, the two components can be fed separately via special valves.
2. The balance [2] have to be as accurate as 0.1 g
3. Pump both components simultaneously. To achieve maximum accuracy, extrude at least 0.3 liter of component A.
4. Weigh the components and calculate the mixing ratio.
5. For the correct mixing ratio refer to the corresponding Product Data Sheet.



If the ratio by weight is outside the  $\pm 10\%$  range, stop working! Adjust the mixture to the required ratio before continuing. In case of problems with setting the mixing ratio, please contact the equipment manufacturer.

An alternative method for checking the mixing ratio is to compare the pot life (snap time) of the machine-mixed material with the pot life of a mixture weighed by hand in an exact ratio as stated in the corresponding Product Data Sheet.

## 8.2 MARBLE TEST FOR HOMOGENEITY (2-PART PRODUCTS ONLY)

The marble test is used to check homogeneity of the mixture and it is particularly recommended in applications with high aesthetical demand.

1. Apply a cone of mixed Sikasil® SG-500 / SG-500 CN / SG-550 on a clean float glass plate.
2. Press a second glass plate onto the plate with the adhesive. Avoid air bubbles!



If you see white or deep-black stripes or distinct light-gray marbling, the adhesive is not properly mixed or an insufficient amount of material was discharged after the last shutdown. Never use such material for bonding. To eliminate the defect, follow the equipment manufacturer's instructions. If a static mixer is used, it may have to be cleaned or replaced.



Figure 4: Positive test = ideal mixing



Figure 5: Negative test = inadequate mixing

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### 8.3 BUTTERFLY TEST FOR HOMOGENEITY (2-PART PRODUCTS ONLY)

The butterfly test is used to check the homogeneity of the mixed material to ensure its ideal properties.

1. Fold a paper or plastic foil along its center and open it again.
2. Apply a bead of mixed Sikasil® SG-500 / SG-500 CN / SG-550 along the fold, moving from one edge to the opposite; the amount has to be equivalent to the volume of the mixers used.
3. Fold the foil again and press it so that the silicone adhesive spreads out. Always press the foil in the direction perpendicular to the fold.
4. Unfold the paper.
5. The silicone adhesive must have a homogeneous color and must not show cured particles (wrinkles).



If you see white or deep-black stripes or distinct light-gray marbling or wrinkles, the adhesive is not properly mixed or an insufficient amount of material was discharged after the last shutdown. Never use such material for bonding. To eliminate the defect, follow the equipment manufacturer's instructions. If a static mixer is in use, it has to be cleaned or replaced.

6. After an adequate curing time, double-check the mixing quality by cutting open the thicker center section of the adhesive and check it for streaks, marbling and bubbles.



Use of the butterfly test is recommended to check the mixer open time (see Section 6.1.2). In order to check lifetime and conditions of the mixer, it is recommended to use the butterfly test in combination with the snake test.



Figure 6: Apply the bead in the fold direction



Figure 7: Press the bead only in direction perpendicular to fold



Figure 8: Unfold the foil - Positive test = ideal mixing



Figure 9: Unfold the foil - Negative test = inadequate mixing

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#### 8.4 SNAKE TEST (2-PART PRODUCTS ONLY)

The snake test is used to check pump mixing quality and allows detecting inconsistent cure, soft spots and inhomogeneous areas of mixed Sikasil® SG-500 / SG-500 CN / SG-550 as evidences that pump maintenance is required.

1. Apply a continuous “snake-shaped” bead at least 1cm thick of Sikasil® SG-500 / SG-500 CN / SG-550 on a cardboard; allow the pump to extrude for circa 3-5 minutes to apply an amount of adhesive equivalent to at least 5 times the volume of A-component pump (double stroke). Let the adhesive cure for at least 3 hours.
2. Finger-press the applied bead every 3-5cm to check the status of curing of the mixed material and its homogeneity.



If soft spots are identified, the adhesive is not properly dosed and pump adjustment is required. Soft spots usually occur with consistent pattern or length along the bead; never use such material for bonding. To eliminate the defect, follow the equipment manufacturer’s instructions or contact a pump technician. If a static mixer is in use, it has to be cleaned or replaced.

3. Using a sharp knife cut the bead section every 5-10cm and check the material conditions; the silicone must have a homogeneous color and must show uniform curing.



If you see white or deep-black stripes or distinct light-gray marbling, the adhesive is not properly mixed or dosed and pump maintenance is required. Never use such material for bonding. To eliminate the defect, follow the equipment manufacturer’s instructions or contact a pump technician. If a static mixer is in use, it has to be cleaned or replaced.

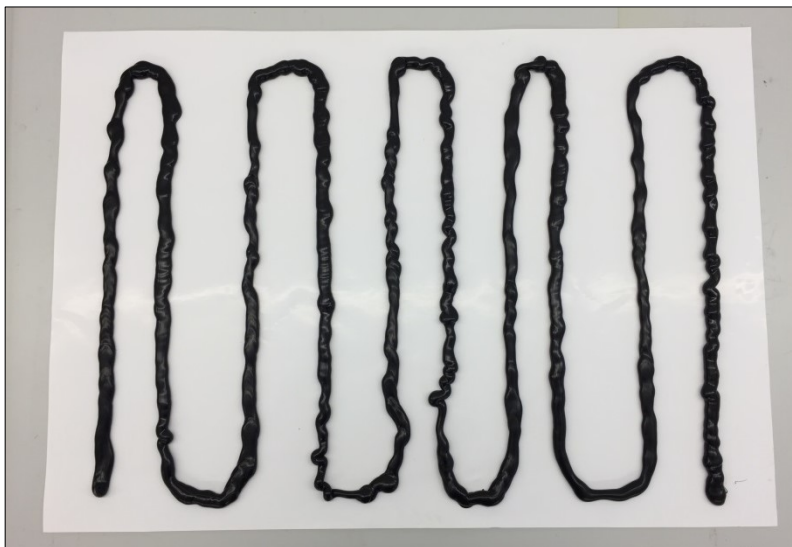


Figure 10: Snake-shaped bead

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## 8.5 POT LIFE (SNAP TIME) TESTING (2-PART PRODUCTS ONLY)

