GE
Advanced Materials

UltraGlaze* SSG4000
silicone structural glazing adhesive

Product Description

UltraGlaze SSG4000 structural glazing adhesive is a one-component, high-strength neutral cure silicone elastomeric adhesive designed and tested for structurally glazed curtain wall applications. The material is supplied as a paste, which cures into a durable flexible silicone rubber upon exposure to atmospheric moisture.

Typical Performance Properties

- **Silicone durability** - exhibits excellent long term resistance to ultraviolet radiation, high and low temperatures, rain, snow and natural weathering with negligible change in elasticity.
- **Stable consistency (uncured state)** - supplied as a lightweight paste the consistency of which remains relatively unchanged over a wide temperature range. The material will extrude easily from the cartridge or container and remains workable under almost any practical temperature without requiring heating (other sealant types can stiffen upon exposure to cooler conditions and require heating in order to dispense and work the material).
- **Thermal stability (cured state)** - once cured, the material remains flexible over a temperature range of -55°F (-48°C) to 250°F (121°C).
- **Primerless adhesion** - bonds to most conventional substrates and finishes including: glass, glass coatings, ceramic frits, fluropolymer and powder coated paints, conversion-coated and anodized aluminum. Some finishes may require a primer.
- **Low sag or slump** - which may be used for application to horizontal, vertical or overhead surfaces.
- **High tensile strength** - increases safety factors in SSG designs.
- **High tear strength** - useful in Protective Glazing applications.
- **Extended work life** to allow the user sufficient time for tooling and placement.
- **Compatible** with these GE Advanced Materials - Silicones insulating glass products: IGS3703, IGS3713-D1, IGS3729, IGS3723, IGS3733.
- **Compatible** with these GE Advanced Materials - Silicones weather-proofing sealants: SCS2000, SCS2700, SCS9000, SCS2800 series.
- **Compatible** with these GE Advanced Materials - Silicones SSG products: SSG4000AC structural glazing adhesive and SSG4800J, SCS2000, SSG4400 series.
- Non-corrosive cure byproduct with low odor.

GE - Advanced Materials, Silicones provides versatile materials as the starting point for our creative approach to ideas that help enable new developments across hundreds of industrial and consumer applications. We are helping customers solve product, process, and performance problems; our silanes, fluids, elastomers, sealants, resins, adhesives, urethane additives, and other specialty products are delivering innovation in everything from car engines to biomedical devices. From helping to develop safer tires and keeping electronics cooler, to improving the feel of lipstick and ensuring the reliability of adhesives, our technologies and enabling solutions are at the frontline of innovation.

GE imagination at work

Basic Uses

- UltraGlaze SSG4000 structural glazing adhesive may be an excellent material of choice for use in structural glazing applications such as factory glazing of unitized curtainwall systems or in field constructed stick curtainwall systems.
- UltraGlaze SSG4000 can also be used as a weatherseal product, when movement expected in the joint does not exceed its movement capability (±25%).
- UltraGlaze SSG4000 structural glazing adhesive has been validated in designs as an appropriate candidate for consideration for use in *protective glazing* applications.
- UltraGlaze SSG4000 structural glazing adhesive is useful in panel stiffener applications.

Packaging

UltraGlaze SSG4000 structural glazing adhesive is available in 10.1 fl. oz. (299 ml) plastic caulking cartridges, 20 fl.oz. (591 ml) foil sausage packs, 5-gallon plastic pails (5 gals, / 18.9 L) and 55-gallon drums (42 gals. / 158.9 L).

Colors

UltraGlaze SSG4000 structural glazing adhesive is available in black.

Limitations

UltraGlaze SSG4000 structural glazing adhesive should not be used, applied or is not recommended:

- In structural glazing applications unless GE Advanced Materials - Silicones has reviewed shop drawings for applicability and has performed adhesion and compatibility tests on project substrates, spacer materials and all accompanying accessories. Review and testing is done on a project-by-project basis. No blanket approval is given by GE Advanced Materials - Silicones for structural glazing applications. Structural glazing industry guidelines (ASTM C1401) suggest that drawings and details are to be reviewed by all parties involved in the manufacture of an SSG system and for each building project.
- For structural adhesion on bare metals or surfaces subject to corrosion (*i.e.,* mill aluminum, bare steel, etc.)
- In designs where the silicone is encapsulated and without access to atmospheric moisture (this material requires atmospheric moisture to cure from paste to rubber).
- In exceedingly large structural cavities (see Sealant Application section for additional information).
- Under exceedingly hot or cold conditions (see Sealant Application section for additional information).
- Underwater or in applications where the product will be in continuous contact with water.
- For contact with strong acids or bases.
- In food contact applications.

