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Standard Specification for Structural Silicone Sealants¹

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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 may 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 C24, with jurisdiction over this specification, is aware of two comparable standards by other organizations: ETAG No. 002 and the Chinese national standard GB16776.

2. Referenced Documents

2.1 ASTM Standards:²

- C603 Test Method for Extrusion Rate and Application Life of Elastomeric Sealants
- C639 Test Method for Rheological (Flow) Properties of Elastomeric Sealants
- C661 Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
- C679 Test Method for Tack-Free Time of Elastomeric Sealants
- C717 Terminology of Building Seals and Sealants
- C792 Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants
- C794 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants

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 For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

- C1087 Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems
- C1135 Test Method for Determining Tensile Adhesion Properties of Structural Sealants
- C1401 Guide for Structural Sealant Glazing
- C1442 Practice for Conducting Tests on Sealants Using Artificial Weathering Apparatus
- G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
- G154 Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
- G155 Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
- 2.2 European Organization for Technical Approvals Document.³
- ETAG No. 002 Guideline for European Technical Approval for Structural Sealant Glazing Systems
- 2.3 Chinese National Standard:⁴
- GB 16776–1997 Structural Silicone Sealants for Building

3. Terminology

3.1 *Definitions*—Refer to Terminology C717 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 C794 for adhesion and Test Method C1087 for compatibility.

³ Available from www.eota.be

⁴ Published May 15, 2005, Implemented August 1, 1997; www.nstn.org

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.

NOTE 1—The proper use of primers is described in Guide **C1401**.

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 $23 \pm 2^\circ\text{C}$ ($73.4 \pm 3.6^\circ\text{F}$) and $50 \pm 5\%$ relative humidity.

8. Test Methods

8.1 *Rheological Properties*—Test Method **C639**, using test procedures for Type II and IV sealants.

8.2 *Extrudability*—Test Method **C603**.

8.3 *Hardness*—Test Method **C661**, using a Type A-2 durometer.

8.4 *Heat Aging*—Test Method **C792**, using a temperature of $88 \pm 5^\circ\text{C}$ ($190 \pm 10^\circ\text{F}$).

8.5 *Tack-Free Time*—Test Method **C679**.

8.6 *Tensile Adhesion*—Test Method **C1135**, using a rate of pull of 12.7 mm ($\frac{1}{2}$ 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 **C1135**, a total of 25 specimens for testing, except that the distance between substrates will be 9.5 mm ($\frac{3}{8}$ 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 $88 \pm 5^\circ\text{C}$ ($190 \pm 10^\circ\text{F}$) in a forced air oven. Test the specimens at $88 \pm 5^\circ\text{C}$ ($190 \pm 10^\circ\text{F}$).

8.6.2.3 Condition five specimens for 1 h at $-29 \pm 2^\circ\text{C}$ ($-20 \pm 4^\circ\text{F}$). Test the specimens at $-29 \pm 2^\circ\text{C}$ ($-20 \pm 4^\circ\text{F}$).

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 with the bond surface facing the light source to either of the exposure conditions specified below in apparatus that conforms to the requirements defined in Practice **C1442**. Because of differences in spectral power distribution of the exposure sources (consult **G154** and **G155**) and differences in test parameters, test results may differ between the two types of tests. Choice of type of exposure shall be by mutual agreement between the interested parties.

NOTE 2—Refer to Practice **G151** for full cautionary guidance regarding laboratory weathering of nonmetallic materials.

(a) *Fluorescent UV/Condensation Apparatus*—Operate the device in accordance with the procedure in Practice **C1442**, Section 7.3 and expose the specimens for a minimum of 5,000 h.

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

Property	Requirement	Test Method
Rheologic, max		C639
Vertical	4.8 mm ($\frac{3}{16}$ in.)	
Horizontal	no deformation	
Extrudability, max	10 s	C603
Hardness, Shore A	20-60	C661
Heat aging		
Weight loss, max	10 %	
Cracking	none	
Chalking	none	
Tack-free time, max	no transfer in 3 h	C679
Tensile value, min		C1135
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