1. Extrude 30 - 75 ml freshly mixed silicone adhesive Sikasil® SG-500 / SG-500 CN / SG-550 (purge mixer sufficiently) from the machine into a small plastic cup, e.g. made of polyethylene [4].
2. Start the timer [3]. Then stir it briefly and vigorously with a wooden spatula [5].
3. After 25 minutes pull out the spatula quickly with its flat side perpendicular to the paste and stir the paste briefly.
4. Repeat this operation every 5 minutes.



If the vigorous stirring is repeated too often, especially at the beginning of the test, the build-up of mechanical strength is disturbed and simulates a longer pot life.

5. The pot life or snap time is the time from extrusion of the silicone adhesive until the point at which it no longer forms long strings (Figure 11) when the spatula is removed, but breaks off in short lengths (Figure 12).
6. The measured value has to be in line with the recommended values for quality control in Section 8.12. Please be aware of the fact that the snap time strongly depends on the temperature of the material. Hand mixed material can have a longer snap time than mixtures from the static mixer.

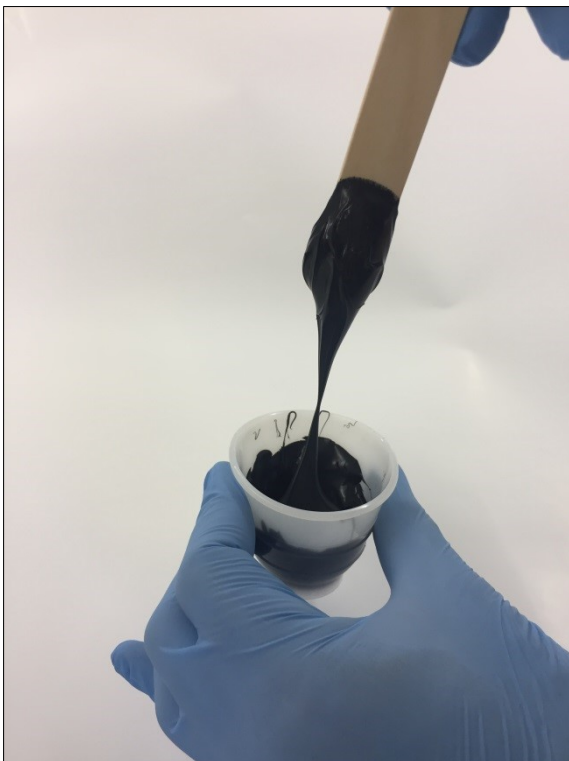


Figure 11: Material shows paste-like behavior: snap time not yet reached



Figure 12: Material shows rubber-like behavior: snap time reached

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## 8.6 SKIN-OVER TIME AND TACK-FREE TIME (1-PART PRODUCTS ONLY)

With 1-part silicone adhesives, check the skin-over time and tack-free time as follows:

1. Apply with a spatula about 30 g of the adhesive to paper or film in a thickness of about 3 to 4 mm and start timer [3].
2. Test every three minutes whether the adhesive surface has changed by probing with a clean fingertip.

Skin-over time is the point at which the adhesive no longer sticks to the finger (Figure 13 - Figure 17).

Tack-free time is the point at which the surface feels dry (no longer tacky).



The skin-over time and tack-free time given in the Product Data Sheets were determined under standard climatic conditions (23°C, 50% relative humidity). Higher temperature and higher humidity reduce the skin-over time and tack-free time.

If there are drastic deviations (more than  $\pm 50\%$ ) from the values given in the certificate of analysis, stop bonding and consult the Technical Department of Sika Industry.

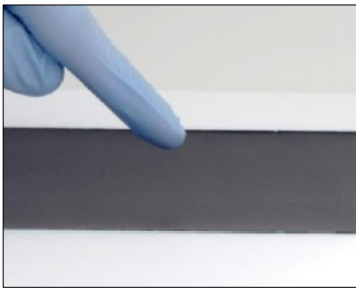


Figure 13: Start at the beginning of the bead

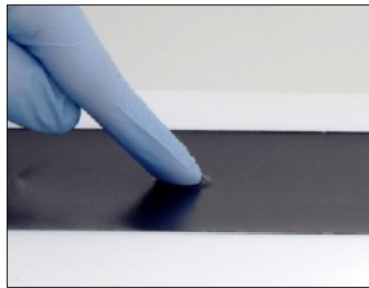


Figure 14: Touch slightly the bead with the finger

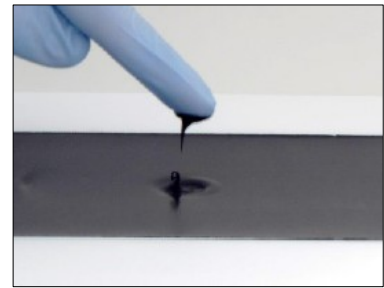


Figure 15: Remove and check for residues

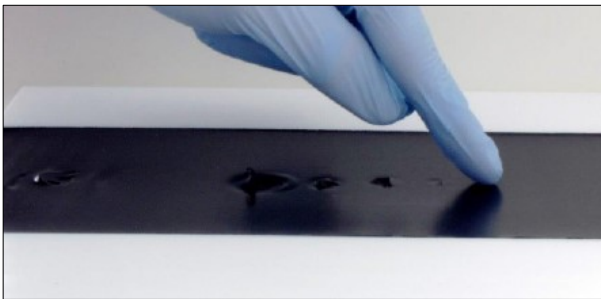


Figure 16: Always change the position for the next test

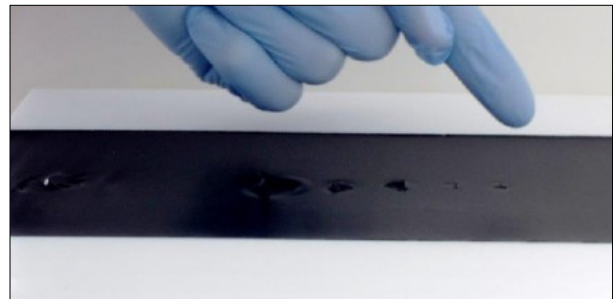


Figure 17: If no residues on your fingers are recognized the skin-over time has been reached

