

SSG4400 UltraGlaze*

silicone structural glazing adhesive

Product Description

GE SSG4400 UltraGlaze* is a high-modulus neutral curing structural silicone elastomeric adhesive for use in shop, factory and field glazing of curtainwall panels. SSG4400 is a two-component product (part A + part B) that upon mixing, yields rapid and thorough deep-section cure, fast durometer and strength build and quick curing to high strength durable silicone rubber.

Typical Performance Properties

Performance

- Silicone durability – cured silicone rubber exhibits excellent long term resistance to natural weathering including: extreme temperatures, ultraviolet radiation, rain and snow, with negligible change in elasticity.
- Primerless adhesion – attains strong bonds to many conventional substrates and finishes without the need of a primer. Primer may be used on some finishes to speed up adhesion time.
- Low pumping viscosity – provides for longer pump life and reduced maintenance on equipment.
- Fast durometer & strength build – enhances early stability of assembled unit.

Application

- Adjustable work life – variable ratio of parts A+B to accommodate assembly and application under varying conditions.
- Catalyst options – increased cure speed and strength to accommodate faster project schedules and unit tip time.
- High application rate – faster and more thorough joint filling capability with easier tooling effort.

Aesthetics

- Catalyst options – non-flammable catalyst available in black or grey and fast or standard cure speed.
- Materials – compatible with many types of coated glass, metal finishes, glazing gaskets, setting blocks and spacers.

Product Compatibility

- SSG4400 is compatible with: GE Insulating Glass, Structural and Weathersealing silicones.

GE is a registered trademark of General Electric Company and is under license by Momentive Performance Materials Inc. Momentive Performance Materials provides versatile materials as the starting point for its 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 helping to ensure the reliability of adhesives, our technologies and enabling solutions are at the frontline of innovation.



SSG4400 UltraGlaze* silicone structural glazing adhesive

Basic Uses

- SSG4400 is suitable for use in structural glazing applications such as factory or field glazing of curtainwall units and modules for unitized and panelized systems.
- SSG4400 is suitable for use as a weatherseal product, when movement expected in the joint does not exceed its movement capability ($\pm 12.5\%$).

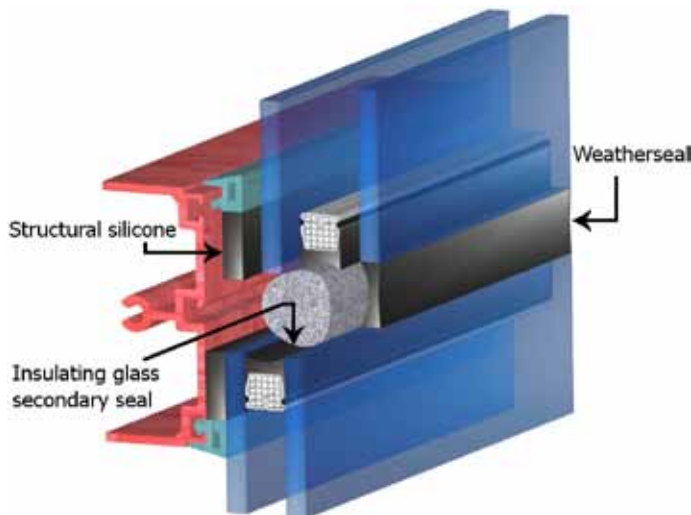
Packaging

Base: SSG4400A base, white paste in 55 gallon drum with a polyethylene liner.

Catalyst: There are three catalyst options for use with SSG4400A base and are supplied in a 5 gallon pail.

- **SSG4400B** catalyst, black paste when mixed with SSG4400A cures to black silicone rubber
- **SSG4713B** catalyst, black paste when mixed with SSG4400A cures to black silicone rubber, fast cure speed
- **SSG4710B** catalyst, black paste when mixed with SSG4400A cures to grey silicone rubber, fast cure speed

Cartridges: SSG4400 is available in 12.8 oz. (380 ml) coaxial cartridges for factory and field repairs. Cartridges are packaged 15 to a case.