Technical Services

Complete technical information and literature are available from GE Advanced Materials - Silicones. Laboratory facilities and application engineering are available upon request from GE Advanced Materials - Silicones.

Specifications

Typical product data values should not be used as specifications. Assistance with specifications is available by contacting GE Advanced Materials - Silicones at 1-800-255-8886.

Applicable Standards

UltraGlaze SSG4000 structural glazing adhesive meets or exceeds the requirements of the following specifications for one-part sealants.

U.S. Federal Specifications:
- TT-S-001543A (COM-NBS)
- TT-S-00230C (COM-NBS)

ASTM Specifications:
- C1184, Type S, Use G and O
- C920; Type S, Grade NS, Class 25, Use NT, A, G, O

Canadian Specification:
- CAN/CGSB-19.13-M87

Joint Designs and Dimensions

Silicone contact width and thickness (see Figure 1) will vary by project with the design wind load and glass size. Contact width can be calculated using the following formula: [Design Wind Load (PSF) x Longest Short Span of Glass or Panel (Ft.)] divided by 480. A minimum sealant thickness of $^1/_4$" (7mm) between substrates is required to accommodate thermal expansion and contraction (see Figure 2) of most systems and should be used in order to assure that sealant can be injected into the structural cavity obtaining full contact with both the glass and metal surfaces while remaining free of air voids. Greater joint thickness may be required to accommodate movement in some larger-sized SSG systems. GE Advanced Materials - Silicones can be contacted to assist in determination of proper joint thickness to accommodate expected movement in structurally glazed applications.

The following materials are required to be submitted to GE Advanced Materials - Silicones to receive suggestions for the use of UltraGlaze SSG4000 structural glazing adhesive.
- Architectural and shop drawings for review and comment.
- Design wind load requirement(s) for project.
- Glass or panel sizes.
- Production samples of metal, glass, gaskets, spacers and setting blocks with type and manufacturer identified.
- Specification and/or identification of paint or finish to which UltraGlaze SSG4000 structural glazing adhesive is intended to adhere (*i.e.,* 215-R1 anodized or if paint; manufacturer, finish system and ID#).

GE Advanced Materials - Silicones will provide the following, after reviewing the materials above:
- Determination as to whether the submitted joint dimensions meet the minimum design criteria necessary for the use of UltraGlaze SSG4000 structural glazing adhesive.
- Short-term adhesion data using (typically) the ASTM C794 and/or ASTM C1135 test method. Other test methods may be employed.
- Short-term compatibility test results on gaskets, spacers and setting blocks and other accessories per ASTM C1087 or GE Advanced Materials - Silicones test method for compatibility.
- Information regarding suggested primers, when required.

Figure 1:

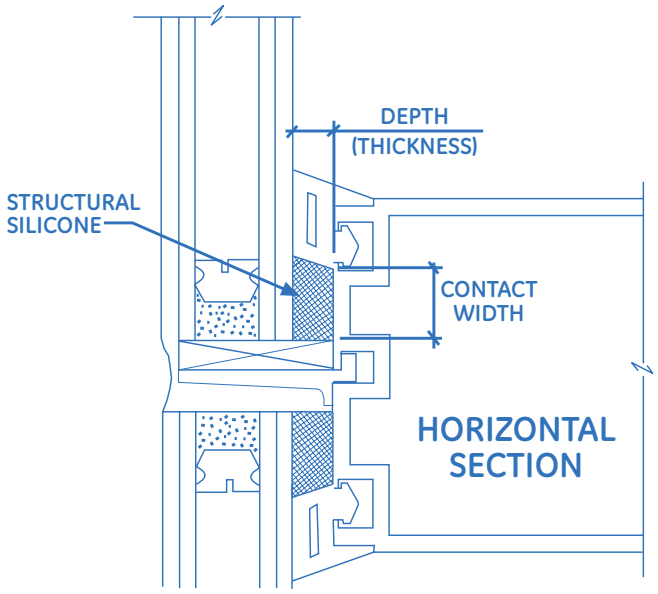
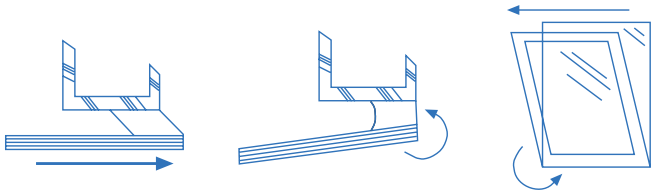