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## 8.7 SHORE A HARDNESS

Check the Shore A hardness according to ISO 868 using a conventional trailer pointer device [9]. The test specimens must have a smooth, flat surface and a thickness of at least 6 mm. Use a doctor blade [6] for finishing the applied bead at the right seal height. This Shore A hardness measurement is an indication of a correct mixing ratio and speed of total vulcanization. The minimum acceptable Shore A hardness of specific Sikasil® SG adhesives after 24 hours at room temperature (2-part adhesives) and 72 hours at room temperature (1-part adhesives) respectively is indicated in Table 5.

Table 5: Shore A hardness of Sikasil® SG adhesives after 24 hours (2-part adhesives) and 72 hours (1-part adhesives)

| Product            |                  | Shore A Hardness |
|--------------------|------------------|------------------|
| Sikasil® SG-500    | 2-part adhesives | 30 - 45          |
| Sikasil® SG-500 CN |                  | 30 - 45          |
| Sikasil® SG-550    |                  | 40 - 55          |
| Sikasil® SG-18     | 1-part adhesives | 35 - 50          |
| Sikasil® SG-20     |                  | 30 - 45          |



The above mentioned values were determined at 23°C / 50% relative humidity. Since temperature – and for 1-component products also humidity – have a significant influence on the curing speed of condensation-curing silicone adhesives, actual Shore A hardness values may vary with factory conditions.

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## 8.8 PEEL ADHESION TEST

1. Extrude a bead of Sikasil® SG of at least 150 mm length onto a clean substrate of original material (pre-treatment exactly as in production line).
2. Draw a template / doctor blade [6] over the bead to ensure its uniform size (about 15 mm wide and 6 mm high).
3. Store the test specimens at room temperature for 24 hours (2-part products) and 72 hours (1-part products), respectively.
4. Carry out the test by cutting approx. 30 mm of one end of the bead from the substrate with a sharp knife or glass scraper [7].
5. Fold back the loose end at an acute angle of about 30° (Figure 18) and try to detach the cured rubber from the substrate.
6. If the cured silicone cannot be detached, use the knife or glass scraper to cut it through to the substrate (Figure 19) several times while still pulling.
7. Repeat this procedure until at least 50% of the bead length has been tested.

After 24 hours (2-part products) and 72 hours (1-part products) respectively, the bead must not detach from the substrate during pulling (i.e. 100 % cohesive failure).



Figure 18: Peel adhesion test: pulling the bead apart, 100% cohesive failure occurring



Figure 19: Peel adhesion test on enameled glass: cutting the bead while pulling

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## 8.9 TENSILE ADHESION TESTS ON H-SPECIMENS

H-specimens with a joint dimension of 12 x 12 x 50 mm are produced for the tensile test. For this purpose, use original materials that have been pre-treated like on the production line.

1. Fix the glass and/or metal (use original material specified in project) test specimens to be bonded with spacers [8] and, if applicable, distance pieces (Figure 20 - Figure 21) so that a joint measuring 12 x 12 x 50 mm can be filled (Figure 22). For 1-part adhesives wrap an e-PTFE tape around the spacers before assembly.
2. Prepare at least 2 bubble-free test specimens per test series with Sikasil® SG adhesive. Remove excess material with a spatula [5] or other tool (Figure 23).
3. Remove the molds from the test specimen after storage at room temperature (remove spacers, adhesive tape or clamps, Figure 24).
4. Determine the mechanical parameters (tensile strength) after at least 72 hours (2-part products) and 21 days (1-part products) by means of a tensile testing equipment (pulling speed: 5 mm/min) or other suitable apparatus (e.g. Roman Scale, Figure 26).



If a tensile strength of less than 0.7 N/mm<sup>2</sup> (Sikasil® SG-550: 1.0 N/mm<sup>2</sup>) is attained consult the Technical Department of Sika Industry before continuing. The failure mode has to be at least 95% cohesive.

In absence of local standards, Sikasil® SG products shall meet the minimum values given in Table 6, line 8

For details regarding this tensile adhesion test please refer to Sika's Corporate Quality Procedure CQP 555-1 which is available upon request.