Typical SSG configuration

Colors

SSG4400 UltraGlaze is available in black and grey.

- Black: SSG4400A + SSG4400B or SSG4713B
- Grey: SSG4400A + SSG4710B

Limitations

- 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. SSG4400 should be used in structural glazing applications only after Momentive Performance Materials (MPM) has reviewed detailed design drawings and has performed adhesion and compatibility tests on project substrates and relevant spacer materials.
- MPM's policy is to test on a project-by-project basis each substrate and component used in a structural glazing assembly for adhesion and compatibility to assess performance. No blanket approvals will be issued relative to adhesion or compatibility of SSG4400 with such components.
- Not recommended for water immersion applications.

Technical Services

Additional technical information and literature may be available from MPM. Laboratory facilities and application engineering are available upon request from MPM.

Applicable Standards

SSG4400 meets or exceeds the requirements of the following specifications for two-component sealants.

ASTM Specifications:

- C1184, Type M, Use G and O (finished aluminium)
- C920, Type M, Grade NS, Class 12.5, Use G and A

China Specification:

- GB16776-2005

European Specification:

- Meets ETAG002 requirements
- EOTA approved; ETA-10/370
- Carries CE marking



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:

- CW** – Contact Width (inches or millimeters)
- DWL** – Design Wind Load (pressure in PSF or kPa)
- LSS** – Longest Short Span (largest piece of glass; shorter side)

SDS – Sealant Design Stress:

Dynamic (wind) loading: ≤20 psi (138 kPa)
 Permanent (dead) loading: ≤1 psi (7 kPa)

$$CW = \frac{DWL \text{ (PSF)} \times LSS \text{ (Ft)}}{SDS \times 24}$$

$$CW = \frac{DWL \text{ (kPa)} \times LSS \text{ (mm)}}{SDS \times 2}$$

Alternate calculational methods may also be employed to derive the contact width. In all cases, a minimum safety factor of five (5) is to be used in conjunction with the sealant's ultimate tensile strength suitable in the proposed conditions of applicability. Contact Momentive Technical Services team for review of proposed designs.

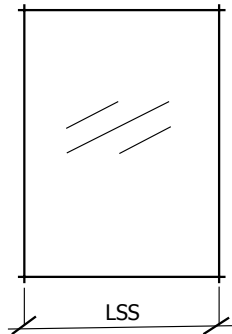
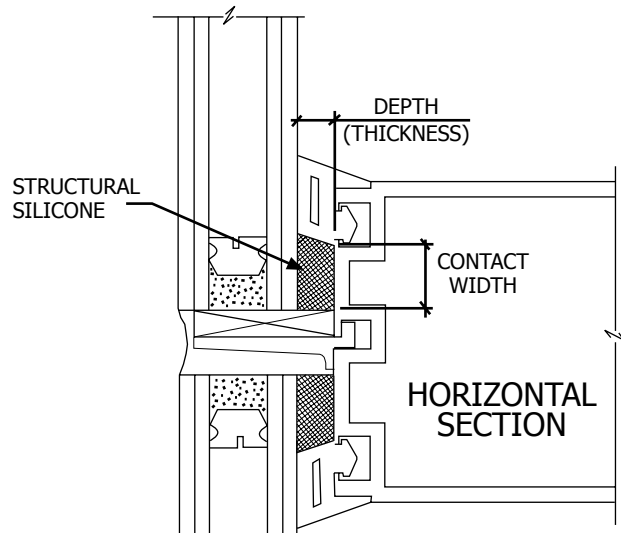
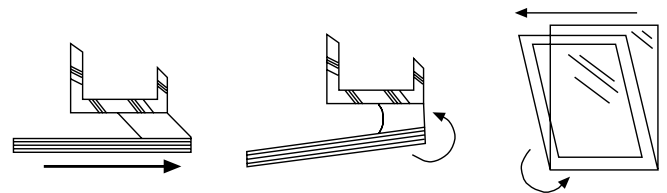


Figure 1:



A minimum sealant thickness of 1/4" (6.4mm) between substrates is required to accommodate thermal expansion and contraction (see Figure 2) of most systems and also to ensure that sealant can be injected into the structural cavity obtaining full contact with both the glass and metal surfaces while remaining free of voids. Greater joint thickness may be required to accommodate movement in some larger-sized SSG systems. MPM Technical Services can be contacted to assist in determination of proper joint thickness to accommodate expected movement, in structurally glazed applications.