Figure 2: Movement from thermal expansion and contraction and/or glass rotation.



Joint Designs and Dimensions (continued)

GE Advanced Materials - Silicones will not:

- Design sealant joints.
- Provide comments on the structural integrity of overall framing system(s).
- Provide long-term performance data.

The design professional has final responsibility for the determination of structural sealant joint dimensions based on project conditions, design wind load(s), glass or panel sizes, anticipated thermal, seismic or other movement of the system.

The ASTM C1401 Standard Guide for Structural Sealant Glazing provides a thorough overview of design topics and information for use in SSG systems.

Typical Properties – Uncured

Property	Value	Test Method
Color	Black	
Polymer	100% Silicone	
Consistency	Paste	
Specific Gravity	1.52	
VOC	31 g/l	
Work Life (tooling time)	20-30 minutes	
Tack Free Time	5-7 hours	ASTM C679
Application Rate	2 seconds	ASTM C603
Sag/Slump	0.1" max.	ASTM D2202

Typical Properties – Cured

Property	Value	Test Method
Hardness, Durometer (Type A Indentor)	39	ASTM D2240
Ultimate Tensile Strength	342 psi (2.36 MPa)	ASTM D412
Ultimate Elongation	451%	ASTM D412
Tensile at 25% Elongation	64.3 psi (0.44 MPa)	ASTM C1184
Tensile at 50% Elongation	102.7 psi (0.71 MPa)	ASTM C1184
Ultimate Tensile Strength	160.2 psi (1.10 MPa)	ASTM C1135
Ultimate Elongation	179%	ASTM C1135
Tear Strength; die B	79.3 ppi	ASTM D624
Shear Strength (@ 1/4" thickness)	175.1 psi (1.21 MPa)	ASTM C961
Peel Strength (average); aluminum, glass (21-day cure @ 75°F (21°C) 50% RH)	39.6 pli	ASTM C794
Joint Movement Capability	±25%	ASTM C719
Service Temperature Range (after cure)	-55°F to +250°F	
Weathering and U.V. Resistance	Excellent	GE 20 yr. study
Cure Time (1/4" or 6 mm deep section) @ 75°F (24°C) 50% RH	2-3 days	
Full Cure (most common bead sizes)	10-14 days	

Installation

Surface Preparation

Sealants may not adhere or maintain long-term adhesion to substrates if the surface is not prepared and cleaned properly before sealant application. Using proper materials and following prescribed surface preparation and cleaning procedures is vital for sealant adhesion. GE Advanced Materials - Silicones can provide quality control information and suggestions to user upon request.

Materials

- Use clean, fresh solvent as recommended by the sealant manufacturer's test report. When handling solvents, refer to manufacturer's MSDS for information on handling, safety and personal protective equipment. Isopropyl Alcohol (IPA) is commonly used and has proven useful for most substrates encountered in SSG systems. Xylene and Toluene have also been found useful on many substrates.
- Use clean, white cloths free of lint or other lint-free wiping materials.
- Use a clean, narrow-blade putty knife when tooling structural silicone into the cavity.
- Use primer when required.

