Designation: C920 – 18

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Standard Specification for Elastomeric Joint Sealants[1]

This standard is issued under the fixed designation C920; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (′) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This ASTM specification covers the properties of a cured single- or multicomponent cold-applied elastomeric joint sealant for sealing, caulking, or glazing operations on buildings, plazas, and decks for vehicular or pedestrian use, and types of construction other than highway and airfield pavements and bridges.

1.2 A sealant meeting the requirements of this specification shall be designated by the manufacturer to be one or more of the types, classes, grades, and uses defined in Section 7.

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

1.4 This standard is similar, but not identical, to ISO 11600 and ISO 11618.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:* [2]

C510 Test Method for Staining and Color Change of Single- or Multicomponent Joint 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

C719 Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)

C793 Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants

C794 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants

C1183 Test Method for Extrusion Rate of Elastomeric Sealants

C1193 Guide for Use of Joint Sealants

C1246 Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants After Cure

C1247 Test Method for Durability of Sealants Exposed to Continuous Immersion in Liquids

C1442 Practice for Conducting Tests on Sealants Using Artificial Weathering Apparatus

3. Terminology

3.1 *Definitions*—Refer to Terminology C717 for definitions of the following terms used in this specification: adhesive failure, caulking, chemically curing sealant, cohesive failure, cure, cured, elastomeric, glazing, joint, primer, seal, sealant, and standard conditions.

4. Classification of Sealants

4.1 A sealant qualifying under this specification shall be classified as to type, grade, class, and use as follows:

4.1.1 *Type S*—A single-component sealant.

4.1.2 *Type M*—A multicomponent sealant.

4.1.3 *Grade P*—A pourable or selfleveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint at 4.4°C (40°F).

4.1.4 *Grade NS*—A nonsag or gunnable sealant that permits application in joints on vertical surfaces without sagging or slumping when applied at temperatures between 4.4 and 50°C (40 and 122°F).

4.1.5 *Class 100/50*—A sealant that when tested for adhesion and cohesion under cyclic movement (8.8) shall withstand an increase of at least 100 % and a decrease of at least 50 % of the joint width as measured at the time of application, and, in addition, meet all the requirements of this specification.

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[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.

4.1.6 *Class 50*—A sealant that when tested for adhesion and cohesion under cyclic movement (8.8) shall withstand an increase and decrease of at least 50 % of the joint width as measured at the time of application, and, in addition, meet all the requirements of this specification.

4.1.7 *Class 35*—A sealant that when tested for adhesion and cohesion under cyclic movement (8.8) shall withstand an increase and decrease of at least 35 % of the joint width as measured at the time of application, and, in addition, meet all the requirements of this specification.

4.1.8 *Class 25*—A sealant that when tested for adhesion and cohesion under cyclic movement (8.8) shall withstand an increase and decrease of at least 25 % of the joint width as measured at the time of application, and, in addition, meet all the requirements of this specification.

4.1.9 *Class 12 ½* —A sealant that when tested for adhesion and cohesion under cyclic movement (8.8) shall withstand an increase and decrease of at least 12 ½ % of the joint width as measured at the time of application, and, in addition, meet all the requirements of this specification.

4.1.10 *Use T* $_1$—A sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages where a higher durometer sealant is desired.

4.1.11 *Use* T_2—A sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks and parking garages where a lower durometer sealant is desired.

NOTE 1—Hardness alone does not correlate with joint performance. The joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks, and parking garages require appropriate design considerations including material selection, total joint design, manufacturer involvement and field testing.

4.1.12 *Use NT*—A sealant designed for use in joints in nontraffic areas.

4.1.13 *Use I*—A sealant designed for use in joints which are submerged continuously in a liquid.

4.1.14 *Use M*—A sealant that meets the requirements of this specification when tested on mortar specimens in accordance with 9.9 and 9.10.

4.1.15 *Use G*—A sealant that meets the requirements of this specification when tested on glass specimens in accordance with 9.9 – 9.11.

4.1.16 *Use A*—A sealant that meets this specification when tested on aluminum specimens in accordance with 9.9 and 9.10.

4.1.17 *Use O*—A sealant that meets this specification when tested on substrates other than the standard substrates in accordance with 9.9 and 9.10.