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



Pre-Construction Project Requirements

Required materials for submission:

- Curtainwall shop drawings for review and comment
- Completed MPM *SSG Project Submittal Form*
- 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 SSG4400 is intended to adhere (i.e., 215-R1 anodized or if paint, or powder coat; manufacturer, finish system and ID#)

Recommendations & information provided after review:

- Determination as to whether the submitted joint dimensions meet the minimum design criteria necessary for the use of SSG4400.
- Short-term adhesion data using (typically) ASTM C794, C1635, ISO 8340, ISO 8339, ISO 10591 and/or ASTM C1135 test method. Other test methods may be requested for a nominal charge.
- Information regarding suggested primers, when required.
- Short-term compatibility test results on gaskets, spacers and setting blocks and other accessories per ASTM C1087 or MPM internal test method for compatibility.

Momentive Performance Materials will not:

- Provide comments on the structural integrity of overall framing system(s).

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

Industry References

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

ETAG 002 guideline for European Technical Approval for structural sealant glazing kits provides an overview of the requirements of materials appropriate for this application.

China's national standard offers curtainwall design guidance related to SSG. Ref. GB JC/102-2003.

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STANDARD CURE SPEED GRADES

SSG4400A+SSG4400B

→ Black

Typical Properties

Uncured Properties	Base	SSG4400A
Color	White	Thixotropic Paste
Specific Gravity	1.42	Trend average
Shelf Life	18 months ⁽¹⁾	When stored accordingly
Uncured Properties	Catalyst	SSG4400B
Color	Black	Thixotropic Paste
Specific Gravity	1.03	Trend average
Shelf Life	12 months ⁽¹⁾	When stored accordingly

Mixed Compound Properties

SSG4400A+SSG4400B

@ 12:1 mix ratio, ambient conditions

Color	Black	Thixotropic Paste
Specific Gravity	1.37	
Ratio Range	9:1 to 14:1	By weight
Tooling Time	15+ minutes	Depends on ratio, temp & RH
Snap Time	15-75 minutes	Depends on ratio, temp & RH
Consistency/Sag	0.1" (2.5 mm)	Non-sagging
VOC Content	27 g/l	

Cured Properties⁽³⁾

21 days @ 70°F (21°C) 50% R.H.

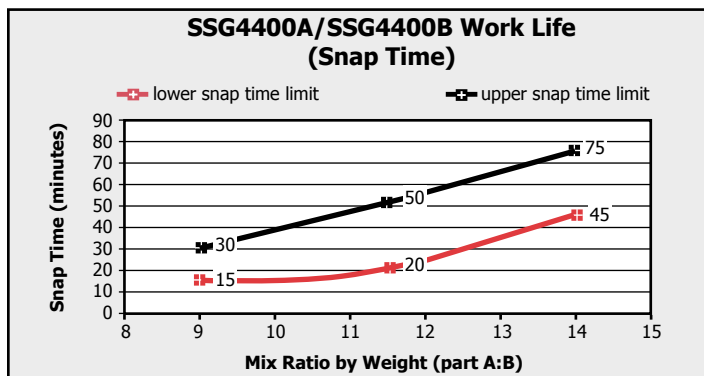
SSG4400A+SSG4400B @ 12:1 mix ratio

Color	Black	
Hardness (A indentor)	35-40	ASTM D2240
Tensile Strength	146 psi (1.00 MPa)	ASTM C1135 ⁽²⁾
Ult. Elongation	102%	ASTM C1135 ⁽²⁾
Tear Strength	39 ppi (die B)	ASTM D624
Shear Strength	153 psi (1.06 MPa)	ASTM C961
Heat Resistance	300°F (149°C)	
Movement Capability	±12.5%	ASTM C719

(1) When properly stored; see section on storage.

