

BUILDING SCIENCE

DOWSIL™ 121 Structural Glazing Sealant Application Guide



Purpose

This document is intended to provide detailed instructions on how to apply DOWSIL™ 121 Structural Glazing Sealant. For in-depth information on silicone structural glazing and Dow's structural and weatherseal warranty requirements, please refer to the Americas Technical Manual, Form Number 62-1112. Specific advice also is available from your local Dow representative.



Product Description

DOWSIL™ 121 Structural Glazing Sealant is a two-part silicone sealant designed specifically to provide structural adhesion, whether in the field or in the factory. The material is supplied in a two-part 2 x 200 mL (2 x 6.8 fl. oz.) cartridge in which the catalyst is a smooth, white paste and the base is tinted either black or gray. Once catalyzed, the material cures into a medium-modulus, flexible silicone rubber that is suitable for use in structural and weatherseal applications. Static mixers are included in the packaging for use in mixing this material.

DOWSIL™ 121 Structural Glazing Sealant cures in deep section within 24 hours and generally achieves full adhesion within 48 hours. Full cure time depends on joint design, substrate type, temperature and humidity.

Applications

DOWSIL™ 121 Structural Glazing Sealant can be used for most structural glazing applications. This includes, but is not limited to, factory (shop) glazing, site (field) glazing, panel stiffeners and sloped glazing.

How To Use

Supplies needed

- DOWSIL™ 121 Structural Glazing Sealant with supplied 18-element static mixer
- Solvent
- Clean rags
- Knife (if deglazing is required)
- Dow-approved pneumatic two-part sealant gun¹
- Air compressor and air hose with attachment that fits onto the sealant gun

Substrate preparation

1. Clean all joints and glazing pockets, removing all foreign matter and contaminants, such as grease, oil, dust, water, frost, surface dirt, old sealants or glazing compounds, and protective coatings. Nonporous substrates must be cleaned with a solvent using the two-cloth cleaning method.
2. Prime, if required. Sealant must be applied the same day the surfaces are primed.
3. The spacer may already be in place during the cleaning and priming process, or it may need to be installed after the metal substrate has been cleaned and primed. The glass is typically cleaned before it is put in position. Mask areas adjacent to joints to ensure clean sealant lines.

¹Please note that use of dispensing equipment of a model or a manufacturer not listed in this document will void any Dow product and structural adhesion Limited Warranties. The only exception to this would be if Dow publishes an updated version of this document and/or issues a document indicating the approval of another manufacturer or dispensing equipment model for use with DOWSIL™ 121 Structural Glazing Sealant.

Substrate preparation for reglazing applications

The following procedure assumes that a DOWSIL™ brand structural adhesive was originally used on the project, and that the original recommendations are available to the contractor performing the repairs. If this information is not available, contact your Dow representative, who may need to determine whether DOWSIL™ brand products have been used on the site.

1. Perform a field adhesion test to confirm the adhesion of the existing silicone to the substrates. If excellent adhesion is not observed, contact your Dow representative immediately.
2. Deglaze the area. Depending on the joint design, this may require specially designed tools or piano wire to cut behind the silicone.
3. Cut away the silicone, leaving a thin film (approximately 0.02–0.04"/0.5–1 mm thick) of adhesive on the frame. Do not damage the surface finish of the substrate. Or, completely remove all sealant, being careful not to damage the substrate finish.
4. Clean the residual sealant with solvent using the “two-cloth” cleaning technique described in the Americas Technical Manual, Form Number 62-1112. If fresh sealant will be applied immediately after cutting the cured sealant, cleaning of the residual cured sealant may not be necessary.
5. DOWSIL™ 121 Structural Glazing Sealant will adhere to cured sealant without primer. Primer may be necessary if sealant has been completely removed.
6. The silicone may absorb some solvent. Allow this solvent to evaporate so the existing cured sealant is completely dry before applying additional sealant.
7. Clean the new glass or panel and set in place. Install temporary fasteners. Mask the joint.
8. Fill the joint with a bead of fresh structural sealant. Refer to the “Sealant Joint Installation” section of this manual.
9. After the sealant has fully cured, check that full adhesion has been achieved and then remove the temporary fasteners.