5. Materials and Manufacture

5.1 A single-component sealant shall be a uniform mixture of a consistency suitable for immediate application by hand or pressure caulking gun or by hand tool. The sealant when completely cured shall form an elastomeric solid capable of maintaining a seal.

5.2 A multicomponent chemically curing sealant shall be furnished in two or more components. The resulting mixture shall be uniform and of a consistency suitable for immediate application by hand or pressure caulking gun, or by hand tool. The sealant when completely cured shall form an elastomeric solid capable of maintaining a seal.

6. General Requirements

6.1 *Shelf-life*—The shelf-life of this sealant shall be determined by its manufacturer. When establishing the shelf-life, the manufacturer should also identify acceptable conditions of storage for the sealant.

6.2 *Color*—The color of the sealant, after curing 14 days in a laboratory controlled at standard conditions, shall be that color which has been agreed upon between the purchaser and the supplier.

6.3 The sealant shall be intended for use only on clean, dry surfaces. Where a primer is recommended by a manufacturer for a specific surface, all tests on that surface shall include the primer.

NOTE 2—The proper use of primers (or surface conditioners) in connection with the application of sealants is described in detail in Guide C1193. This guide also describes proper methods for joint design, back-up materials, surface preparation, tooling of sealant, and other important procedures in sealant application in buildings.

6.4 The same conditions of time, temperature, and humidity shall be used for cure of test specimens for Test Methods C661, C719, C794, and C1247.

7. Significance and Use

7.1 This specification covers several classifications of sealants as described in Section 4 for various applications. It should be recognized by the purchaser or design professional that not all sealants meeting this specification are suitable for all applications and all substrates. It is essential, therefore, that the applicable type, grade, class, and use be specified so that the proper classification of sealant is provided for the intended use. Test methods relate to special standard specimen substrates of mortar, glass, and aluminum. If tests are required using substrates in addition to or other than the standard, they should be so specified for testing.

8. Physical Requirements

8.1 *Rheological Properties:*

8.1.1 Grade P (pourable or selfleveling) sealant shall have flow characteristics such that when tested in accordance with Test Method C639 it shall exhibit a smooth, level surface. (Refer to Types I and III in the test.)

8.1.2 Grade NS (nonsag) or gunnable sealant shall have flow characteristics such that when tested in accordance with Test Method C639 it does not sag more than 4.8 mm (3⁄16 in.) in vertical displacement. Also the sealant shall show no deformation in horizontal displacement. (Refer to Types II and IV in the test.)

8.2 *Extrusion Rate:*

8.2.1 Type S (single component), Grade P (pourable or selfleveling) sealant shall have an extrusion rate of not less than 10mL/min when tested in accordance with Test Method C1183, Procedure A.

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8.2.2 Type S (single component), Grade NS (nonsag or gunnable sealant) shall have an extrusion rate of not less than 10 mL/min when tested in accordance with Test Method C1183, Procedure A.

8.3 *Application Life:*

8.3.1 Type M (multicomponent), Grade P (pourable or selfleveling) sealant, when tested in accordance with Test Method C1183, Procedure A shall be extrudable at a rate of not less than 10 mL/min 3 h after mixing.

8.4 *Hardness:*

8.4.1 Use T_1 (traffic) sealant shall have a hardness reading, after being properly cured, of not less than 25 when tested in accordance with Test Method C661.

8.4.2 Use T_2 (traffic) sealant shall have a hardness reading, after being properly cured, of less than 25 when tested in accordance with Test Method C661.

8.4.3 Use NT (nontraffic) sealant shall have a hardness reading, after being properly cured, of less than 60 when tested in accordance with Test Method C661.

8.5 *Effects of Heat Aging*—The sealant shall not lose more than 7 % of its original weight or show any cracking or chalking when tested in accordance with Test Method C1246.

8.6 *Tack-Free Time*—There shall be no transfer of the sealant to the polyethylene film when tested at 72 h in accordance with Test Method C679.

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8.7 *Stain and Color Change*—The sealant shall not cause any visible stain on the top surface of a white cement mortar base when tested in accordance with Test Method C510.