(2) t = 0.25 in. (6.4 mm)

(3) Typical value, actual value may vary.



Graph is relevant to ambient conditions; see also section on Curing.

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FAST CURE SPEED GRADES

SSG4400A+SSG4710B

→ Grey

SSG4400A+SSG4713B

→ Black

Typical Properties

Uncured Properties	Catalyst	SSG4710B
Color	Black	Thixotropic Paste
Specific Gravity	1.04	Trend average
Shelf Life	12 months ⁽¹⁾	When stored accordingly
Uncured Properties	Catalyst	SSG4713B
Color	Black	Thixotropic Paste
Specific Gravity	1.10	Trend average
Shelf Life	12 months ⁽¹⁾	When stored accordingly

Mixed Compound Properties

SSG4400A+SSG4713B or SSG4710B

@ 12:1 mix ratio, ambient conditions

Color	Black or Grey	Thixotropic Paste
Specific Gravity	1.38	
Ratio Range	9:1 to 14:1	By weight
Tooling Time	10+ minutes	Depends on ratio, temp & RH
Snap Time	10-45 minutes	Depends on ratio, temp & RH
Consistency/Sag	0.1" (2.5 mm)	Non-sagging
VOC Content	20 (26) g/l	SSG4713B (SSG4710B)

Cured Properties⁽³⁾

21 days @ 70°F (21°C) 50% R.H.

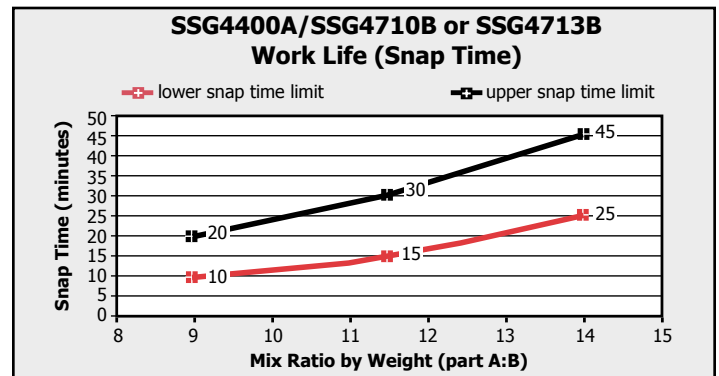
SSG4400A+SSG47XXB @ 12:1 mix ratio

Color	Black or Grey	
Hardness (A indentor)	35-40	ASTM D2240
Tensile Strength	169 psi (1.16 MPa)	ASTM C1135 ⁽²⁾
Ult. Elongation	122%	ASTM C1135 ⁽²⁾
Tear Strength	37 ppi (die B)	ASTM D624
Shear Strength	126 psi	ASTM C961
Heat Resistance	300°F (149°C)	
Movement Capability	±12.5%	ASTM C719

(1) When properly stored; see section on storage.

(2) t = 0.25 in. (6.4 mm)

(3) Typical value, actual value may vary.



Graph is relevant to ambient conditions; see also section on Curing.

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SSG4400A/SSG4713B Weight to Volume Ratio Correlation

9:1 by weight	(7.0:1 by volume)
10:1 by weight	(7.7:1 by volume)
11:1 by weight	(8.5:1 by volume)
12:1 by weight	(9.3:1 by volume)
13:1 by weight	(10.1:1 by volume)
14:1 by weight	(10.8:1 by volume)

SSG4400A/SSG4710B Weight to Volume Ratio Correlation

9:1 by weight	(6.6:1 by volume)
10:1 by weight	(7.3:1 by volume)
11:1 by weight	(8.1:1 by volume)
12:1 by weight	(8.8:1 by volume)
13:1 by weight	(9.5:1 by volume)
14:1 by weight	(10.3:1 by volume)