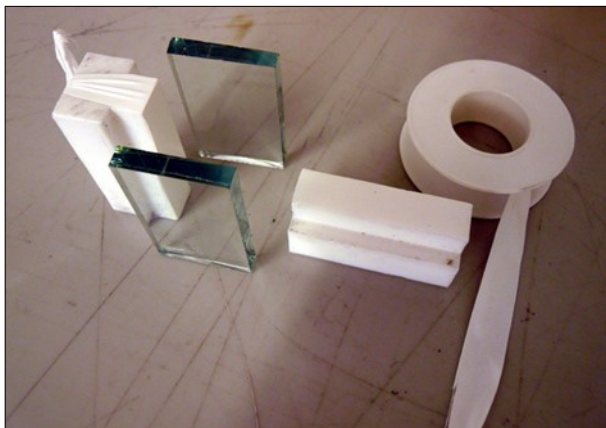


Figure 20: Spacers, e-PTFE tape (tape necessary for 1-component adhesives) and substrate pieces (e.g. glass)



Figure 21: Arrangement and fixation of the samples with a rubber band and tape

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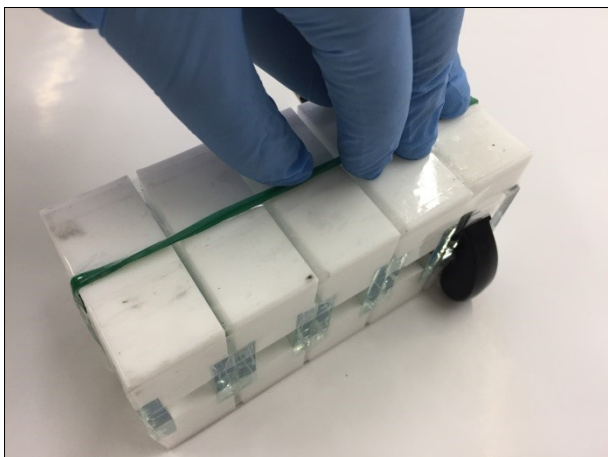


Figure 22: Injection of the silicone adhesive into the joint

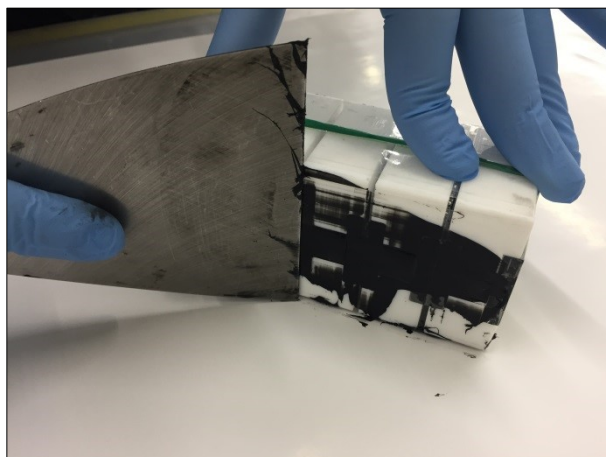


Figure 23: Removal of excess of silicone adhesive

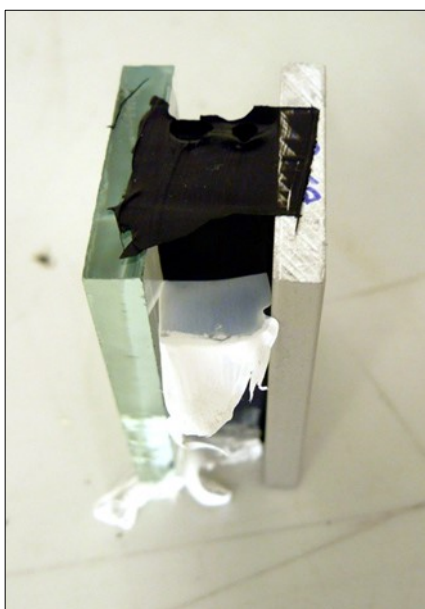


Figure 24: Remove spacers after 1 day, remove e-PTFE tape after 7 days (1-part adhesives).

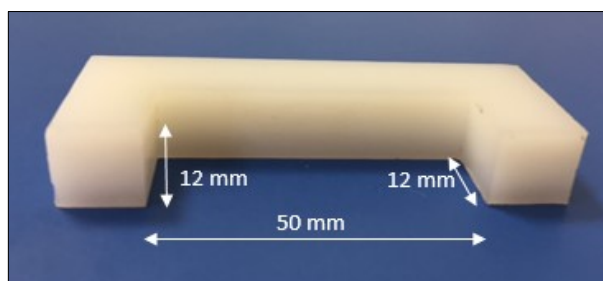


Figure 25: Alternative test arrangement (suitable for profiles and 1-part adhesive)

#### Tensile test equipment "Roman Scale":

A Roman Scale (see Figure 26) allows silicone applicators to test sealant cure and adhesion with "low cost equipment". The weight applied to the specimen is equal to the weight ( $W$ ) on the scale plate times the ratio of  $b/a$ . According to EOTA ETAG 002 the tensile strength at rupture have to be a minimum of 0.70 MPa. This value corresponds to strength applied to the test specimen of  $12 \text{ mm} \times 50 \text{ mm} \times 0.7 \text{ N/mm}^2 = 420 \text{ N}$  and to a load of 42 kg (SG-550:  $1.0 \text{ N/mm}^2$ , 600 N or 60 kg). In case of a  $b/a$  ratio of 10, a weight of 4.2 kg (SG-550: 6 kg) shall be applied to the plate ( $W$ ). This load shall be applied for 10 seconds with neither adhesive nor cohesive failure of the specimen. If no rupture occurs, you may incrementally add 0.5 kg to the scale until the H-piece ruptures. Record the load at rupture and percent cohesive failure observed on the test samples in the quality control logbook.

