

STRUCTURAL SEALANT GLAZING APPRAISAL PROGRAM



165 Wambold Road | Harleysville | PA | 1-800-523-6051

What is Structural Sealant Glazing?

Structural Sealant Glazing or SSG hereafter, is the work result of bonding glass or other materials to curtain wall or other framing members utilizing a high-strength, high-performance silicone sealant specifically designed and tested for SSG. In SSG applications wind, seismic, dead, and live loads are transferred from the glass lite or panel by the structural silicone sealant, to the supporting framing mullions.

Why Structural Glazing?

Since its beginnings in the 1970s, the SSG curtain wall system has experienced continued growth. Compared to conventionally glazed curtain wall systems, SSG offers architects greater design freedom and affords building occupants increased daylight and views; specifically, SSG:

- Increases the thermal efficiency of buildings because the exterior exposure of metal framing is either reduced or eliminated.
- Reduces or eliminates water and air infiltration.
- Reduces the potential for thermal breakage of glass.

What is the purpose of Pecora's SSG Appraisal Program?

Acceptance by the design community and construction industry of this innovative form of glazing has placed significant responsibilities on project participants. Each participant must complete specific tasks in its area of expertise with the highest degree of proficiency in order to ensure a successful structural glazing installation. The SSG Appraisal Program addresses each of these concerns with particular emphasis on the structural silicone

sealant. The sealant manufacturer must keep pace with technical advances to ensure that the best quality structural glazing methods are available in implementing these glazing techniques.

Pecora feels these guidelines are necessary. There is no room in SSG for guess work or "second best". Following the essential practices of SSG as stated in this bulletin will contribute to a sound structurally-glazed curtain wall project. Failure to do so may result in job failures with considerable liability involved for all project participants concerned.

PROJECT PARTICIPANTS

Design Professional

The architect, engineer, and/or building enclosure consultant establish all design parameters including structural design criteria, system performance, glazing unit sizes, and aesthetic effects as well as verify compliance of shop drawings with the requirements of the project's contract documents. Frequently, the specifications require the sealant manufacturer's adhesion and compatibility test reports and SSG detail evaluation be submitted for information prior to the start of glazing.

General Contractor

The general contractor engages subcontractors and performs construction and other services necessary to complete the project in accordance with the contract documents.

Curtain Wall Fabricator/Supplier The curtain wall fabricator or supplier prepares and submits curtain wall shop drawings to the general contractor based on structural and aesthetic criteria set by the design professional. This includes showing a compatible substrate with a consistent metal finish application (e.g.

anodized or factory-coated) of sufficient dimension to allow a properly sized structural silicone sealant bite. It is absolutely vital that all finishes are well adhered to the base metal and provide a substrate to which structural silicone sealants will adhere on a long-term basis.

Glass Fabricator/Supplier

The glass fabricator or supplier furnishes glass lites or panels designed to meet project requirements based on structural and aesthetic criteria and specified optical properties.

Structural Silicone Sealant Supplier/Manufacturer

The structural silicone sealant supplier or manufacturer has responsibility for:

- Recommending the proper structural sealant for the job.
- Reviewing curtain wall shop drawings to verify proper sealant bite and thickness dimensions.
- Verifying structural sealant joint configuration.
- Testing all substrates in contact with or in close proximity to the sealant.
- Recommending proper surface preparation and sealant installation procedures in coordination with the glazier.

The Glazier

For field-glazed projects, the glazier is THE key participant in the glazing process and has responsibility for:

- Conducting preliminary field adhesion tests of the structural silicone sealant to confirm the laboratory evaluations.
- Performing proper surface preparation.

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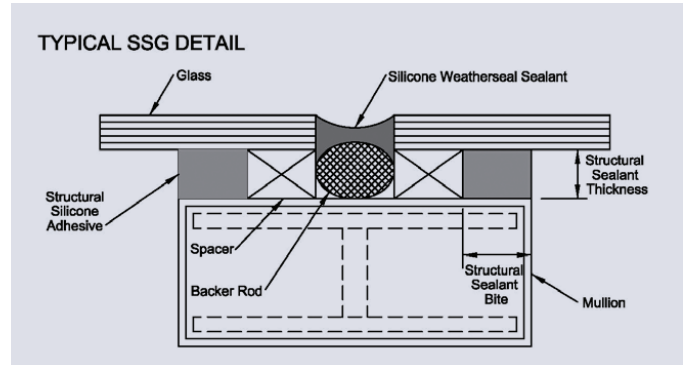


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The Program

As a major participant in the glazing process, Pecora offers this complimentary SSG Appraisal Program which is intended to reduce the risks for all participants. Compliance with the program is a requirement for all projects using Pecora structural silicone sealants.

Figure 1 The drawing above illustrates the most commonly used SSG detail. It applies to both 2- and 4-sided support systems. If insulating glass utilizing a 2-part sealant is used, the weatherseal must be a non-acetoxy silicone sealant. The structural seal is isolated from the insulating glass unit edge by spacers.