SSG4400A/B Weight to Volume Ratio Correlation

9:1 by weight	(6.5:1 by volume)
10:1 by weight	(7.3:1 by volume)
11:1 by weight	(8.0:1 by volume)
12:1 by weight	(8:7 by volume)
13:1 by weight	(9.4:1 by volume)
14:1 by weight	(10.2:1 by volume)

Installation

Prior to production, a sample of base (part A) and catalyst (part B) should be taken from each lot of material to be used, weighed to the desired A/B ratio, mixed and checked for proper curing before placing material into production.

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. Refer to MPM project-specific adhesion test reports for information. MPM can provide quality control information and suggestions to users upon request.

Materials

- Use clean, fresh solvent as recommended by the MPM project-specific 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, MEK and Toluene have also been found useful on many substrates. Do not use Denatured Alcohol. Denatured Alcohol is not suggested because of the variability of additives, which may or may not provide reproducible results.
- Use only clean 99.9% pure industrial grade solvents. Do not use diluted solvents.
- Use clean, white cloths free of lint or other suitable lint-free wiping materials.
- Use a clean suitable spatula or blade when tooling structural silicone into the cavity.
- Use primer when required (reference MPM project-specific adhesion test report (s)).

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 applied to.
- 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 dirty. It is easier to see dirt 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.
- 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.

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Primers

SSG4400 will bond to many clean surfaces without the aid of a primer. However, for some substrates the use of a primer or special surface preparation should be evaluated and may be necessary to achieve successful adhesion. An evaluation should be made for each specific application/substrate to determine quality of bond. When properly used, primers help to attain strong and consistent sealant adhesion to surfaces that the sealant otherwise doesn't adhere to. Obtaining the proper materials, as well as following the prescribed procedures, is vital to ensure the successful use of primers. Consult primer datasheet(s) for specifics and instructions for use.

- PRIMER APPLICATION IS NOT A SUBSTITUTE FOR PRESCRIBED SURFACE PREPARATION.
- GE SILICONE PRIMERS ARE NOT EFFECTIVE TO CURED SILICONE RUBBER OR TO THE RESIDUE OF SUCH. TAKE NOTE OF THIS WHEN REGLAZING. CONSULT WITH MPM TECHNICAL SERVICES FOR QUESTIONS.

CAUTION

Primers may contain solvents. When handling primers, refer to the respective product SDS for information on handling, safety and personal protective equipment.

Masking

- When desired, the use of masking may simplify cleanup of excess sealant. Use easy-to-release, painter's tape to mask adjacent surfaces before applying the structural silicone sealant. Remove masking immediately after application of silicone or as soon as practical.

Sealant Application

- Apply the sealant by pushing the bead ahead of the nozzle and making sure that the entire cavity is filled. Voids or under filled areas within the structural cavity are considered as defective workmanship and should be avoided. 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.
- The suggested temperature range for sealant application is between 50 and 90°F (10 and 32°C) and is a range conducive for normal processing of this material. However, the mixed product can cure and adhere above and below these extremes and when doing so, additional precautions or tests should be considered to verify that the desired outcome is being achieved.
- SSG4400 should not be applied to hot surfaces as this can result in the formation of defects at the bond interface. Apply to surfaces below <113°F (45°C).
- Sealant application must never proceed if frost or moisture is present on the surfaces to be sealed.
- Due to the smooth consistency of SSG4400, tooling agents such as water, soap or detergent solutions are not necessary or recommended. Dry tooling is recommended.

