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Standard Specification for Structural Silicone Sealants¹

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^{ε1} NOTE—An editorial change was made in 8.6.2.5 in June 2001.

1. Scope

1.1 This specification describes the properties of cold liquid applied, single-component or multicomponent, chemically curing elastomeric structural silicone sealants herein referred to as the sealant. These sealants are intended to structurally adhere components of structural sealant glazing systems.

1.2 Only those properties for which there are industry-agreed-upon minimum acceptable requirements, as determined by available ASTM test methods, are described in this specification. Additional properties are presently being defined and will be added as ASTM test methods for those properties become available.

1.3 The values stated in metric (SI) units are to be regarded as the standard. The values in parentheses are for information only.

1.4 Committee C-24, with jurisdiction over this specification, is aware of only one comparable standard, **ETAG No. 002**.

2. Referenced Documents

2.1 ASTM Standards:

- C 603 Test Method for Extrusion Rate and Application Life of Elastomeric Sealants²
- C 639 Test Method for Rheological (Flow) Properties of Elastomeric Sealants²
- C 661 Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer²
- C 679 Test Method for Tack-Free Time of Elastomeric Sealants²
- C 717 Terminology of Building Seals and Sealants²
- C 792 Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants²
- C 794 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants²
- C 1087 Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems²

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- C 1135 Test Method for Determining Tensile Adhesion Properties of Structural Sealants²
 - C 1193 Guide for Use of Joint Sealants²
 - C 1401 Guide for Structural Sealant Glazing²
 - G 53 Practice for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials³
 - G 151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices That Use Laboratory Light Sources³
 - G 154 Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials³
 - G 155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials³
- 2.2 *European Organization for Technical Approvals Document:*
- ETAG No. 002 Guideline for European Technical Approval for Structural Sealant Glazing Systems

3. Terminology

3.1 *Definitions*—Refer to Terminology C 717 for definitions of the following terms used in this specification: adhesive failure, chemically curing sealant, cohesive failure, compatibility, cure, elastomeric, glazing, hardness, non-sag sealant, primer, sealant, shelf life, silicone sealant, structural sealant, substrate, and tooling.

4. Significance and Use

4.1 Not all sealants meeting this specification should be presumed to be suitable for all applications and all substrates. This specification assists in selecting sealants that meet certain minimum standards of performance.

4.2 Although this specification qualifies a sealant for use, it does not address the adhesion capability of the sealant for a specific substrate nor the compatibility of the sealant with the materials it contacts. Adhesion and compatibility characteristics required for specific substrates or finishes can be determined by Test Method C 794 for adhesion and Test Method C 1087 for compatibility.

¹ This specification is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.10 on Specifications, Guides and Practices.

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² *Annual Book of ASTM Standards*, Vol 04.07.

³ *Annual Book of ASTM Standards*, Vol 14.04.

4.3 To properly specify a sealant for the intended use when using this specification, it is essential that the applicable type and use be included.

5. Classification of Sealants

5.1 A sealant qualifying under this specification shall be classified as to type and use as given in 4.1.1-4.1.4.

- 5.1.1 *Type S*—Single-component sealant.
- 5.1.2 *Type M*—Multicomponent sealant.
- 5.1.3 *Use G*—A sealant that meets the requirements of this specification when tested on a clear, uncoated float glass substrate.

5.1.4 *Use O*—A sealant that meets the requirements of this specification when tested on a substrate other than a clear, uncoated float glass substrate (for example, Use O—Granite).

6. Materials and Manufacture

6.1 Furnish single-component sealants as a homogeneous mixture of a consistency suitable for application and within the manufacturer’s stated shelf life. Apply the sealant in accordance with the written recommendations of the sealant manufacturer. The cured sealant shall be an elastomeric solid.

6.2 Furnish multicomponent sealants in two or more components. Mix and apply the sealant in accordance with the written recommendations of the sealant manufacturer. The cured sealant shall be an elastomeric solid.

6.3 Furnish primer of the type required by, and apply in accordance with, the written recommendations of the sealant manufacturer.

7. Requirements

7.1 The physical, mechanical, and performance properties of the sealant shall conform to the requirements described in Table 1.