Cleaning Procedures

- Remove all loose material (such as dirt and dust), plus any oil, frost or other contaminants from the substrates to which the structural silicone will be adhered.
- Do not use detergent to clean the substrate as residue may be left on the surface.
- Clean the substrates receiving the sealant as follows: Using a two-rag wipe technique. Wet one rag with solvent and wipe the surface with it, then use the second rag to wipe the wet solvent from the surface BEFORE it evaporates. Allowing solvent to dry on the surface without wiping with a second cloth can negate the entire cleaning procedure because the contaminants may be re-deposited as the solvent dries.
- Change the cleaning rags frequently, as they become soiled. It is easier to see the soiling if white rags are used. Do not dip used wipe cloths into solvent as this can contaminate the solvent. Cleaning with contaminated solvent can result in sealant adhesion issues. Always use clean containers for solvent use and for solvent storage.
- When cleaning deep, narrow joints, wrap the cleaning cloth around a clean, narrow-blade putty knife. This permits force to be applied to the cleaned surface.
- Clean only as much area as can be sealed in one hour. If cleaned areas are again exposed to rain or contaminants, the surface must be cleaned again.

Primers

UltraGlaze SSG4000 structural glazing adhesive will bond to many clean surfaces without the aid of a primer. For difficult-to-bond substrates, the use of a primer or special surface preparation should be evaluated. An evaluation should be made for each specific application/substrate to determine quality of bond. When properly used, primers help assure strong and consistent sealant adhesion to surfaces that may be difficult to bond. Most primers are a blend of organic and inorganic chemicals, resins and solvents. NEVER APPLY PRIMER TO GLASS SURFACES. Obtaining the proper materials, as well as following the prescribed procedures, is vital to ensure the successful use of primers. PRIMER APPLICATION IS NOT A SUBSTITUTE FOR SURFACE PREPARATION. Consult GE Advanced Materials - Silicones primer datasheet(s) for specifics and recommendations for use.

CAUTION

Primers may contain solvents. When handling solvents, refer to manufacturer's MSDS for information on handling, safety and personal protective equipment.

Masking

- To simplify clean up of excess sealant, use easy to release, pressure sensitive tape to mask adjacent surfaces before applying the structural silicone sealant.
- Start from the top down and overlap the runs. Tool in direction of over-lap so that masking is not disturbed during tooling.
- Remove masking immediately after application of silicone or as soon as possible or practical.
- Drop cloths can be used to cover any surfaces likely to collect excess sealant removed during tooling operations.

Structural Glazing

Sealant Application

- Apply the sealant by pushing the bead ahead of the nozzle and making sure that the entire cavity is filled. Tooling should be done neatly, forcing the sealant into contact with the sides of the joint, thus helping to eliminate any internal voids and assuring good substrate contact. AIR POCKETS OR VOIDS WITHIN THE STRUCTURAL CAVITY ARE NOT ACCEPTABLE.
- Due to the smooth consistency of UltraGlaze SSG4000 structural glazing adhesive, tooling agents such as water, soap or detergent solutions are not necessary or recommended. Dry tooling is recommended.
- Sealant application is not recommended when the temperature is below 40°F (4°C) or if frost or moisture is present on the surfaces to be sealed.
- UltraGlaze SSG4000 structural glazing adhesive works best when applied to surfaces below 122°F (50°C).
- UltraGlaze SSG4000 structural glazing adhesive should not be applied in totally confined spaces since the sealant requires atmospheric moisture from the air and release of cure by-products to cure properly and develop typical properties. In a typical SSG cavity, cure depths up to 3/4" from an air interface will generally cure satisfactorily and reach maximum properties within several days. Cure depths > 3/4" may take significantly longer time to cure and when applied in a single application may not cure satisfactorily. Please consult GE Advanced Materials - Silicones technical services for additional information on depth of cure for this product.
- The cure rate of this product is dependent upon temperature and the availability of atmospheric moisture. Under Standard Conditions (relative humidity of 50 ±5% at an air temperature of 73.4 ±2°F [23 of ±1°C]) this material can attain a cured thickness of 2-3 mm per 24 hours (assuming ample access to atmospheric moisture). As temperature decreases, the cure rate slows down (and vice versa). Low moisture environments will also reduce the cure rate. Near-confined spaces which limit the overall access to atmospheric moisture will cure only from that surface which has access to the atmosphere. Colder temperatures can significantly increase cure times and can open the possibility of sealant irregularities if joint movement occurs while sealant is not fully cured. The following reference provides additional information on Movement-During-Cure of sealant joints: ASTM C1193 – Standard Guide for Use of Joint Sealants; section 12.5.

