Designation: D5893/D5893M – 16 (Reapproved 2021)

Standard Specification for Cold-Applied, Single-Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements[1]

This standard is issued under the fixed designation D5893/D5893M; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers cold-applied, single-component, chemically curing silicone sealants that are based on polymers of polysiloxane structures and are intended for use in sealing joints and cracks in portland cement concrete highway and airfield pavements. The specification includes both non-sag and self-leveling types of sealants.

1.1.1 This specification does not purport to cover the properties required of sealants for use in areas of portland cement concrete pavements subject to jet fuel or other fuel spillage, such as vehicle or aircraft refueling and maintenance areas, or a combination thereof.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.3 The following safety hazards caveat pertains only to the test methods portion, Section 9, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Appendix X1.

1.4 *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]

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

C792 Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants

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

C1183/C1183M Test Method for Extrusion Rate of Elastomeric Sealants

D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D618 Practice for Conditioning Plastics for Testing

D1985 Practice for Preparing Concrete Blocks for Testing Sealants, for Joints and Cracks

D2202 Test Method for Slump of Sealants

D5249 Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland Cement Concrete and Asphalt Joints

D5329 Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt Pavements and Portland Cement Concrete Pavements

D5535 Terminology Relating to Formed-in-Place Sealants for Joints and Cracks in Pavements (Withdrawn 2009)[3]

3. Terminology

3.1 *Definitions*—Refer to Terminology D5535 for definitions of the following terms used in this specification: backer material, chemically curing sealant, joint, and sealant.

[1] This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.33 on Formed In-Place Sealants for Joints and Cracks in Pavements.

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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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

4. Classification

4.1 Sealants meeting the requirements of this specification shall be classified according to type as one of the following:

4.1.1 *Type NS (Non-Sag)*—A single-component sealant that resists sagging after application in horizontal joints and requires tooling or forming into the joint to achieve the desired application configuration.

4.1.2 *Type SL (Self-Leveling)*—A single-component sealant that is self-leveling and has sufficient flow characteristics to form a smooth and level surface in horizontal joints without tooling or forming after application.

5. General Requirements

5.1 The sealant shall be a uniform mixture with a consistency that is appropriate for application to joints in portland cement concrete pavements through pressure-fed application units or by hand caulking guns. The sealant shall cure by means of a chemical reaction of the components to form an elastomeric seal that seals joints in concrete throughout repeated cycles of thermal expansion and contraction and against the infiltration of moisture and incompressibles.

5.2 When stored in the original, unopened containers at conditions recommended by the manufacturer, the sealant shall be capable of meeting the specification requirements for at least six months after the original purchase.

5.3 After specified curing in the laboratory, the color of the cured sealant shall be as agreed upon by the purchaser and the manufacturer.

5.4 The sealant is intended for use in appropriately prepared, clean, dry, and frost-free portland cement concrete joints or cracks in new pavements or pavements that are being resealed.

6. Physical Requirements

6.1 *Cure Evaluation*—The sealant shall cure throughout a 12.7 by 12.7-mm [0.5 by 0.5-in.] cross section within 21 days when evaluated in accordance with 9.1. At 21 days ± 4 h of curing, the sealant shall not show the presence of any uncured material, as indicated by sealant that has not changed from a liquid to a solid state.

6.2 *Rheological Properties:*

6.2.1 When tested in accordance with Test Method D2202, Type NS sealant shall not slump more than 7.6 mm [0.30 in.].

6.2.2 When tested in accordance with Test Method C639 for Type I sealant, Type SL sealant shall exhibit a smooth, level surface with no indication of bubbling.

6.3 *Extrusion Rate*—When tested in accordance with Test Method C1183/C1183M for Type S sealants, the extrusion rate shall not be less than 20 mL/min [1.22 $in.^3$/min].

6.4 *Tack-Free Time*—The sealant shall be tack-free, with no transfer of the sealant to the polyethylene, when tested at 5 h ± 10 min in accordance with Test Method C679.

6.5 *Effects of Heat Aging*—The sealant shall not lose more than 10 % of its original weight or show any cracking or chalking when tested in accordance with Test Method C792.

6.6 *Bond*—The sealant shall be tested in accordance with 9.6 at −29 ± 1 °C [−20 ± 2 °F] for five complete cycles of 100 % extension each. All three specimens shall meet the following requirements for bond:

6.6.1 *Non-Immersed*—No specimen shall develop any crack, separation, or other opening in the sealant or between the sealant and the concrete test blocks.