NOTE

In some instances, the structural joint cannot be accessed once the glass has been set. In such instances, the sealant can be applied directly to the frame and the glass set in place, compressing the sealant in the joint. The joint must be filled in excess with sealant, and the glass must be set within 10 minutes or before the sealant begins to skin. Under-filled structural joints are workmanship issues. It is the responsibility of the sealant applicator to ensure proper joint fill. Dow will review and comment on reglazing procedures.



Sealant application procedure

DOWSIL™ 121 Structural Glazing Sealant curing agent and base must be thoroughly mixed using an airless mixing system. DOWSIL™ 121 Structural Glazing Sealant is compatible with existing pneumatic dispensing tools that accommodate 2 x 200 mL cartridges. Dow has successfully tested this product with the following pneumatic dispensing tools. If you would prefer to use another manufacturer, please contact your local Dow representative to ensure you will get proper sealant mix.

- Sultzzer MIXPAC DP 400-100-01
- Cox A400HPMR
- Albion P/N AT400 Standard t
400 mL Cartridge Air Gun
- Newborn VR400

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Twelve 18-element, ½-inch diameter static mixers are included in the packaging with the sealant and are required to mix the material. A new static mixer **MUST** be used for each cartridge to ensure proper mixing of the material. Neither hand-mixing nor mechanical mixing is satisfactory due to the incorporation of air, which will result in altered physical properties.

Step 3



1. Attach the air hose to the compressor and to the end of the pneumatic sealant tool. The air pressure should not exceed 90 psi or the maximum air pressure listed on the gun, whichever is greater.
2. Ensure the dual pistons are to the back of the gun so the cartridge can be inserted. This can be done using the reverse function on the pneumatic dispensing tool.
3. Remove the cap from the top of the cartridge. Remove the plug on the dispensing end of the cartridge by inserting a flat screwdriver or similar tool into the rectangular slot on the plug. Use the tool to bend the plug 90 degrees as if to make it perpendicular to the cartridge. This movement will release the plug.
Alternate method: Hold cartridge perpendicular to a hard surface. Lightly tap the cartridge onto the surface so that the plug pushes into the cartridge about ¼". Pull the plug out from the cartridge.

Step 4



4. Insert the cartridge. The cartridge should snap into the tool so that the ends of the cartridge are aligned with the dual pistons.
5. Once the cartridge is inserted, ensure that the pistons are set to move in the forward direction. Then, press and hold the trigger until material comes out of **BOTH** the curing agent and base cartridges. Once both the curing agent and base are being extruded from the cartridge, wipe off the excess sealant.
6. Attach a new static mixer. The end of the static mixer can be cut using a sharp knife or scissors to make the tip larger or to slant it at an angle. Do not remove any of the mixing elements in the mixer.

Step 5



7. With the static mixer screwed on, depress the trigger until the static mixer is completely full and the sealant can be seen coming out the end of the mixer. This is best done over a waste area. Wipe off the initial material that comes out of the static mixer.
8. To ensure proper mixing of the material, extrude a small amount of material onto the edge of the box or another scrap substrate. Check this material to make sure it cures into a soft rubber within four hours. If not, the sealant was not well-mixed, and the units glazed with this cartridge should be checked for proper sealant cure and adhesion.
9. The material is now ready to use. Install the sealant into the joint according to the "Sealant Joint Installation" section of this manual.

10. Once the cartridge is emptied, reverse the dual plungers. Remove the cartridge and static mixer from the dispensing tool and dispose. The static mixer should not be reused. To use another cartridge of DOWSIL™ 121 Structural Glazing Sealant, repeat steps 3-7.
11. Once you have completed your sealant installation, turn off the air compressor and shut off the air to the gun. Pull the trigger until the air pressure reads zero (0) and then disconnect the air hose from the gun.

Sealant joint installation

Once the joint has been prepped and the sealant cartridges are ready to use, gun the sealant into the sealant joint. It is crucial that the sealant fills the entire joint or cavity and firmly contacts all surfaces intended to receive sealant. If the joint is improperly filled, good adhesion will not be achieved, and sealant performance will be weakened. This is crucial because the effectiveness of the silicone in structural applications is largely dependent on the sealant bite (contact area).