Mixing, Pumping and Dispensing

- SSG4400 should be mixed and dispensed using suitable two-component mixing equipment, available from several equipment manufacturers. These mixing / pumping systems are specifically designed to meter precise proportions of A base and B catalyst, in an air-free environment, and mix and dispense material at proper pressures and volumes to insure thoroughly mixed air-free material. Reference MPM *SSG Technical Manual & Quality Control Information* document for information regarding suitable equipment types for use with SSG4400.
- Consult mixing equipment manufacturer or system operating manual for startup and shutdown procedures that cover proper operating pressures, mixing devices, and purging requirements.
- Hand mixing of A base + B catalyst is not recommended, except for pre-use testing to confirm cure.
- Kit matching of the A and B components of SSG4400 is not required.
- SSG4400 can be used successfully in both "In-line" mixing systems and on "purgeless" after-the-gun mixing equipment. Consult equipment manufacturer and/or MPM for information on mixing device options.
- When properly mixed, the material should be a solid, homogeneous color (gray when using SSG4710B catalyst, black when using SSG4400B or SSG4713B catalyst) free of any swirling or marbling of colors. If incomplete mixing is noticed, cease use of the material until equipment has been adjusted and confirmed that complete mixing is being attained.

Curing

- When mixing SSG4400A base + SSG4400B catalyst at approximately a 12:1 weight ratio, the material will become tack-free after about 1-2 hours under ambient conditions of @ 70°F (21°C), 50% R.H. Mixing SSG4400A with the faster curing catalysts (SSG4710B & SSG4713B) will halve this range. Under these conditions approximately 70% of strength should develop within 24 hours. Development of full properties requires full liberation of cure by-products and will normally be achieved within 7 days. Full properties will take additional time in colder climates or deeper SSG cavities.
- Work life and cure rate may be adjusted by changing the A base to B catalyst ratio. Ratio must be within recommended range to achieve desired cured material property profile.
- Work life and cure rate can be affected by temperature and humidity levels. Mild heat (*i.e.*, around 113°F/45°C) will shorten the work life of the material, but will not significantly reduce the time required for complete cure. Cooler temperatures and lower humidity (*i.e.*, <50°F/10°C and <30% R.H.) tend to slow the cure and adhesion process.
- The B catalysts are sensitive to prolonged exposure to atmospheric moisture and the storage containers should be kept tightly closed whenever possible to maximize useful life.
- The catalyst may require mixing before placing container in pumping equipment if settling of components has occurred. Contact MPM technical services for additional information.

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Adhesion

Development of maximum bond strength can depend on: substrate finish, joint configuration, primer use, adhesive width, substrate preparation, batch variability and ambient conditions at location of use. Minimum stress should be applied to the adhesive bond for 24 hours. The adhesive strength of the bond should eventually exceed the cohesive strength of the silicone rubber.

Maintenance and Repairs

If repairs are required, the following products are candidates for use: SSG4600, SSG4400, SSG4000, SSG4000AC, SSG4000E, SSG4800J and SCS2000. Reference MPM *SSG Technical Manual & Quality Control Information* document regarding specific requirements for substrate preparation when reglazing.

Availability

Information on ordering can be obtained from Momentive Performance Materials, Waterford, NY, the sales office nearest to you, or an authorized GE sealants product distributor. For information regarding cost, contact your local distributor or territory manager. Our Customer Service number is: +1-877-943-7325.

Patent Status

Nothing contained herein shall be construed to imply the nonexistence 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, Handling and Storage

Keep containers out of direct sunlight for prolonged periods. The stated shelf life is contingent upon storage in their original unopened containers at or below:

- SSG4400A base: 75°F (24°C)
- SSG4400B catalyst: 75°F (24°C)
- SSG4713B catalyst: 75°F (24°C)
- SSG4710B catalyst: 75°F (24°C)

These materials may be shipped at ambient temperature of up to 110°F (43°C) for up to 7 days maximum. Longer term storage of these materials at temperatures above noted temps may serve to reduce the stated shelf life.

Customers considering the use of this product should review the latest Material Safety Data Sheet and label for product safety information, handling instructions, personal protective equipment if necessary, and any special storage conditions required. Material Safety Data Sheets are available at www.ge.com/silicones or, upon request, from any Momentive Performance Material representative. Use of other materials in conjunction with Momentive Performance Materials' sealants products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.

SSG4400 UltraGlaze* silicone structural glazing adhesive

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