6.6.2 *Water-Immersed*—No specimen shall develop any crack, separation, or other opening in the sealant or between the sealant and the concrete test blocks.

6.6.3 *Oven-Aged*—No specimen shall develop any crack, separation, or other opening in the sealant or between the sealant and the concrete test blocks.

6.7 *Hardness:*

6.7.1 When tested in accordance with Test Method C661 at −29 ± 1 °C [−20 ± 2 °F], using a Type A-2 durometer, the hardness shall not exceed 25.

6.7.2 When tested at standard laboratory conditions and in accordance with Test Method C661 at 23 ± 2 °C [73.4 ± 3.6 °F], using a Type 00 durometer, the hardness shall not be less than 30.

6.8 *Flow*—When tested in accordance with 9.8 at 93.3 ± 1 °C [200 ± 2 °F] for 72 h ± 30 min, there shall be no flow.

6.9 *Rubber Properties in Tension:*

6.9.1 *Ultimate Elongation*—When tested at standard laboratory conditions and in accordance with Test Methods D412 using Die C, at 23 ± 2 °C [73.4 ± 3.6 °F], and using a 500 ± 20 mm/min [20 ± 2 in./min] elongation rate, the ultimate elongation of the sealant shall not be less than 600 %.

6.9.2 *Tensile Stress at 150 % Elongation*—When tested at standard laboratory conditions and in accordance with Test Methods D412 using Die C, at 23 ± 2 °C [73.4 ± 3.6 °F], and using a 500 ± 20 mm/min [20 ± 2 in./min] elongation rate, the tensile stress at 150 % elongation shall not exceed 310 kPa [45 psi].

6.10 *Effects of Accelerated Weathering*—After 5000 h of exposure in accordance with 9.10, the sealant shall not flow, show tackiness, the presence of an oil-like film, or reversion to a mastic-like substance, form surface blisters either intact or broken, form internal voids, or have surface crazing, chalking, cracking, hardening, or loss of rubber-like properties. The sealant shall not experience any cracking or crazing when subjected after weathering to bending at –26 ± –2 °C [–15 ± 3.6 °F] as described in Test Method C793. Evidence of physical change in the surface of the material by visual and tactile examination shall constitute failure of this test. The accelerated weathering test shall be repeated every five years or when a formula change is made.

6.11 *Resilience*—When tested in accordance with 9.11, the resilience of the sealant shall not be less than 75 %.

7. Sampling

7.1 Samples may be taken at the plant or warehouse prior to delivery or at the time of delivery, at the option of the purchaser. If sampling is conducted prior to shipment, the inspector representing the purchaser shall have free access to the material to be sampled. The inspector shall be afforded all

reasonable facilities for inspection and sampling that shall be conducted so as not to interfere unnecessarily with the operation of the works.

7.2 Samples for testing shall consist of not less than 3.78 L [1 gal] of the sealant. If the sealant is supplied in cartridges, a sufficient number of cartridges shall be obtained at random to provide at least 3.78 L [1 gal]. If the sealant is supplied in 18.9-L [5-gal] or 207.9-L [55-gal] containers, the sample shall be obtained from an unopened container. The container shall be opened and any surface covering removed to expose the sealant. The required amount of sealant shall be removed from the container quickly and placed in a container that will minimize exposure of the sealant to air. The sample container shall be compatible with the sealant. Use of a liner inside the container may assist in minimizing air exposure. The sample container shall be completely filled in a manner that excludes air entrapment and then sealed. A metal can with a double friction lid lined with a polyethylene bag meets these requirements. After obtaining the sample from containers, any lining or covering shall be replaced to prevent exposure of the material remaining in the container to air. The container lids shall be replaced tightly.

7.3 When the sample (other than those in cartridges) for testing is opened to begin laboratory testing, it shall be examined for the presence of cured material. Any skins of cured sealant shall be removed from the sample. The material tested shall not contain any cured portions. If sufficient quantities of uncured sealant cannot be obtained from the sample, or if cured portions of sealant are noted within the sample (other than surface skins), the sample shall be discarded and a new sample obtained.

7.4 After opening and examination of the test sample, all test specimens shall be prepared without delay to minimize curing of the sample. The sample should be handled in a manner that minimizes air exposure while preparing test specimens. If any cured material skins form on the sample while preparing test specimens, the cured material shall be removed prior to preparing additional specimens.

