

HIGH PERFORMANCE BUILDING SOLUTIONS

# DOWSIL™ Crystal Clear Spacer

Application guide  
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# Introduction

DOWSIL™ Crystal Clear Spacer is a fully cured, ready to apply, preformed silicone spacer that can be used in the assembly of insulating glass units, refrigerator doors, glass doors or other glass panels, where a full vision is required. When used in combination with glass or other transparent substrates, it enables excellent full vision panel aesthetics.

## Product offer

DOWSIL™ Crystal Clear Spacer: a preformed silicone spacer suitable for the assembly of insulating glass units and the construction of transparent panels.

DOWSIL™ R-40 Universal Cleaner: a specially formulated solvent blend designed to clean glass and metal profiles used in many external applications.

DOWSIL™ 1200 OS Primer: a one-part chemical treatment primer designed for use with DOWSIL™ Sealants in a variety of applications.

## Quality

### General considerations

Material storage and handling: DOWSIL™ Crystal Clear Spacer must be stored at temperatures between 10 and 40°C and relative humidity between 30 and 80% RH. Higher temperatures or moisture can negatively impact adhesion, clarity and strength properties of DOWSIL™ Crystal Clear Spacer prior to application.

Shelf life: DOWSIL™ Crystal Clear Spacer must be used within its stated shelf life. DOWSIL™ Crystal Clear Spacer that is used beyond its stated shelf life may not adhere properly and must not be used.

DOWSIL™ Crystal Clear Spacer preparation and application: Specific procedures and recommendations for DOWSIL™ Crystal Clear Spacer are explained in this guide. These procedures and recommendations will help to ensure proper spacer adhesion. Ignoring or skipping a step in the process could have an adverse effect on the performance of the DOWSIL™ Crystal Clear Spacer. These procedures are mandatory and should be fully understood and followed by the applicator.

Quality control: A comprehensive quality control program is one of the most critical elements for a successful DOWSIL™ Crystal Clear Spacer project. Dow provides procedures and recommendations that must be fully understood and followed by the applicator. These procedures have shown to be effective and reliable. In the documentation section (page 9) of this guide, Dow provides a quality control log template which can be used by the applicator. Dow assigned technical distribution partners will assist you in the development of an effective quality control program specifically for your organization. This program includes an audit of your production facility by a Dow representative in order to verify that all procedures have been implemented and propose any potential recommendations for improvements.

## Application of DOWSIL™ Crystal Clear Spacer

- a. Application conditions
- b. Surface preparation
- c. Priming
- d. Application and positioning of DOWSIL™ Crystal Clear Spacer on the substrate
- e. Adhesion build up and quality control
- f. Compatibility with DOWSIL™ Silicones

### a. Application conditions

The production area should be swept and cleaned daily. To avoid any contamination of DOWSIL™ Crystal Clear Spacer, we recommend that the production area is completely separate from the metal cutting and/or glass cutting area. We also recommend that the production area has controlled temperature and humidity.

### b. Surface preparation

**Attention: DOWSIL™ Crystal Clear Spacer should not be touched with bare hands. Wearing of nitrile gloves during handling helps to ensure that no grease or dirt is transferred from hands to the surface of the spacer**



Prior to bonding DOWSIL™ Crystal Clear Spacer to a substrate, it is important to ensure that the surface is clean and free from grease, oil, dust or particles. The use of DOWSIL™ R-40 Universal Cleaner is recommended to remove any greasy contamination on the substrate to be bonded. The DOWSIL™ Crystal Clear Spacer has a low natural surface tackiness.

### Cleaning

The “two-cloth cleaning method” is a successful technique for cleaning non-porous surfaces. The use of one cloth to clean a substrate is not a recommended procedure and is not as effective as using two cloths. Clean, soft, absorbent, lint-free cloths must be used. This method consists of cleaning the substrate with a solvent saturated cloth followed by a drying wipe with a separate clean cloth. This procedure is described in more detail below:

1. Thoroughly clean all surfaces of loose debris.
2. Pour a small quantity of cleaning solvent into a working container. A clear plastic, solvent-resistant, squeeze bottle works best for this purpose. Do not apply solvent directly from the original container.
3. Wipe the joint surfaces with sufficient force to remove dirt and contaminants.
4. Immediately wipe dry the solvent wet surface of the substrate with a separate clean, dry cloth. The second cloth must wipe the substrate before the solvent has evaporated.
5. Visually inspect the second cloth to determine if contaminants were effectively removed. If the second cloth remains dirty, repeat the “two-cloth cleaning method” until the second cloth is clean. For each subsequent cleaning, rotate each cloth to use a clean portion of the cloth. Do not clean with the dirty portion of the cloth. For best results, replace used and dirty cloths frequently.