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8.8 *Adhesion and Cohesion Under Cyclic Movement*—The total loss in bond and cohesion areas among the three specimens tested for each surface shall be no more than 9 cm^2 (1½ $in.^2$) when tested in accordance with Test Method C719 with standard mortar, glass, and aluminum or any other specified substrates.

8.9 *Adhesion-in-Peel*—The peel strength for each individual test shall not be less than 22.2 N (5 lbf) when tested in accordance with Test Method C794 with standard mortar, glass, and aluminum or any other specified substrate. In addition, the sealant shall show no more than 25 % adhesive bond loss for each individual test.

NOTE 3—Curing conditions are specified by all of the test methods cited. The manufacturer may request other conditions than those specified for the curing period provided they meet the following requirements: (*1*) the curing period shall extend for 21 days; (*2*) the temperature during the curing period shall not exceed 50°C (122°F); and (*3*) the amended curing conditions recommended by the manufacturer shall also be applied to the durability, adhesion in peel, and ultraviolet radiation exposure tests.

8.10 *Adhesion-in-Peel for Use G Exposed to Ultraviolet Exposure Through Glass*—The peel strength for each individual test shall not have less than 22.2 N (5 lbf) and the compound shall be no more than 25 % adhesive bond loss for each individual test when tested in accordance with Test Method C794 modified to include 200 h in an accelerated weathering device followed by 7 days immersion in distilled water.

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8.10.1 *Exposure Apparatus*—The exposure apparatus shall be one of the three types of laboratory accelerated weathering devices described in Practice C1442, that use either xenon arc, fluorescent UV or open flame carbon arc radiation. Consult Practice C1442 for the differences in test parameters among the devices. Because of differences in test conditions, test results may differ with the type of device used. The choice of device shall be by mutual agreement among the interested parties.

8.10.1.1 When peel adhesion is to be tested on glass substrate specimens after ultraviolet exposure through glass, place the specimens in the weathering device with the sealant surface facing away from the light source after 21 days of cure at laboratory conditions. Test conditions in each type of device are in accordance with the procedures in C1442, Section 7 on Apparatus, except that the xenon arc and open flame carbon arc devices shall be operated without the water spray. Expose the specimens for 200 h and then continue with 7 days of water immersion.

NOTE 4—Although the xenon arc irradiance setting of 0.35 W/(m^2·nm) at 340 mm is acceptable, Practice C1442 specifies 0.51 W/(m^2·nm) at 340 mm as the preferred setting. To accommodate testing in xenon arc weathering devices that cannot use the higher irradiance setting, 0.35 W/(m^2·nm) at 340 nm may be used if the length of the total exposure time is increased to provide the equivalent radiant exposure received at 0.51 W/(m^2·nm) at 340 nm for 200 h exposure. See Annex A1 in Practice C1442 for determining the exposure time.

8.10.2 Immediately following the weathering cycle, completely immerse the specimen in distilled or deionized water for 7 days. Mortar specimens are placed in a separate container from the glass and aluminum specimens, because the highly alkali conditions generated could have an effect on the glass and aluminum.

8.11 *Effects of Accelerated Weathering*— The sealant shall show no cracks greater than those shown in Example #2 of Fig. 1 in Test Method C793 after the specified ultraviolet exposure and shall show no cracks greater than those shown in Example #2 of Fig. 2 in Test Method C793 after exposure at cold temperature and the bend test when tested in accordance with Test Method C793.

8.12 *Effects of Continuous Immersion for Use I Sealants:*

8.12.1 *Class 1*—After 6 weeks exposure, the total loss in bond and cohesion areas among the specimens tested for each substrate shall be no greater than 9.5 cm^2 (1.5 $in.^2$) when tested according to Test Method C1247 with standard glass, aluminum, or any other substrate specified.

8.12.2 *Class 2*—After 10 weeks exposure, the total loss in bond and cohesion areas among the specimens tested for each substrate shall be no greater than 9.5 cm^2 (1.5 $in.^2$) when tested according to Test Method C1247 with standard glass, aluminum, or any other substrate specified.

9. Test Methods

9.1 *Standard Conditions for Laboratory Tests*—All tests described in the following paragraphs shall be performed in a laboratory controlled at standard conditions. The sealant sample shall be conditioned at standard conditions for at least 24 h before laboratory tests are made.

9.2 *Rheological Properties*—Test Method C639.