8. Standard Conditions

8.1 *Standard Conditions for Laboratory Tests*—The laboratory atmospheric conditions, to be referred to as standard conditions, shall be 23 ± 2 °C [73.4 ± 3.6 °F] and 50 ± 10 % relative humidity as described in Practice D618. Condition the sealant sample to be tested for at least 24 h at standard conditions prior to opening and beginning any tests.

NOTE 1—The positive and negative variations specified along with the temperature and relative humidity settings are the maximum allowed operational fluctuations from the set points under equilibrium conditions. They do not imply that the set points can be higher or lower than those specified.

9. Test Methods

9.1 *Cure Evaluation:*

9.1.1 *Scope*—This test method determines that the sealant is cured to a solid form.

9.1.2 *Significance and Use*—This test method determines that the sealant is cured throughout to a solid form in the allotted time so that further testing can be completed.

9.1.3 *Procedure*—Make and cure one bond sample, as specified in 9.6.4, at laboratory standard conditions for 21 days + 4 h. To aid with specimen curing, spacers may be removed prior to reaching the specified cure time, provided that the sealant has cured sufficiently so that no damage or distortion of the sealant occurs. After 21 days of curing, within +4 h, remove all spacers and other non-adherent surfaces from the sealant. Remove the sealant from the concrete block surfaces by slicing cleanly along each concrete-sealant bonding surface with a knife or blade. This produces a sealant portion that has a 12.7 by 12.7-mm [0.5 by 0.5-in.] cross-sectional area and is 50.8 mm [2 in.] in length. Immediately slice this sealant portion in half to produce two sealant portions that are 25.4 mm [1 in.] long. Immediately examine the 12.7 by 12.7-mm [0.5 by 0.5-in.] surfaces of the sealant that were exposed by slicing and the bottom of the sealant portion that was in contact with the spacers or a base sheet for the presence of uncured material, as indicated by sealant that has not changed from a liquid to a solid state. The presence of any uncured sealant shall constitute failure of this evaluation.

9.1.4 *Precision and Bias*—No information is presented about precision or bias of this test method for cure evaluation since the result is nonquantitative.

9.2 *Rheological Properties:*

9.2.1 *Type NS Sealant*—Test Method D2202.

9.2.2 *Type SL Sealant*—Test Method C639, Type I sealant.

9.3 *Extrusion Rate*—Test Method C1183/C1183M, Type S sealant.

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

9.5 *Effects of Heat Aging*—Test Method C792.

9.6 *Bond:*

9.6.1 *Scope*—This is a test method for evaluating bond performance.

9.6.2 *Significance and Use*—This test method provides a way to determine bond and movement capability.

9.6.3 *Concrete Block Preparation*—Prepare concrete test blocks in accordance with Practice D1985. If desired, blocks may be cut in half to produce blocks that are 25.4 by 25.4 by 76.2 mm [1 by 1 by 3 in.].

9.6.3.1 Prepare, store, and clean the blocks in accordance with the procedure of Test Methods D5329 for bond, non-immersed. After the specified scrubbing and blotting, place the blocks on their 25.4 by 50.8-mm [1 by 2-in.] or 25.4 by 25.4-mm [1 by 1-in.] ends, and allow them to dry for 16 to 24 h at standard laboratory conditions.

9.6.4 *Specimen Preparation*—Prepare three test specimens for each bond evaluation. Assemble each test specimen using two prepared concrete test blocks. Assemble the blocks with their 50.8 by 76.2-mm [2 by 3-in.] or 25.4 by 76.2-mm [1 by 3-in.] surfaces facing, using appropriate spacers to form a cavity in which the sealant is placed between the blocks, which is 12.70 + 0.13 mm wide by 12.70 + 0.13 mm deep by 50.80 + 0.13 mm long [0.500 + 0.005 in. wide by 0.500 + 0.005 in. deep and 2.000 + 0.005 in.] long. Use adhesive tape, rubber