Keyway considerations: It is recommended to always use a flat surface for structural glazing. When additional structural bite is required, it may become necessary to use a keyway as part of the structural bite. In this case, the sealant installation must be carried out as a separate step. To ensure full joint fill and adhesion to a surface that is contributing to structural bite, the keyway must be cleaned and primed (if necessary), and the sealant must be installed and tooled as its own procedure prior to the remainder of the structural sealant being installed.

Sealant should be applied as follows:

1. To ensure an aesthetically pleasing job, use masking tape to keep excess sealant from contacting adjacent areas where it is not intended.
2. Apply the sealant in a continuous operation using an approved pneumatic caulking gun. A positive pressure, adequate to fill the entire joint width, should be used. This can be accomplished by “pushing” the sealant ahead of the application nozzle. Ensure complete fill of the sealant cavity.
3. Tool the sealant with firm pressure before a skin begins to form (typically 10 to 20 minutes). Tooling forces the sealant against the spacer and the joint surfaces. Do not use liquid tooling aids such as water, soap or alcohols. These materials may interfere with sealant cure and adhesion and create aesthetic issues.
4. Remove the masking tape before the sealant skins over (within about 15 minutes of tooling).

Some general rules to follow when using silicone sealant in glazing applications are as follows:

1. Ensure that joint surfaces that have been prepared are not contaminated.
2. In some field glazing applications, the silicone may not be applied the same day the glass is set. Joint preparation (cleaning and priming) must be accomplished immediately prior to applying the silicone.
3. Temporary fasteners or clips must be used to retain the structurally glazed lites or panels until the silicone has fully cured. A two-sided adhesive tape, used as the structural spacer, may be considered sufficient temporary support, provided the tape manufacturer has approved the use of the product for this application.

QUALITY CHECK

The first inch (25.4 mm) of the static mixer closest to the cartridge should have a distinct white area and dark (black or gray) area, approximately dividing the static mixer in half. If you do not see this, you may have skipped step 5.



Sealant cure and application requirements

DOWSIL™ 121 Structural Glazing Sealant cures in deep section within 24 hours and generally achieves full adhesion within 48 hours. However, full cure time depends on joint design, substrate type, temperature and humidity.

In all silicone structural glazing applications, the silicone must be fully cured and adhered before the adhesive is stressed. The exact time can be determined by fabricating several small samples that replicate the joint design of the units. These test specimens, which should be cured along with the curtainwall units, can be cut apart to determine the degree of cure as a function of time. The samples also will be used to check the adhesion of the sealant to the substrates. Full-frame deglazes also are used to determine time to full cure, as well as to test adhesion and joint fill (structural bite). DOWSIL™ 121 Structural Glazing Sealant should not be installed once the air temperature falls below 3°F (-16°C) or the surface temperature of the substrates is above 122°F (50°C).

Quality Assurance

Shelf life and storage conditions

When stored in original, unopened containers in a dry location below 30°C (86°F), DOWSIL™ 121 Structural Glazing Sealant has a shelf life of 12 months from date of manufacture. Refer to product packaging for “Use By” date.

Shop/site adhesion testing

Dow requires that adhesion tests be performed on representative production substrates as a means to verify adhesion of actual production units. Quality control adhesion tests are not a substitute for unit deglazing but only provide an ongoing means to continuously monitor adhesion in a nondestructive manner.



Peel-in-adhesion test procedure

Peel-in-adhesion tests are required as a means to verify sealant adhesion on production materials. Peel-in-adhesion testing should be performed as follows:

1. Clean and prime the surface following the project-specific recommendations.
2. Place a piece of polyethylene sheet or bond breaker tape across the flat test surface.
3. Apply a bead of sealant and tool it to form a strip approximately 7.8" (200 mm) long, 1" (25 mm) wide and 1/8" (3 mm) thick. At least 2" (50 mm) of the sealant should be applied over the polyethylene sheet or bond breaker tape.
4. After cure of the sealant, pull the sealant perpendicular to the substrate until failure. Record the mode of failure of the test sealant.