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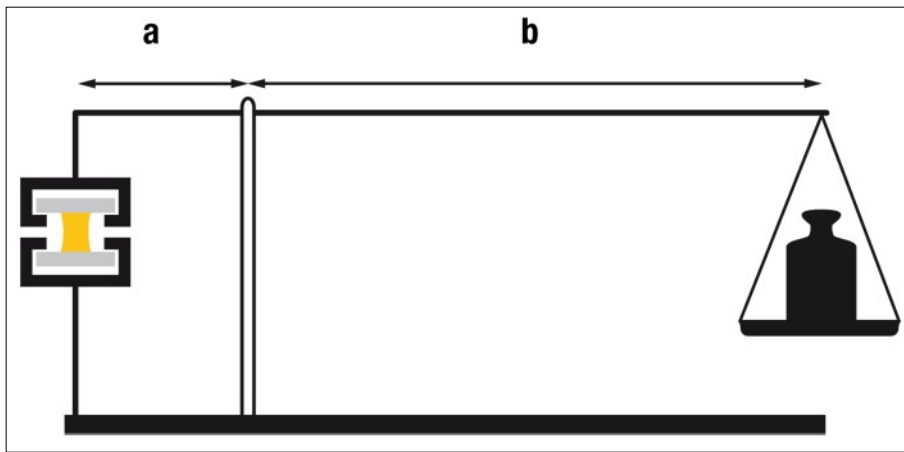


Figure 26: Roman scale for tensile test

### 8.10 VISUAL INSPECTION

Each bonded element shall be inspected visually in order to avoid mistakes in installation and adhesive application. The following criteria shall be checked for each panel:

- Correct joint dimensioning according to the drawings [10, 11]
- Complete joint filling according to drawings, eventually deglazing necessary (see 8.10)
- No bubble inclusions and marble defects in the joint [12]
- Correct installation of spacer tapes, gaskets, setting blocks, dead load support (if applicable).

### 8.11 DEGLAZING

The main purpose of this deglazing test is to check the functionality of the real façade unit. Deglazing shall be carried out before moving the bonded elements to the job-site or when the adhesive has cured completely throughout. The number of units to be tested and frequency of deglazing tests shall be coordinated with the Technical Department of Sika Industry.

A suggested frequency is the following deglazing scheme:

- 1 panel of the first 10 panels
  - 1 panel of the next 40 panels
  - 1 panel of the next 50 panels
  - 1 panel of every 100 panels
1. Using a sharp knife (e.g. Stanley or carpet knife), cut the cured silicone joint on a plane parallel to the bonded surfaces and in the middle of the joint thickness. Cut the whole joint section in order to reach the spacer tape or spacer gasket (Figure 27).
  2. Cut the joint along the whole perimeter of the bonded element, so that the glass pane can be completely removed (Figure 28).
  3. With reference to the joint portion bonded to the frame, cut approx. 30 mm of bead from the substrate with a sharp knife or glass scraper [7], taking care not to damage the substrate (Figure 29).
  4. As per peel test described in Section 8.8, fold back the bead end at an acute angle of 30° and try to detach the cured material from the substrate. The adhesive must tear 100% cohesively.
  5. If the cured adhesive cannot be detached, use the knife to cut it at a distance of approx. 1.0-1.5mm from the frame interface several times while pulling (Figure 29).
  6. Repeat this procedure until all bead length applied on the frame is tested.
  7. Along the whole bonded perimeter the adhesive must not detach from the frame interface (no adhesion loss) and must not show any air bubbles, white or deep black stripes and soft spots. Inspect joint filling, thru-curing and mixing quality. Check the joint dimensions and compare with values provided in the drawings and approved

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by Sika. Notify the Technical Department of Sika Industry immediately if adhesion loss occurs, mixing defects are detected or joint dimensions do not match drawings and Sika requirements.

8. Repeat the same test procedure with reference to the joint portion bonded on the glass panel removed, following procedure provided from 3) to 7) above (Figure 30).
9. Immediately after the test, reseal the cut-out joint using the same adhesive as originally used in the unit. Adhesive must always be applied on the adhesive layer 1.0-1.5mm thick left on the substrates after testing. Prior cleaning is not necessary if the cut surfaces are clean and smooth, and sealing is carried out immediately after the test. When the repair adhesive has completely cured, the element can be installed in the façade (Chapter 7).

The use of the deglazing report with local Sika letter head and company address is mandatory for Sika technicians. Customers may use the forms on Section 8.13 as a master copy and are asked to note if no Sika technician has supervised the deglazing procedure.

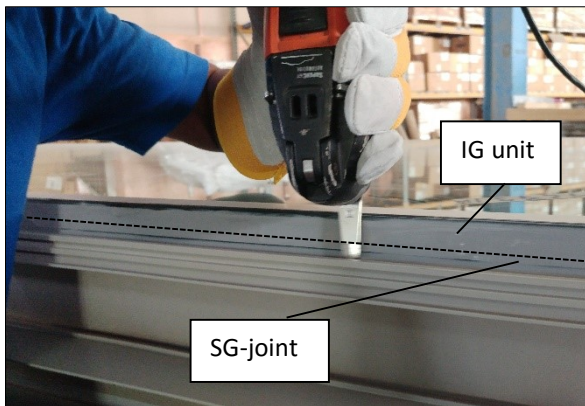


Figure 27: Cutting the joint in the middle of its thickness, along the whole perimeter of the bonded element (grey SG silicone used here).



Figure 28: Glass pane completely removed from frame.

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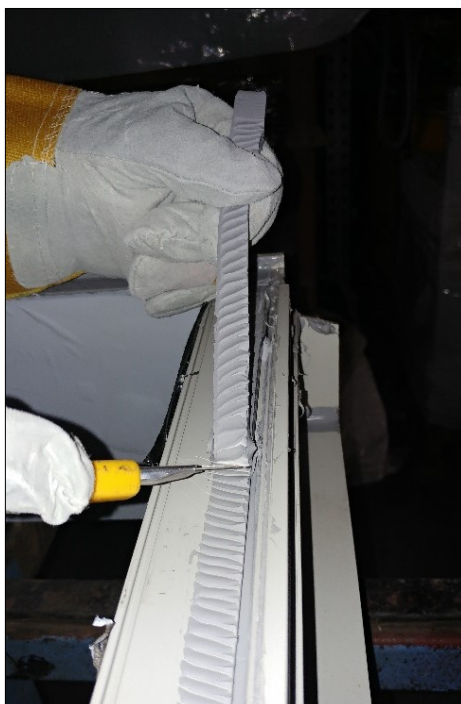


Figure 29: Testing joint adhesion along the whole frame – Good adhesion.