bands, or clamps to hold the block and spacer assembly together. Center this cavity along the 76-mm [3-in.] length of the blocks; the ends of the sealant cavity shall each be 12.7 mm [½ in.] from the ends of the concrete test block. The spacers used shall be of appropriate dimensions to create the specified sealant cavity. Construct the spacers of appropriate materials that will permit easy separation from the sealant without damaging the sealant after it has cured. The spacers shall also be compatible with the sealant, and there shall be no reaction between the spacers and the sealant. Suitable materials may include polyethylene, TFE-fluorocarbon, or metal covered with an adhesive-backed release film. Liquid or paste-type release agents can be used; however, extreme care must be used to prevent contamination of the test blocks. Apply sealant into the cavity between the concrete blocks and spacers in a manner that does not entrap air or result in voids in the sealant. Excess sealant should be struck off level with a straightedge. Then cure the specimens at standard conditions for 21 days + 4 h. To aid with sealant curing, spacers may be removed prior to reaching the specified cure time, provided that the sealant has cured sufficiently so that no damage or distortion of it occurs. After the sealant has been cured for the specified time, remove any remaining spacers carefully, in a manner that does not damage the specimens, and then examine the sealant. The sealant should be cured to a solid state on all outer surfaces and should not show the presence of any voids or other damage such as adhesion loss due to spacer removal. If the specimens do not meet these requirements, discard them and prepare new specimens.

9.6.5 *Non-Immersed Bond*—Test specimens that were prepared and cured in accordance with 9.6.4 using the Test Methods D5329 procedure for bond, non-immersed, with a –29 + 1 °C [–20 + 2 °F] testing temperature and a 12.7-mm [½-in.] extension, for a total of five extension and recompression cycles. Complete the required five extension cycles within seven days.

9.6.6 *Bond, Water-Immersed*—Test specimens that were prepared and cured in accordance with 9.6.4 using the Test Methods D5329 procedure for bond, water-immersed, with a –29 + 1 °C [–20 + 2 °F] testing temperature and a 12.7-mm [½-in.] extension, for a total of five extension and recompression cycles. Complete the required five extension cycles within seven days.

9.6.7 *Oven-Aged*—Place specimens prepared and cured in accordance with 9.6.4 in a forced-draft oven maintained at 70 + 1 °C [158 + 2 °F] for 7 days + 2 h. After removing them from the oven, test the specimens for non-immersed bond in accordance with Test Methods D5329. Complete the required five extension cycles within seven days.

9.6.8 *Precision and Bias*—No information is presented about precision or bias of this test method for bond evaluation since the result is nonquantitative.

9.7 *Hardness:*

9.7.1 *Scope*—This test method describes a laboratory procedure and curing for determining hardness of joint sealing compounds according to Test Method C661.

9.7.2 *Significance and Use*—The results obtained in this test method are simply a measure of the indentation into the sealant material of the indentor under load at low temperatures.

9.7.3 *Hardness at –29 + 1 °C [–20 + 2 °F]*—Test Method C661.

9.7.4 *Procedure*—Cure the test specimen at standard laboratory conditions for 21 days + 4 h. Following curing, condition the specimen in an atmosphere that is –29 + 1 °C [–20 + 2 °F] for a minimum of 2 h. Remove the specimen quickly from the –29 + 1 °C [–20 + 2 °F] atmosphere, and test for hardness using a Type A-2 durometer within 10 s after removal from the –29 + 1 °C [–20 + 2 °F] atmosphere. Then immediately return the specimen to the –29 + 1 °C [–20 + 2 °F] atmosphere for a minimum of 30 min, then remove and take another hardness reading. Repeat the above process four more times to obtain six readings. Then calculate the mean value as specified in Test Method C661.

9.7.5 *Hardness at 23 + 2 °C [73.4 + 3.6 °F]*—Test Method C661 and at standard laboratory conditions.

9.7.5.1 *Procedure*—Cure the test specimen at standard laboratory conditions for 21 days + 4 h. Following curing, test the specimen for hardness using a Type 00 durometer instead of the Type A at 23 + 2 °C [73.4 + 3.6 °F], using the procedures specified in Test Method C661.

9.7.6 *Precision and Bias*—The precision and bias of this test method for measuring hardness are as specified in Test Method C661.

9.8 *Flow:*

9.8.1 *Scope*—This test method describes a procedure for making and curing a test specimen to test flow according to Test Methods D5329.

9.8.2 *Significance and Use*—The results obtained in this test procedure are a measure of movement of the sealant when applied in a non-horizontal mode.

9.8.3 *Procedure*—Make one specimen by placing sealant into a flow mold, specified in the Test Methods D5329 procedure for flow, and then striking off level with a straightedge. Cure the specimen at standard laboratory conditions for 21 days + 4 h. Following curing, remove the mold and test the specimen for flow at 93.3 + 1 °C [200 + 2 °F] for 72 h + 30 min using the Test Methods D5329 procedure for flow.

9.8.4 *Precision and Bias*—The precision and bias of this test method for measuring flow are as specified in Test Methods D5329.