### c. Priming

DOWSIL™ 1200 OS Primer should be allowed to air-dry for a minimum of 5 minutes and a maximum of 30 minutes prior to the application of DOWSIL™ Crystal Clear Spacer. Drying time is dependent on temperature and humidity. Excellent adhesion can be obtained when the primer is allowed to dry for 5 minutes following application, to react with the substrate. DOWSIL™ Crystal Clear Spacer should then be applied immediately to the substrate. Attention: DOWSIL™ Crystal Clear Spacer is flexible — care must be taken to ensure that it is correctly positioned on the first attempt as it cannot be removed from the primed surface without causing damage to the spacer.

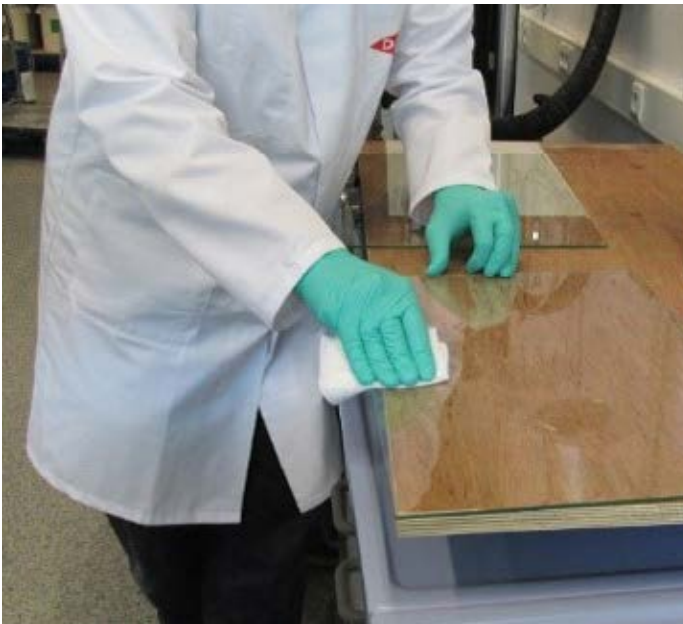
**Attention: Avoid any contamination of the DOWSIL™ Crystal Clear Spacer with the DOWSIL™ R-40 Universal Cleaner. DOWSIL™ 1200 OS Primer should only be in contact with the DOWSIL™ Crystal Clear Spacer at the point of adhesion to the substrate.**

### Primer Application

DOWSIL™ 1200 OS Primer should be used to prepare the substrates for application of DOWSIL™ Crystal Clear Spacer. The following procedures describe how to properly prime surfaces with DOWSIL™ 1200 OS Primer:

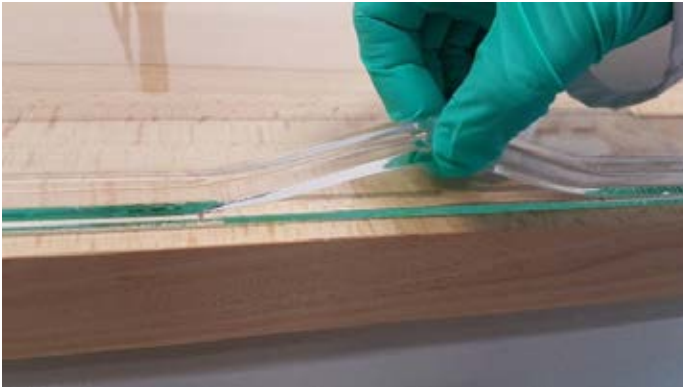
1. Before using, verify that the DOWSIL™ 1200 OS Primer is within its stated shelf life. The primer should be stored below 25°C in its original unopened container. The primer should be clear and water-like in appearance. If the primer is milky white in appearance, do not use the primer. Red colored primer is also available.
2. The surface to be primed must be clean and dry. Priming should be carried out within four (4) hours of cleaning. If there is a greater time delay, joint surfaces must be recleaned before priming.
3. Pour a small amount of primer into a clean, dry working container. Do not decant more than a 10 minute supply of primer into the working container. Replace and tighten the cap on the primer can immediately after dispensing primer into a working container. Excessive exposure of the primer to atmospheric moisture will cause it to deteriorate and turn milky white in the can.
4. Pour a small amount of primer from the working container onto a clean, dry, lint-free cloth and gently wipe a thin film on all surfaces requiring a primer. Apply only enough primer to wet the surface. Over priming can cause adhesion loss between the DOWSIL™ Crystal Clear Spacer and the substrate. If too much primer is applied, a powdery white film will form on the substrate. Over priming is not an acceptable practice and should be stopped immediately. Over primed surfaces must be recleaned and primed in a proper manner.
5. The use of DOWSIL™ 1200 OS Primer should be performed a minimum of 5 minutes and a maximum 30 minutes prior to the application of DOWSIL™ Crystal Clear Spacer. The best results are obtained when the primer is left 5 minutes to react with the substrate and DOWSIL™ Crystal Clear Spacer is then applied immediately.