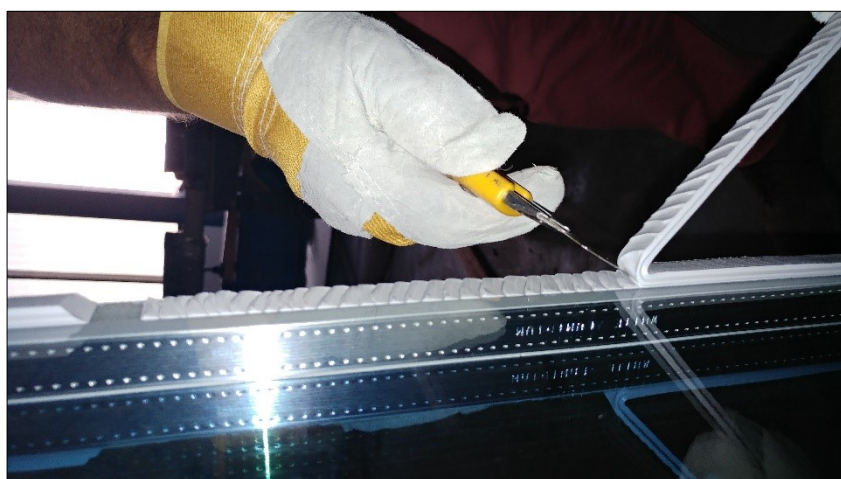


Figure 30: Testing joint adhesion along the glass perimeter – Good adhesion.



Figure 31: Example with black SG joint - Good adhesion.



Figure 32: Example with black SG joint - Adhesion failure.

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## 8.12 RECOMMENDED BASIC QUALITY CONTROL SCHEME

Table 6: Scheme for factory quality control

|   | Test                   | Chapter | Substrate | Frequency   | Remark and Details  | Requirement   |
|---|------------------------|---------|-----------|---|---|---|
| 1 | Mixing Ratio by weight | 8.1     | n/a       | daily before start of production and each time base (A) or catalyst (B) are changed                                 | Only for 2-part products                                      | Sikasil® SG-500 & Sikasil® SG-500 CN<br>11.7:1 to 14.3:1 (A:B) by weight<br>Sikasil® SG-550<br>10.8:1 to 13.2:1 (A:B) by weight |
| 2 | Snap Time              | 8.5     | n/a       | daily before start of production and each time base (A) or catalyst (B) are changed                                 | Only for 2-part products, required values only valid for 23°C | Sikasil® SG-500: 35 - 70 min<br>Sikasil® SG-500 CN: 45 - 90 min<br>Sikasil® SG-550: 30 - 80 min (Stain free time)               |
| 3 | Butterfly Test         | 8.3     | n/a       | daily before start of production and at restart after base purge and each time base (A) or catalyst (B) are changed | Only for 2- part products                                     | No white or deep black stripes, no marbling, no wrinkles  |
| 4 | Snake Test             | 8.4     | n/a       | Weekly and after any kind of adjustment of pump and mixing equipment  | Only for 2-part products                                      | No soft spots<br>No white or deep black stripes, no marbling  |

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|   | Test                             | Chapter | Substrate          | Frequency  | Remark and Details  | Requirement   |
|---|----------------------------------|---------|--------------------|--|---|---|
|   | Before production                |         |                    |  |   |   |
| 5 | Skin-over Time                   | 8.6     | n/a                | daily before start of production and<br>each time a new batch is used                                    | Only for 1- part products,<br>required values only valid for<br>23°C / 50% relative humidity  | Sikasil® SG-18: 15 - 45 min<br>Sikasil® SG-20: 10 - 35 min  |
| 6 | Shore A hardness                 | 8.7     | n/a                | 2x daily before start of production and<br>each time base (A) or catalyst (B)<br>are changed             | After 24 hours (2-part<br>adhesives) or 72 hours (1-part<br>adhesives) @ room<br>temperature  | Sikasil® SG-500: 30-45<br>Sikasil® SG-500 CN: 30-45<br>Sikasil® SG-550: 40-55<br>Sikasil® SG-18: 35-50<br>Sikasil® SG-20: 30-45   |
| 7 | Peel Adhesion                    | 8.8     | Glass* &<br>Frame* | 1 specimen daily before start of<br>production and<br>each time base (A) or catalyst (B)<br>are changed  | After 24 hours (2-part<br>products) or 72 hours (1-part<br>products) in the factory (same<br>conditions as bonded elements<br>are stored) | 95% cohesive failure  |
| 8 | Tensile Adhesion<br>(H-specimen) | 8.9     | Glass* &<br>Frame* | 2 specimens daily before start of<br>production and<br>each time base (A) or catalyst (B)<br>are changed | After 72 hours (2-part<br>products) or 21 days (1-part<br>products) in the factory (same<br>conditions as bonded elements<br>are stored)  | ≥ 0.7 N/mm <sup>2</sup> & 95% cohesive failure<br>(for Sikasil® SG-500, Sikasil® SG-500<br>CN, Sikasil® SG-18, Sikasil® SG-20)<br>≥ 1.0 N/mm <sup>2</sup> & 95% cohesive failure<br>(for Sikasil® SG-550) |

\* For peel adhesion test and tensile adhesion test use substrates equal to the ones used in project (e.g. in terms of coating type, enamelled glass, edge deletion, anodization, etc.)