9.9 *Rubber Properties in Tension:*

9.9.1 *Scope*—The procedure described below is for curing before testing to Test Methods D412, Method A.

9.9.2 *Significance and Use*—This procedure sets forth a consistent curing method before testing.

9.9.3 *Procedure*—Obtain test specimens from a cured sheet of the sealant. Construct a rectangular mold consisting of a flat surface with spacers to form a space that is at least 152.4 mm [6 in.] wide by 152.4 mm [6 in.] long and is 3.2 + 0.13 mm [0.125 + 0.05 in.] deep. Cover the flat bottom surface with an appropriate non-deforming release sheet, or construct it from material that will release from the sealant. Place sealant into the formed space in a manner that excludes air or voids until the mold is slightly overfilled. Draw a straightedge across the

tops of two of the parallel spacers in a smooth, uniform motion to level the sealant to the thickness of the spacers, and remove excess sealant. Cure the sealant in the mold for 21 days + 4 h at standard conditions. Remove the sealant from the mold in a single sheet; slicing with a knife or razor edge may assist in removal. As an alternative to using a release sheet, the bottom of the mold may be constructed of a smooth, flat brass, aluminum plate, or other hard surface that is not covered with a release surface. The cured sealant sheet may be removed from this surface by careful slicing at the surface with a single-edged razor or other flat cutting tool. Following removal from the mold, inspect the sealant sheet for defects such as voids, nicks, depressions, and so forth that were formed as a result of casting or removal operations. Cut test specimens form the sheet using Die C, specified in Test Methods D412. Obtain the test specimens from the sealant sheet in areas in which there are no defects resulting from sheet casting or removal operations. After cutting, examine the test specimens for defects. If any specimens have defects such as nicks, cuts, voids, or depressions in the reduced section area, discard them and obtain specimens without defects.

9.9.3.1 *Ultimate Elongation*—Determine the ultimate elongation of the test specimens at standard laboratory conditions in accordance with Test Methods D412, Method A, at 23 + 2 °C [73.4 + 3.6 °F], using a 500 + 50 mm/min [20 + 2 in./min] elongation rate.

9.9.3.2 *Tensile Stress at 150 % Elongation*—During the ultimate elongation testing procedure, record the force obtained when the specimens reach 150 % elongation, measured between the bench marks, and use it to calculate the tensile stress at 150 % elongation.

9.9.3.3 *Precision and Bias*—The precision and bias of this test method for measuring tensile stress at 150 % elongation are as specified in Test Methods D412.

9.10 *Accelerated Weathering:*

9.10.1 *Scope*—This test method describes a procedure for artificial weathering of cold-applied, single-component, chemically curing, silicone joint sealants.

9.10.2 *Significance and Use*—A sealant must be able to withstand weathering to perform in its intended use. This test method is a laboratory evaluation of the resistance to artificial weathering.

9.10.3 *Procedure*—Make and cure the test specimens for 72 h, as specified in Section 15.3 and Note 3 of Test Methods D5329. Subject the specimens to 5000 ± 2 h of laboratory accelerated weathering in accordance with Section 15.4 in Test Methods D5329. As soon as possible after the exposure is completed, examine the specimens thoroughly while they are at test chamber temperature.

9.10.4 *Precision and Bias*—No information is presented about precision and bias of this test method since the result is nonquantitative.

9.11 *Resilience:*

9.11.1 *Scope*—This test method describes the cure and testing procedure for the sealant and its ability to reject incompressible objects.

9.11.2 *Significance and Use*—This test method evaluates the ability of the sealant to rebound when curing. Rejection of incompressibles is an important function of a sealant.

9.11.3 *Procedure*—Prepare one specimen in a 177.5-cm^3 [6-oz] capacity tin measuring approximately 7.0 cm [2.76 in.] in diameter and 4.5 cm [1.77 in.] in depth by slightly overfilling the tin with sealant in a manner that excludes entrapped air. Then immediately level the surface with a straightedge. Then cure the specimen at standard laboratory conditions for 21 days + 4 h. Place the specimen in a forced-draft oven maintained at 70 + 1 °C [158 + 2 °F] for 7 days + 2 h. Remove the specimen from the oven, and test it using the oven-aged resilience procedure of Test Methods D5329.

9.11.4 *Precision and Bias*—The precision and bias of this test method for resilience are as specified in Test Methods D5329.