Method of Application

UltraGlaze SSG4000 structural glazing adhesive can be dispensed directly from cartridges and foil sausage packs or by using a bulk caulking gun in conjunction with a follower plate and 5 gallon pails. The sealant may also be dispensed from 55-gallon drums and 5-gallon pails with pumping equipment. Consult GE Advanced Materials - Silicones regarding suggested pumping equipment and information.

HANDLING AND SAFETY

Material Safety Data Sheets are available @ www.GESilicones.com or, upon request, from a GE Advanced Materials - Silicones representative. Similar information for solvents and other chemicals used with GE Advanced Materials - Silicones products may be obtained from your suppliers.

Storage Conditions and Warranty Period

The warranty period is 12 months from date of shipment from GE Advanced Materials - Silicones if stored in the original unopened container at 80°F (27°C) or lower. All users of this material are recommended to obtain and retain any invoices or other documentation relating to delivery and to manage their inventory on a FIFO (FIRST IN / FIRST OUT) basis.

Availability

Information on ordering can be obtained from GE Advanced Materials - Silicones, Waterford, NY; the GE Advanced Materials - Silicones' sales office nearest to you, or an authorized GE Advanced Materials - Silicones' product distributor.
For information regarding cost, contact your local distributor or GE Advanced Materials - Silicones Territory Manager.
Our Customer Service number is: 877-943-7325.

Government Requirement

Prior to considering use of a GE Advanced Materials - Silicones product in fulfilling any government requirement, please contact the Government and Trade Compliance office at: 413-448-4624.

Patent Status

Nothing contained herein shall be construed to imply the non-existence of any relevant patents or to constitute the permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

Product Safety

Customers considering the use of any of GE - Silicones products should consult the latest Material Safety Data Sheets and labels for product safety information. Customers must evaluate GE - Silicones products and make their own determination as to fitness of use in their particular applications. For Material Safety Data Sheets contact the GE - Silicones sales office nearest you. Customers must ensure that all applicable federal, state, and local requirements have been met before handling any of the products mentioned in the text.

Emergency Service

GE - Silicones maintains an around-the-clock emergency service for its products. The American Chemistry Council (CHEMTREC), Transport Canada (CANUTEC), and the Chemical Emergency Agency Service also maintain an around-the-clock emergency service for all chemical products:

Location	GE - Silicones Products	All Chemical Products
Mainland U.S., Puerto Rico	800.809 9998	CHEMTREC: 800.424.9300
Alaska, Hawaii	304.926.8418 (collect)	CHEMTREC: 800.424.9300
Canada	304.926.8418 (collect)	CANUTEC: 613.996.6666 (collect) or CHEMTREC: 800.424.9300
Europe, Middle East, Africa	+32.(0)14.58.45.45 (Belgium)	CHEMTREC: +1-703.527.3887 (collect)
Latin America, Asia/Pacific, all other locations worldwide	+304.926.8418 (collect)	CHEMTREC: +1-703.527.3887 (collect)
At sea	Radio U.S. Coast Guard, which can directly contact GE - Silicones at 800.809.9998 or CHEMTREC at 800.424.9300.	

DO NOT WAIT. Phone if in doubt. You will be referred to a specialist for advice.

Principal Locations

Regional Information	Phone	Fax
North America World Headquarters 187 Danbury Road Wilton, CT 06897, USA	800.295.2392	607.754.7517
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Europe, Middle East, Africa and India GE Bayer Silicones GmbH & Co. KG Leverkusen Germany	00.800.4321.1000	
Pacific GE Toshiba Silicones 6-2-31 Roppongi Minato-ku Tokyo 106-8550 Japan	+81.3.3479.5361	+81.3.3479.5391

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UA, Silanes, Resins, and Specialties 800.334.4674	304.746.1623
RTV Products-Elastomers 800.332.3390	304.746.1623
Sealants and Adhesives and Construction 877.943.7325	304.746.1654

Canada Toronto, Canada	Within Canada Outside Canada	800.668.4644 905.858.5187	905.858.6687
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