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|    | Test              | Chapter | Substrate | Frequency   | Remarks and details   | Requirement   |
|----|-------------------|---------|-----------|---|---|---|
| 9  | Visual Inspection | 8.10    | Panel     | Each panel assembled  | Check for: complete joint filling according to drawings; bubble inclusions in the joint; correct installation of spacer tapes, gaskets, setting blocks, dead load support (if applicable); etc. | Joint dimensions correspond to drawings; no air inclusions are allowed; accessories must be installed according to drawings   |
| 10 | Deglazing         | 8.11    | Panel     | <p>Suggested deglazing scheme:</p> <ul style="list-style-type: none"> <li>- 1 panel of the first 10 panels</li> <li>- 1 panel of the next 40 panels</li> <li>- 1 panel of the next 50 panels</li> <li>- 1 panel of every 100 panels</li> </ul> <p>Number of units to be tested and frequency of deglazing to be coordinated with the Technical Department of Sika Industry.</p> | Before moving the bonded elements to the job-site and when the adhesive has cured completely throughout.  | Joint dimensions correspond to drawings; no gas inclusions are allowed; 100% adhesion on bonded substrates (100% cohesive failure of the joint), homogenous joint curing, no soft spots, no white or deep black stripes |

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### 8.13 RECOMMENDATIONS FOR LOGBOOK CONTENT

The production/quality control logbook for structural glazing should contain the following information:

#### General

- Project/job name
- Date
- Production line designation (if applicable)

#### Panel Information

- Curtain wall panel code
- Progressive number (indicate 1st panel after change of structural silicone base (A) or catalyst (B) change
- Place of panel installation in the curtain wall

#### Bonding Substrate & Surface Pre-treatment Information

- Metal frame finish (anodized, PPC, PVDF, stainless steel)
- Type of glass (float, enamel coated, pyrolytic coating)
- Type of cleaning agent for frame and glass
- Batch numbers and expiry dates for cleaning agents
- If applicable: type of primer or activator for frame and/or glass
- Batch numbers and expiry dates for primer or activator

#### Structural Silicone & Mixer Cleaner Information

- Type of structural silicone
- Batch numbers and expiry dates of structural silicone (A and B in case of 2-part products)
- Type of mixer cleaner (usually: Sika® Mixer Cleaner)
- Batch numbers and expiry dates for mixer cleaner

#### Factory Conditions

- Temperature:
- Relative humidity:

#### Quality Control Results

- Mixing ratio in parts
- Snap time in minutes
- Skin-over time in minutes
- Butterfly test
- Snake test
- Shore A
- Peel adhesion
- Tensile adhesion
- Visual inspection
- Deglazing

**All QC documents and samples have to be properly stored for a minimum time equivalent to at least the warranty duration.**

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Product Quality Control of 2-part Sikasil® Structural Glazing Adhesives

Project: \_\_\_\_\_ Theoretical pot life time [min]: \_\_\_\_\_

Adhesive: \_\_\_\_\_ Theoretical Shore A hardness: \_\_\_\_\_

| Date | Time | Temperature<br>/ relative<br>humidity | Batch<br>numbers | Mixing<br>ratio by<br>weight | Butterfly<br>test | Snake<br>test | Pot life<br>time<br>[min] | Adhesion test<br>on glass | Adhesion test<br>on frame | Shore A<br>hardness | Tensile<br>adhesion<br>test | Deglazing | Remarks | Sample<br>taken by |
|------|------|---------------------------------------|------------------|------------------------------|-------------------|---------------|---------------------------|---------------------------|---------------------------|---------------------|-----------------------------|-----------|---------|--------------------|
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                              |                   |               |                           |                           |                           |                     |                             |           |         |                    |

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Product Quality Control of 1-part Sikasil® Structural Glazing Adhesives

Project: \_\_\_\_\_ Theoretical skin-forming time [min]: \_\_\_\_\_

Adhesive: \_\_\_\_\_ Theoretical Shore A hardness: \_\_\_\_\_

| Date | Time | Temperature /<br>relative<br>humidity | Batch<br>numbers | Skin-forming<br>time [min] | Adhesion test<br>on glass | Adhesion test<br>on frame | Shore A<br>hardness | Tensile<br>adhesion<br>test | Deglazing | Remarks | Sample<br>taken by |
|------|------|---------------------------------------|------------------|----------------------------|---------------------------|---------------------------|---------------------|-----------------------------|-----------|---------|--------------------|
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |
|      |      |                                       |                  |                            |                           |                           |                     |                             |           |         |                    |

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## 9 REPAIR GLAZING

If glass in a structural glazing unit breaks during transport or installation, it should be replaced in the factory if possible, since conditions here are more suitable. Already installed structural glazing units must only be removed from the façade by trained employees exercising extreme care. Always follow Sika structural glazing processing guidelines.

1. Cut out the broken pane so that about 1 - 2 mm of silicone adhesive remains on the metal frame (**Errore. L'origine riferimento non è stata trovata.**). Never scratch out the adhesive completely, since this could damage the metal surface. For complicated designs and joint geometries, vibration cutters or similar tools can be used. The cut must be absolutely smooth and must never leave loose adhesive parts on the cut surface. Remove the spacer tape completely.
2. Never clean the adhesive surface if a new pane is to be inserted and bonded immediately after one has been cut out. If the pane is not to be installed until later, it may be necessary to clean with Sika® Cleaner P. Since silicone can absorb solvent, clean very carefully using a cloth only sparingly moistened with cleaner. Allow the cleaner to evaporate completely before re-bonding. We do not recommend priming the cut surface. Pre-treat the glass as required in the lab report.
3. The cleaning step can be avoided by cutting out the glass very close to the glass surface. The metal frame can then be transported or stored for longer periods. Just before re-bonding, neatly cut away the old adhesive with a sharp blade, leaving behind about 2 mm thickness. You can then re-bond on the smooth, freshly cut surface.
4. Factory re-bonding: Always clean the glass to Sika's specifications before bonding. Then install the new spacer tape (and new setting blocks if necessary). Position the new glass pane and fill the joint as described in chapter 6. The new adhesive must be approved by Sika by means of adhesion tests (It is usually the same adhesive as used for bonding in the first place).
5. Re-bonding in the curtain wall: it is recommended to re-bond with the same material used in the original application. Before removing the temporary clamps fixing the panes, check on test specimens that adhesion has developed fully and that the silicone adhesive has cured throughout. In general, the clamps can be removed:
  - In the case of two-part adhesives: after 7 days
  - In the case of one-part adhesives: after 21 days.
6. Only install the weather sealant after the structural glazing adhesive has cured completely. Use the sealant originally recommended by Sika for this purpose.