- Installing glazing accessories including spacer shims, setting blocks glazing tape, and gaskets.
- Applying the structural silicone sealant.
- Conducting post-application testing of silicone sealant adhesion.

2-Sided vs. 4-Sided SSG

Two-sided structural silicone glazing provides structural support for two opposite sides of a glass lite, usually the vertical sides. Thus only two sides are structurally adhered to the supporting framing. The dead load of the glass unit is supported mechanically while imposed loads are carried on the other two sides by structural silicone sealant as well as by mechanical fastenings.

No distinction should be made between two- and four-sided support when the design of the structural silicone bead is undertaken. The function of the structural sealant is critical in either system. Two-sided systems require the same standard of care in design and application as four-sided systems.

Safety Factor

As applied to structural glazing, "safety factor" is the ratio of a sealant's ultimate tensile strength to the industry standard sealant design strength of 20 psi. Safety factors of 5:1 and 6:1 have proven

adequate since the inception of structural glazing and are the most commonly specified.

Considering the number of variables possible in a SSG system, as well as the potential liability, the higher the safety factor the more tolerant of errors the system becomes.

Basic Guidelines for SSG Details

- Structural silicone sealant thickness must not be less than 1/4 inch (6mm).
- Structural sealant bite must not be less than sealant thickness.
- Structural bite (inches) equals:

$$0.5 \times \text{shortest leg of window (ft)} \times \text{wind load (psf)}$$

$$\frac{\text{Sealant design strength (20psi)} \times (12\text{in}/\text{ft})}{\text{Sealant design strength (20psi)} \times (12\text{in}/\text{ft})}$$
- Always round up when using the above equation. For instance, a 4- by 8-foot glass lite under a wind load of 40 pounds per square foot requires a 0.3333-inch (8.47 mm) bite of silicone sealant. This is then rounded up to 3/8-inch (9 mm). Never round down.
- The SSG joint must be able to be filled using standard caulking practices.
- The SSG joint must not move during the sealant cure.

Shop Drawing Review

Pecora will review project curtain wall shop drawings and SSG details to verify whether properly configured sealant bead is shown. Each request for review must be accompanied by the following data:

- Project name and location.
- Name and address of the design professional, general contractor, and glazier.
- Length, width, and thickness of each glass lite or panel.
- Structural sealant bite and thickness dimensions.
- Design wind load established by the design professional expressed in pounds per square foot (psf).
- Glass type and manufacturer.
- Metal framing type, finish and manufacturer.
- Spacer and setting block types and manufacturer.

Laboratory Testing

Pecora will perform laboratory adhesion and compatibility testing per ASTM C1135 and C1087, respectively, of all substrates that either directly contact or come in close contact with the structural silicone sealant. Samples of each substrate must be submitted in the quantities noted on page 3.

The samples should be from an actual production run for this project.

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Metal Framing

Three pieces minimum, 4" x 6" with finishes and sealant contact surface identified.

Glass

One 12" x 12" piece with manufacturer, glass type, and contact surface identified.

Gaskets, Spacers and Setting Blocks

One piece each mini- mum 12" long with manufacturer and material type identified.

Insulating Glass

One piece with edge sealant intact, or one sample, 12" long of insulating glass edge sealant with manufacturer and type identified.

Note: *If insulating glass is used, it should be a high-quality, dual-seal unit with a silicone secondary seal which has been certified by an approved agency such as the Insulating Glass Certification Council. Compatibility of the structural silicone sealant with the insulating glass edge seal must be verified.*

Compatibility of Materials

Evaluation of sealant compatibility with preformed rubber parts, such as spacers, setting blocks and gaskets, and/or with the materials used in fabrication of these parts is considered a vital step in process. The reason for this is that these parts or materials must not cause a color change in the sealant. Color change indicates a chemical reaction between the performed rubber parts and the structural silicone sealant. This reaction may, in the long run, cause a complete loss of bond between the silicone sealant and the glass and/or metal substrates especially when they are exposed to ultraviolet light.

Our experience shows that some organic rubbers, such as neoprene and EPDM, when exposed to UV, can cause color change and adhesion loss of the sealant,

and therefore they are judged not compatible and should not be used in SSG systems.

Surface Preparation

No sealant will maintain long-term adhesion to any substrate if the surface is not prepared and cleaned properly before the sealant is applied. The use of proper materials, as well as following prescribed surface preparation and cleaning procedures, are essential for good sealant adhesion.

All loose material, such as dirt, dust, frost or other contaminants must be removed from all surfaces to achieve good adhesion of the structural silicone sealant. Nonporous substrates such as glass and aluminum must be thoroughly cleaned.

Pour or squirt solvent onto a cloth. Do not dip the cloth into the container of solvent. Wipe vigorously to remove surface contaminants.