### Correct primer application

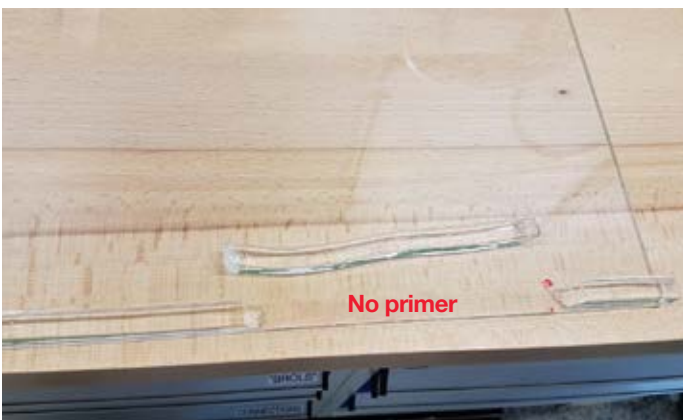


**Attention: If primer is not applied correctly, this will negatively impact the adhesion of the spacer**

### Poor adhesion without the use of DOWSIL™ 1200 OS Primer



**Incorrect DOWSIL™ 1200 OS Primer application**



### d. Application and positioning of DOWSIL™ Crystal Clear Spacer on the substrate

Excellent adhesion between the substrate and the DOWSIL™ Crystal Clear Spacer can be achieved when the DOWSIL™ Crystal Clear Spacer is applied 5 minutes after primer application. Nitrile gloves should be changed if worn following the primer application to prevent contamination of the DOWSIL™ Crystal Clear Spacer and to avoid fingerprints on the spacer. Remove carefully the protective film packaging from the DOWSIL™ Crystal Clear Spacer. Apply DOWSIL™ Crystal Clear Spacer to the glass using the tool developed by Dow (or a suitable alternative) on two opposite sides of the glass, ensuring it is positioned according to the customer design on the glass edge.

### e. Adhesion build up

The adhesion buildup of DOWSIL™ 1200 OS Primer on the substrate might differ according to the temperature and humidity. Similarly, the bonding speed of DOWSIL™ Crystal Clear Spacer to the primed substrate is dependent on temperature, humidity and the nature of the substrate.

*Typically, DOWSIL™ Crystal Clear Spacer will bond to the primed surface after 5 minutes.*

### Samples of DOWSIL™ Crystal Clear Spacer after mechanical testing



### Finished refrigerator door



## f. Compatibility with DOWSIL™ Silicones\*

Compatibility tests with DOWSIL™ Crystal Clear Spacer, DOWSIL™ 3362 Insulating Glass Sealant, DOWSIL™ 3363 Insulating Glass Sealant and DOWSIL™ 335 Butyl Sealant have been performed following the ASTM C-1087 test procedure or test method ETAG 002 Paragraph 5.1.4.2.5 (long term compatibility through adhesion test). These sealants are not adversely affected when in contact with DOWSIL™ Crystal Clear Spacer.

*\* It should be noted that DOWSIL™ Crystal Clear Spacer is permeable to moisture and does not suffice to pass stringent insulating glass standards like EN-1279 part 2 and 3. In order to significantly reduce moisture ingress, the use of a primary seal in combination with DOWSIL™ Crystal Clear Spacer is recommended.*

## Quality control test procedures

Following Dow's stringent quality control requirements is one of the most important aspects of a successful DOWSIL™ Crystal Clear Spacer project and is the primary responsibility of the refrigerator door/insulating glass unit applicator. This section of the guide should be fully understood and continually reviewed by the applicator. The procedures and recommendations made in this section form the foundation of a comprehensive quality control program which should be adopted by the applicator. In the Documentation section of this guide, Dow provides a quality control log template which can be used for the development of a comprehensive quality control program. Dow assigned technical distribution partners will assist you in the development of an effective quality control program specifically for your organization.