10. Packaging and Marking

10.1 The sealant shall be delivered to the job site in the manufacturer's original, unopened containers. Typical containers that material is supplied in are caulking tubes, 18.9-L [5-gal] sealed pails, or 207.9-L [55-gal] sealed drums. Each container shall be marked clearly with the name and address of the manufacturer, trade name of the sealant, classification of the sealant in accordance with Section 4, and manufacturer's batch or lot number.

10.2 Each package shall be labeled in accordance with applicable federal, state, and local regulations regarding hazards or precautions associated with use of the sealant.

11. Keywords

11.1 chemically curing sealant; joint sealant; portland cement concrete pavement; silicone sealant

APPENDIX

(Nonmandatory Information)

X1. PRECAUTIONS FOR USE AND APPLICATION OF COLD-APPLIED, SINGLE-COMPONENT, CHEMICALLY CURING SILICONE JOINT SEALANT FOR PORTLAND CEMENT CONCRETE PAVEMENTS

X1.1 *Storage*—Since these types of sealants begin to cure by a chemical reaction when exposed to air, it is important that the sealant be stored in the original, unopened containers supplied by the manufacturer prior to use. Containers should be opened for only the minimum amount of time practical prior to application. The sealant should be stored in accordance with recommendations provided by the manufacturer to maintain storage stability.

X1.2 *Application Equipment*—These sealants are applied to pavement joints by the use of appropriate types of pressure-fed application systems. Sealant supplied in caulking tubes may be applied using hand or pneumatic types of caulking guns. Sealant supplied in 18.9-L [5-gal] pails or 207.9-L [55-gal] drums is typically applied using pneumatic pumping systems that feed material through an application hose and wand with a nozzle that is placed in the joint. Type NS materials will additionally require the use of an appropriate forming tool to force the sealant into the joint and form the sealant to the specified application configuration.

X1.3 *Pavement Joints in New Construction*—Before sealant is applied into new construction pavement joints, the joints should be dry and clean of all scale, dirt, dust, curing compound, and other foreign material. The sidewalls of the joint space should be sandblasted thoroughly and blown clean of loose sand by high-pressure air of 689 kPa [100 psi], minimum. Compressors should be equipped with an adequate oil and water trap to ensure that compressed air is not contaminated. If joints are cleaned by jet water-blasting, the jet water-blast machine shall be capable of discharging water at 58.6 to 68.9 MPa [8500 to 10 000 psi] pressure and 75.7 to 83.3 L [20 to 22 gal] of water/min. Backer material of the appropriate size and type, meeting the requirements of Specification D5249, shall be placed into the joint. The joints shall be thoroughly dry before installation of the backer material. Sealant is then applied to the joint using the equipment described in X1.2 to the appropriate configuration recommended by the manufacturer. Typical configurations consist of a depth to width ratio of approximately 1 to 2, with a recess of the top surface of the sealant of 6.4 mm [¼ in.], minimum, below the pavement surface. Sealing operations should be performed when weather conditions meet those specified by the manufacturer.

X1.4 *Pavement Joints to Be Resealed*—When sealant covered by this specification is used for the maintenance and resealing of joints that have previously contained either similar or dissimilar sealant, it is recommended that the joints be cleaned thoroughly with a plow, router, concrete saw, or other suitable tool or tools designed for the purpose of neatly cleaning pavement joints without spalling the joint edges. Loose material should be blown free of the joint. The joint sidewalls should be sandblasted thoroughly and blown free of loose sand with high-pressure air of 689 kPa [100 psi], minimum. Compressors should be equipped with an adequate oil and water trap to ensure that the compressed air is not contaminated. If the joints are cleaned by jet water-blasting, the jet water-blast machine will be capable of discharging water at 58.6 to 68.9 MPa [8500 to 10 000 psi] pressure and 75.7 to 83.3 L [20 to 22 gal] of water/min. Backer material of the appropriate size and type, meeting the requirements of Specification D5249, shall be placed into the joint. The joints shall be thoroughly dry before installation of the backer material. Sealant is then applied to the joint using the equipment described in X1.2 to the appropriate configuration recommended by the manufacturer. Typical configurations consist of a depth to width ratio of approximately 1 to 2, with a recess of the top surface of the sealant of 6.4 mm [¼ in.], minimum, below the pavement surface. Sealing operations should be performed when weather conditions meet those specified by the manufacturer.

X1.5 The manufacturer shall state necessary precautions for use clearly on the sealant container and shall supply a U.S. Department of Labor Material and Safety Data Sheet (OSHA Form 20) so that proper safe handling and application techniques may be used.