7.2 When a primer (see Note 1) is required by the sealant manufacturer, all tests performed in accordance with this specification shall be performed with the primer. When a primer is not required by the sealant manufacturer, all tests performed in accordance with this specification shall be performed without a primer.

TABLE 1 Requirements for Physical, Mechanical and Performance Qualities of the Sealant

Property	Requirement	Test Method
Rheologic, max		C 639
Vertical	4.8 mm (3/16 in.)	
Horizontal	no deformation	
Extrudability, max	10 s	C 603
Hardness, Shore A	20-60	C 661
Heat aging		
Weight loss, max	10 %	
Cracking	none	
Chalking	none	
Tack-free time, max	no transfer in 3 h	C 679
Tensile value, min		C 1135
Standard conditions:	345 kPa (50 psi)	
88°C (190°F)	345 kPa (50 psi)	
-29°C (-20°F)	345 kPa (50 psi)	
Water immersion	345 kPa (50 psi)	
5000 h weathering	345 kPa (50 psi)	8.6.2.5
Shelf life, min	6 months	9.1

NOTE 1—The proper use of primers is described in Guide C 1401.

7.3 The standard substrate for this specification is clear, uncoated float glass.

7.4 Standard conditions referred to in this specification are a temperature of 23 ± 2°C (73.4 ± 3.6°F) and 50 ± 5 % relative humidity.

8. Test Methods

8.1 *Rheological Properties*—Test Method C 639, using test procedures for Type II and IV sealants.

8.2 *Extrudability*—Test Method C 603.

8.3 *Hardness*—Test Method C 661, using a Type A-2 durometer.

8.4 *Heat Aging*—Test Method C 792, using a temperature of 88 ± 5°C (190 ± 10°F).

8.5 *Tack-Free Time*—Test Method C 679.

8.6 *Tensile Adhesion*—Test Method C 1135, using a rate of pull of 12.7 mm (1/2 in.)/min. Determine the average ultimate tensile value for each group of five specimens prepared as described in 8.6.1 and 8.6.2.

8.6.1 Prepare, in accordance with Test Method C 1135, a total of 25 specimens for testing, except that the distance between substrates will be 9.5 mm (3/8 in.).

8.6.2 Cure all specimens for 21 days at standard conditions. Condition and test the specimens as described in 8.6.2.1-8.6.2.5.

8.6.2.1 Test five specimens at standard conditions after the initial curing period.

8.6.2.2 Condition five specimens for 1 h at 88 ± 5°C (190 ± 10°F) in a forced air oven. Test the specimens at 88 ± 5°C (190 ± 10°F).

8.6.2.3 Condition five specimens for 1 h at -29 ± 2°C (-20 ± 4°F). Test the specimens at -29 ± 2°C (-20 ± 4°F).

8.6.2.4 Immerse five specimens in deionized or distilled water at standard temperature for seven days. Test the specimens at standard conditions within 10 min after their removal from the water.

8.6.2.5 Expose five specimens for 5000 h with the bond surface facing the light source and using either of the exposure conditions specified below:

(a) *Fluorescent UV/Condensation Apparatus*—Expose specimens to fluorescent UVA-340 radiation in accordance with Practices G 151 and G 154 using an exposure cycle consisting of 4 h ultraviolet with the uninsulated black panel temperature controlled at 60 ± 3°C (140 ± 5.4°F) followed by 4 h condensation with the uninsulated black panel temperature controlled at 40 ± 3°C (104 ± 5.4°F). The irradiance in apparatus without irradiance control shall be maintained at 0.77 ± 0.21 W/(m²·nm) at 60°C (140°F) and 340 nm. Unless otherwise specified, apparatus with irradiance control shall be maintained at an irradiance level of 0.77 ± 0.08 W/(m²·nm) at the operational control point.

NOTE 2—Previous versions of this standard referenced G 53 which described specific equipment designs for the fluorescent UV/condensation device. Practice G 53 is being replaced by Practice G 151, which describes performance criteria for all exposure devices that use laboratory light sources, and by Practice G 154, which is a performance-based standard for fluorescent UV/condensation devices.