Production quality control: During production, periodic quality control tests should be performed on DOWSIL™ Crystal Clear Spacer. These quality tests help to ensure that the DOWSIL™ Crystal Clear Spacer is being properly applied. The table below details these tests and their recommended frequency:

### DOWSIL™ Crystal Clear Spacer QC tests

QC test	Frequency
<b>Adhesion test:</b> Choose 1 of the following 2 tests 1/ Peel test 2/ H-Piece glass/glass	Every day and after each spacer lot change
<b>Visual inspection of DOWSIL™ Crystal Clear Spacer</b>	Prior to application during production

### Adhesion quality control tests:

#### 1. Peel adhesion test

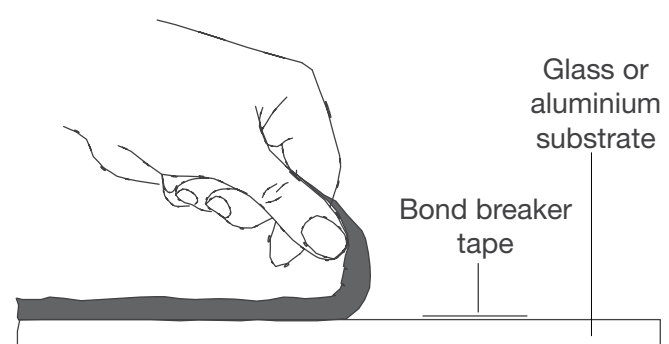
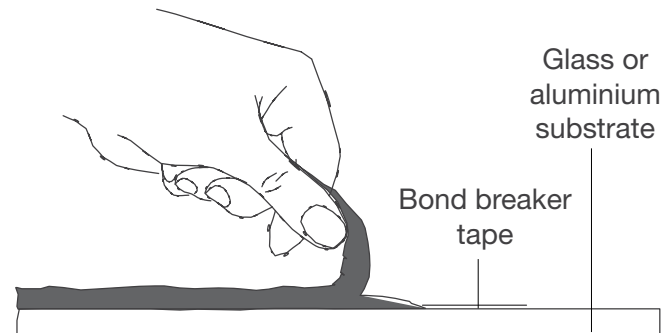
The peel adhesion test is a highly effective test to verify the adhesion of DOWSIL™ Crystal Clear Spacer to a substrate. This test should be performed on all substrates to which the spacer is required to have adhesion at the following intervals:

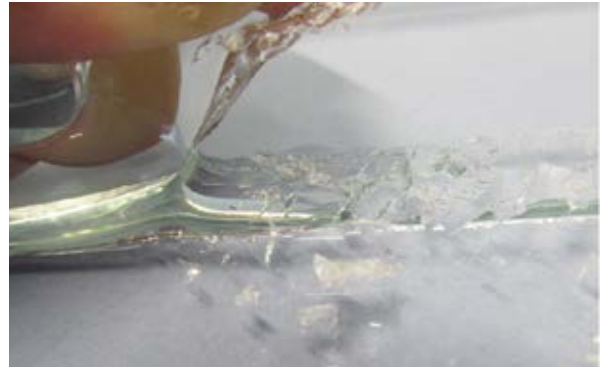
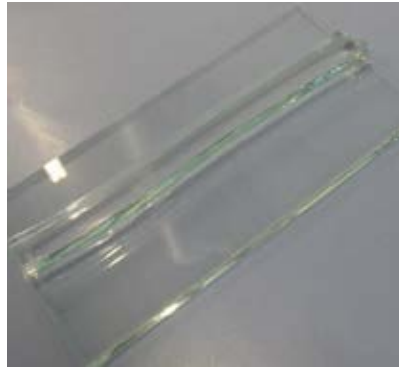
Frequency: every day and after each lot change of DOWSIL™ Crystal Clear Spacer

Below is a description of the peel adhesion test

1. Clean and prime the glass substrate as recommended by Dow.
2. Place a polyethylene sheet or bond breaker tape across the flat surface.
3. Position DOWSIL™ Crystal Clear Spacer onto the substrate. At least 4 cm of the spacer should be applied over the polyethylene sheet or bond breaker tape.
4. Allow the DOWSIL™ Crystal Clear Spacer 5 minutes for adhesion build-up between the spacer and the primed substrate. Hold the 4cm tab of spacer which overlays the polyurethane sheet. Peel back to only 1 to 2 cm of spacer leaving the remainder in place for additional testing.
5. If the DOWSIL™ Crystal Clear Spacer tears within itself and remains fully bonded to the substrate, this is called "cohesive failure". 100% cohesive failure is desirable since this indicates that the strength of adhesion is greater than the strength of cohesion.
6. If the DOWSIL™ Crystal Clear Spacer releases from the substrate, the sample indicates 100% adhesive failure (or 0% cohesive failure). Since DOWSIL™ Crystal Clear Spacer adhesion develops over time, repeat the test after an additional 24 hours of cure. Continue until 100% cohesive failure is achieved. If adhesion does not develop as expected, contact your local Dow Technical Specialist.