The sealant should be applied to each representative substrate. Sealant samples should be peeled back at the time increment that the units are to be moved or temporary clips are to be removed. Units may be moved in as little as 24 hours. At the time that curtainwall units may be subjected to stress on the structural silicone – either during transit within the shop or to the job site – the sealant must have achieved 100% cohesive failure to each of the substrates to which adhesion is required. Only after the sealant has achieved 100% cohesive failure can significant stress be applied to the structural joint. Peel-in-adhesion test results should be correlated with results from deglazing of actual production units.

The tests described above must be performed to verify that adhesion of structural silicone is obtained before curtainwall units are transported to a job site and temporary clips are removed from the building. Adhesion time of two-component structural sealants can vary with conditions of lower temperature and humidity, and units that do not have full adhesion can lose adhesion during transportation if adhesion is not verified prior to shipment. Curtainwall units should not be subjected to stress unless the sealant has developed full adhesion. Dow should be consulted for recommendations in determining the appropriate handling of structurally glazed curtainwall units.

Deglazing

Performed on glass or panels and frames that use structural silicone attachment, deglazing is a method of quality inspection used to confirm good adhesion and proper fill of the structural joint. Deglazing on silicone structural glazing projects is an excellent quality control procedure. Deglazing involves completely detaching the panel from the frame and testing the structural silicone sealant for adhesion to both the panel and the frame. To obtain the best inspection, the surface of the panel and/or frame must not be damaged.

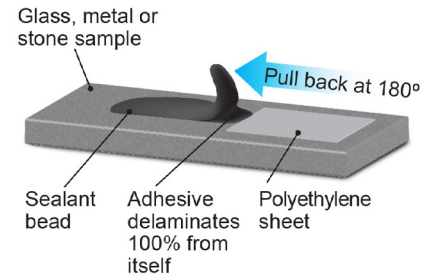
The inspection should include the following (see the Deglaze Inspection Form in the Americas Technical Manual, Form Number 62-1112):

1. Measured size of structural bite (minimum measurement if under-filled)
2. Size of structural glueline
3. Adhesion of silicone sealant with panel and frame
4. Joint type/condition of sealant applied
5. Appearance of the sealant/uniformity of color/bubbles/etc.

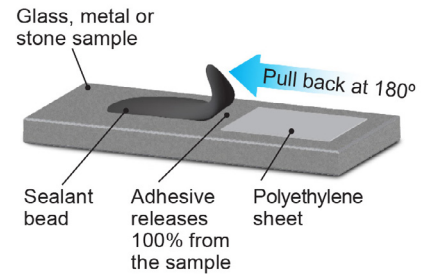
NOTE

When measuring the size of the structural bite during deglazing, if any voids or under-filling occurs, the measured bite may not meet the minimum bite requirements outlined in the Dow project print review letter and Dow Structural Glazing Warranty requirements. The minimum measured bite at any point (on the frame or panel) governs the measured bite reported on the Deglaze Inspection Form – reporting measured average bites is not acceptable. Always follow proper application techniques to ensure complete fill is attained to avoid these issues and the need to reapply the sealant.

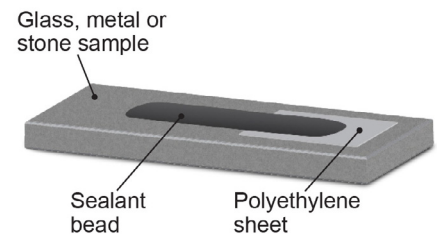
Cohesive Failure



Adhesive Failure



Test Piece



Deglazing Frequency

Deglazing should be performed according to the following schedule:

1. First deglaze – 1 unit out of the first 10 units manufactured (1/10)
2. Second deglaze – 1 unit out of next 40 units manufactured (2/50)
3. Third deglaze – 1 unit out of next 50 units manufactured (3/100)
4. Fourth and subsequent deglazes – 1 unit out of every 100 units manufactured thereafter

In other words, deglazing should occur at a rate of 3% for the first 100 units and at a rate of 1% thereafter. Deglazing frequency can be changed under mutual agreement, on a case-by-case basis. The terms and conditions of warranty are not affected by any mutually agreed-upon change in deglazing frequency. If such agreement is achieved, it must be documented in writing.

Quality control tests not identified above may be required or accepted as alternatives to these tests on a job-specific basis.

For more information

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