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## 10 STRUCTURAL GLAZING – FACTORY AUDIT REPORT

### General information

|                        |                     |             |
|------------------------|---------------------|-------------|
| Customer:              | Date:               |             |
| Project name:          | Project location:   |             |
| Audited customer team: | QC responsible:     | Trained on: |
|                        | Name 1:             | Trained on: |
|                        | Name 2:             | Trained on: |
| Panel ID:              | Date of production: |             |

### Sika Guidelines

General Guideline "Structural Silicone Glazing with Sikasil® SG Adhesives"

|                                      |                              |                             |
|--------------------------------------|------------------------------|-----------------------------|
| Latest version available:            | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Document available in local language | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

### Sika products used for the panel to deglaze

|            |  |  |
|------------|--|--|
| Cleaner:   | Batch #:                                 | Expire date:   |
|            | Latest version of PDS available:         | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | Latest version of SDS available:         | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | PDS and SDS available in local language: | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | Storage & product condition:             |  |
| Aktivator: | Batch #:                                 | Expire date:   |
|            | Latest version of PDS available:         | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | Latest version of SDS available:         | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | PDS and SDS available in local language: | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | Storage & product condition:             |  |
| Primer:    | Batch #:                                 | Expire date:   |
|            | Latest version of PDS available:         | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | Latest version of SDS available:         | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | PDS and SDS available in local language: | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | Storage & product condition:             |  |
| Sealant:   | Batch #: A:                              | Expire date:   |
|            | Batch #: B:                              | Expire date:   |
|            | Latest version of PDS available:         | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | Latest version of SDS available:         | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | PDS and SDS available in local language: | <input type="checkbox"/> Yes <input type="checkbox"/> No |
|            | Storage & product condition:             |  |
|            | Tooling:                                 |  |

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## Substrates

|        |  |
|--------|--|
| Glass: | Type:<br>Cleaned / pre-treated by:<br>Pre-treatment recommendations<br>from Sika Lab report available: <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Applied pre-treatment compliant with Lab report: <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Frame: | Type:<br>Cleaned / pre-treated by:<br>Pre-treatment recommendations<br>from Sika Lab report available: <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Applied pre-treatment compliant with lab report: <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Other: | Type:<br>Cleaned / pre-treated by:<br>Pre-treatment recommendations<br>from Sika Lab report available: <input type="checkbox"/> Yes <input type="checkbox"/> No<br>Applied pre-treatment compliant with Lab report: <input type="checkbox"/> Yes <input type="checkbox"/> No |

## Quality Control recorded by customer at production date

|                    |                    |
|--------------------|--------------------|
| Temperature:       | Humidity:          |
| Snap time:         | Mixing ratio:      |
| Butterfly test:    | Snake test:        |
| Adhesion on glass: | Adhesion on frame: |

## Storage & Movement:

|            |   |
|------------|---|
| Panel      | Tracking system & labelling:<br>Movement condition:<br>Storage condition: |
| QC samples | Tracking system & labelling:<br>Storage condition and duration:           |

## Deglazing test

|                        |                      |
|------------------------|----------------------|
| Mixing of silicone:    | Shore A:             |
| Adhesion on glass:     | Adhesion on frame:   |
| Calculated joint size: | Measured joint size: |
| Air pockets:           | Other:               |

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**Remarks / Documents / photographs attached:**

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Summary: You have requested us to inspect your factory for a deglazing of façade elements for above mentioned project and we are pleased to confirm the following based on our visit of \_\_\_\_\_ (Name of auditor)

- Application of the above mentioned Sika products has been effected in accordance with our written recommendations.  
Yes: ☐ No: ☐
- Visible defects detected in Sika's products as applied:  
Yes: ☐ No: ☐
- Air pockets detected:  
Yes: ☐ No: ☐
- Deglazing approved with limitations (see Remarks)  
Yes: ☐ No: ☐
- Deglazing approved (see Remarks)  
Yes: ☐ No: ☐

Location: \_\_\_\_\_

Date: \_\_\_\_\_

Sika Subsidiary

Customer

With the signature the customer confirms the correct use of the aforementioned batches of Sika products according to Sika's latest product data sheets and SG application guidelines.

**Important note:**

*Please note that the above conclusions are based only on a visual inspection of the actual status of the production line and the works executed as seen during our visit. Our responsibility is therefore limited to the results of our visual inspection and does not imply any further responsibility as to Sika's products and their correct application by any third party.*

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## 11 LEGAL NOTE

The information contained herein and any other advice are given in good faith based on Sika's current knowledge and experience of the products when properly stored, handled and applied under normal conditions in accordance with Sika's recommendations. The information only applies to the application(s) and product(s) expressly referred to herein and is based on laboratory tests which do not replace practical tests. In case of changes in the parameters of the application, such as changes in substrates etc., or in case of a different application, consult Sika's Technical Service prior to using Sika products. The information contained herein does not relieve the user of the products from testing them for the intended application and purpose. All orders are accepted subject to our current terms of sale and delivery. Users must always refer to the most recent issue of the local Product Data Sheet for the product concerned, copies of which will be supplied on request.

**Version given by**  
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