#### Peel adhesion test: cohesive failure





## 2. H-Piece testing

This test could be an alternative for the peel test but it is not mandatory.

The H-piece test is a secondary test used to check the properties of DOWSIL™ Crystal Clear Spacer. This test should be performed once per day. When a production lot of spacer is changed, an H-piece test should be used to confirm the DOWSIL™ Crystal Clear Spacer properties. The H-piece test is a recommended daily adhesion quality control test. However, as this test can be difficult to implement, the peel test can be used as a daily adhesion quality control test as an alternative.

Three H-piece test samples should be prepared on a daily basis. Samples should be made using representative project substrates (glass, etc). The substrates should be cleaned and primed in the same manner as the production units. The test samples should be stored in the same temperature and humidity environment as the production units. Full adhesion typically occurs after 24 hours. When properly cured, the material should have a minimum strength of 0.04 MPa with 100% cohesive failure. If the results do not meet the specified criteria, two further H-piece samples are available for additional testing.

### H-Piece sample:



# Documentation

The applicator of DOWSIL™ Crystal Clear Spacer is responsible for developing proper quality control documentation for their project. The sample quality control log provided in this guide may be used as provided or it can be used as a model for a customized quality control document. After completion of a project, the quality control logs must be provided to Dow should a warranty be requested. Dow recommends that project documentation be retained for at least the length of the warranty. These documents should be available to Dow or local officials if requested.



# Step by step instructions for production of an insulating glass unit

The following describes a simple application method to assemble insulating glass units, refrigerator doors, glass doors or glass panels using DOWSIL™ Crystal Clear Spacer.

It is recommended that nitrile gloves are worn during handling and application of DOWSIL™ Crystal Clear Spacer to avoid the appearance of finger prints on the material. This also helps to ensure that no grease or dirt is transferred from hands to the surface of the spacer. DOWSIL™ Crystal Clear Spacer is supplied ready for use.

1. Clean the surface of the glass substrates that will be in contact with the DOWSIL™ Crystal Clear Spacer with DOWSIL™ R-40 Universal Cleaner, using the two-cloth cleaning method, as described under 'Surface preparation'.
2. DOWSIL™ 1200 OS Primer should be applied and allowed to air-dry for a minimum of 5 minutes and a maximum of 30 minutes prior to the application of DOWSIL™ Crystal Clear Spacer. Drying time is dependent on temperature and humidity. Please refer to the Priming section of this guide for full application details.
3. Ensure a new pair of nitrile gloves are worn prior to handling the DOWSIL™ Crystal Clear Spacer to avoid the appearance of fingerprints or other contamination resulting from cleaning or priming. Remove carefully the protective plastic packaging from the DOWSIL™ Crystal Clear Spacer.
4. Apply DOWSIL™ Crystal Clear Spacer to the glass using the tool developed by Dow (or a suitable alternative) on two opposite sides of the glass. The DOWSIL™ Crystal Clear Spacer has one straight edge and one concave edge - either edge may be positioned on the outer face of the insulating glass unit.
5. Insert any suitable standard spacer to the two remaining open sides of the unit. This spacer can be a warm edge or standard metal spacer.
6. Align the second glass on top of the DOWSIL™ Crystal Clear Spacer and standard spacers and apply equal pressure to the unit on all sides to help ensure excellent contact with all spacers.
7. A secondary sealant may now be applied to the perimeter of the unit. DOWSIL™ 3362 Insulating Glass Sealant and DOWSIL™ 3363 Insulating Glass Sealant are fully compatible with DOWSIL™ Crystal Clear Spacer.








## For more information

Learn more about Dow's full range of High Performance Building solutions by visiting us online at [dow.com/highperformancebuilding](http://dow.com/highperformancebuilding).

Dow has sales offices, manufacturing sites and science and technology laboratories around the globe. Find local contact information at [dow.com/contactus](http://dow.com/contactus).

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