Move the cloth to a wiped area and rewipe until no dirt or oily material is evident on the cloth. Immediately wipe the solvent-cleaned area with a second clean, dry cloth. The solvent must be removed with the dry cloth before it evaporates or the cleaning will be ineffective.

Do not spread the contaminants being removed by the solvent over the face of the area being cleaned. Any residue left may discolor or stain the face of the panels. Clean only as much as can be sealed in one hour. If cleaned areas are again exposed to rain or contaminants, the surface must be cleaned again. Change rags frequently as they can easily become dirty. Use only clean solvent.

Should it become contaminated, change to a fresh supply as cleaning with dirty solvent can result in compromised sealant adhesion. Only after the substrates have been properly cleaned in this manner may primer, if required, or the silicone sealant be applied.

Note: *Solvents usually are flammable and toxic. Follow the solvent manufacturer's label instructions and precautions carefully. Refer to applicable Safety Data Sheets.*

Primers

Various substrates or finishes might require the use of a primer. The type of substrate and/or finish will determine whether and which primer might be necessary in a particular application. Primers, when used properly, enhance sealant adhesion to surfaces to which adhesion may be difficult. In each application, only apply primers to substrates identified by Pecora.

- Mask joint edges to ensure that primer is not misapplied to adjacent surfaces.
- Brush or wipe (depending on primer used) a thin film of primer to the joint surface. Do not puddle primer in glazing pockets.
- Allow primer to dry before applying the sealant. Drying time is dependent upon ambient conditions, but in most cases, waiting time should be no more than 5 to 15 minutes.
- NEVER apply or allow primers to come into contact with glass surfaces.
- Priming is NEVER a substitute for proper cleaning and surface preparation.

Note: *Primers usually are flammable and toxic. Follow the primer manufacturer's label instructions and precautions carefully. Refer to applicable Safety Data Sheets.*

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Sealant Application

- Use pressure-sensitive tape to mask the exterior face of the joint. Start from the top and work downward, overlapping the runs.
- Cover areas below caulking area to catch any excess sealant removed during the tooling operation.
- Use a standard cartridge caulking gun. If using air-powered guns, do not exceed 45 psi.
- Carefully apply the sealant from the bottom of the joint upward making sure that the entire cavity is filled. Air pockets and voids are not acceptable and should be removed with tooling.
- Tool the joint immediately after application before the sealant begins to form a skin. Tooling should be neat while forcing sealant to completely wet the sides of the joint. Dry tool or use a solvent; never tool with soap or detergent solutions.
- If the glass is installed in a vertical position, temporary stops must be used to mechanically fasten the glass to the frame while the sealant is curing.

Quality Control Considerations

Field Testing

As a final check of ultimate sealant adhesion, the following field adhesion test should be conducted by the glazier:

1. Depending on the sealant used, let cure for 14 to 21 days and then conduct a hand peel test.
2. Make a knife cut horizontally from one side of the joint to the other.
3. Make two vertical cuts approximately two inches long at the sides of the joint meeting the horizontal cut at the top of the two-inch cuts.

4. As shown in Figure 2, grasp the two-inch piece of sealant firmly between the fingers and pull down at a 90° angle or more and try to pull the uncut sealant out of the joint.
5. If adhesion is good, sealant should tear cohesively or be difficult to remove adhesively from the substrate.
6. Sealant may be replaced by applying additional sealant in the same manner it was originally installed.

Maintenance Program

All structurally glazed joints should be inspected annually by an experienced agency acceptable to the building owner. During these inspections, special attention should be given to those installations involving SSG insulating glass. Any unit exhibiting evidence of condensation within the sealed air space between the glass lites should be replaced as soon as possible.

Failure to replace such defective units may eventually compromise the structural integrity of the system and possibly cause extensive damage to the structure as well as danger to building occupants and others.

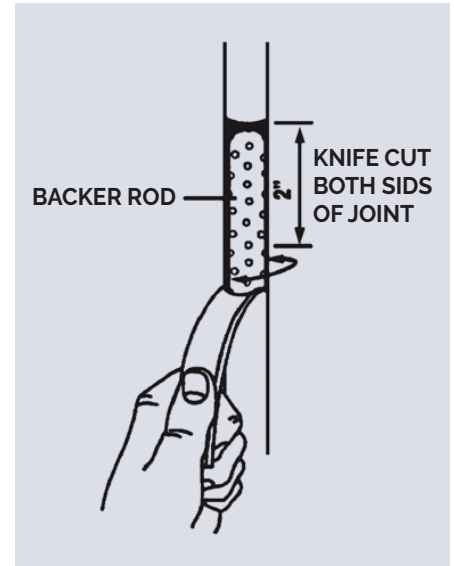


Figure 2 Pull test

FILING SYSTEMS

CSI MasterFormat Designations:

07 92 00 Joint Sealants

08 44 26.13 Structural Sealant
Glazed Assemblies

