

NOTICE OF
CANCELLATION

INCH-POUND

SS-S-1401C
NOTICE 2
3 MARCH 2009
SUPERSEDING
NOTICE 1
5 September 1988

FEDERAL SPECIFICATION

SEALANT, JOINT, NON-JET-FUEL-RESISTANT, HOT-APPLIED, FOR
PORTLAND CEMENT AND ASPHALT CONCRETE PAVEMENTS

SS-S-1401C, dated 15 August 1984, is hereby canceled without replacement.

Custodians:

Army – CE
Navy – YD
Air Force – 99

Preparing activity:

DLA – IS

(Project 8030-2008-008)

Review activities:

Army – MD, MR
Navy – MC, MS

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.

SS-S-1401C
AMENDMENT-1
May 14, 1993

FEDERAL SPECIFICATION

SEALANT, JOINT, NON-JET-FUEL-RESISTANT, HOT-APPLIED,
FOR PORTLAND CEMENT CONCRETE AND ASPHALT CONCRETE PAVEMENTS

This amendment, which forms a part of SS-S-1401C, dated August 15, 1984, is approved by the General Services Administration for use by all federal agencies.

Page 2 - Paragraph 2.2

DELETE: C33 - Concrete Aggregates

C150 - Portland Cement

C192 - Making and Curing Concrete Test Specimens in the Laboratory,
Methods of

ADD: C1985- Preparing Concrete Blocks for Testing Sealants, for Joints and
Cracks, Standard Practice for

Page 7 - Paragraph 4.4.6.2

DELETE: Concrete block preparation. Prepared blocks are available (see 6.6.3).

ADD: Concrete block preparation. Prepare concrete blocks in accordance with
ASTM D1985. Prepared blocks are available (see 6.6.3).

DELETE: Paragraph 4.4.6.2.1 and Table I.

Page 8

DELETE: Paragraph 4.4.6.2.2

Page 9 - Paragraph 4.4.6.5, last sentence

DELETE: Three cycles of immersion, conditioning, extension, and recovery shall
constitute one complete test for water-immersed bond (see 4.4.6.6).

ADD: Two additional cycles of extension and recovery shall constitute one
complete test for water-immersed bond (see 4.4.6.6).

MILITARY INTERESTS:

Custodians

Army - CE

Navy - YD

Air Force - 99

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS 9FTE-10

COM - NIST

PREPARING ACTIVITY:

Navy - YD

(Project 8030-0670)

Review Activities

Army - MD, MR

Navy - MS

User Activity

Navy - MC

FSC 8030

DISTRIBUTION STATEMENT A. Approved for public release; distribution is
unlimited.

NOTICE OF
VALIDATION

SS-S-1401C
NOTICE 1
5 September 1988

FEDERAL SPECIFICATION

SEALANTS, JOINT, NON-JET-FUEL-RESISTANT, HOT-APPLIED, FOR
PORTLAND CEMENT AND ASPHALT CONCRETE PAVEMENTS

SS-S-1401C, dated August 15, 1984, has been reviewed and determined to be valid for use in acquisition.

Custodians:

Army - CE
Navy - YD
Air Force - 99

CIVIL AGENCY COORDINATING ACTIVITY:

GSA - FSS
COM - NBS

Review Activities:

Army - MD, MR
Navy - MS

Preparing Activity:

Navy - YD

AMSC N/A

FSC 8030

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

SS-S-1401C
August 15, 1984
SUPERSEDING
SS-S-1401B
November 11, 1974

FEDERAL SPECIFICATION

SEALANT, JOINT, NON-JET-FUEL-RESISTANT, HOT-APPLIED, FOR
PORTLAND CEMENT AND ASPHALT CONCRETE PAVEMENTS

This specification was approved by the Assistant Administrator,
Office of Federal Supply and Services, General Services Administration,
for the use of all Federal agencies.

1. SCOPE

1.1 Scope. This specification covers one type of one-component,
hot-applied material for use in sealing joints and cracks in portland cement
and asphalt concrete pavements.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation
for bids or request for proposal, form a part of this specification to the
extent specified herein.

Federal Specification

PPP-P-704 - Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons)

Federal Standards

FED-STD-123 - Marking for Shipment (Civil Agencies)
FED-STD-313 - Material Safety Data Sheets Preparation and the
Submission of

(Activities outside the Federal Government may obtain copies of Federal
specifications, standards, and commercial item descriptions as outlined under
General Information in the Index of Federal Specifications, Standards, and
Commercial Item Descriptions. The Index, which includes cumulative bimonthly
supplements as issued, is for sale on a subscription basis by the Superin-
tendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal specifications and
commercial item descriptions required by activities outside the Federal
Government for bidding purposes are available without charge from General
Services Administration Business Service Centers in Boston, MA; New York, NY;
Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO;
Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA;
and Seattle, WA.

FSC 8030

(Federal Government activities may obtain copies of Federal Specification documents, and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

Military Standards

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-147 - Palletized Unit Loads

(Copies of military specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

Federal Regulations

- 29 CFR 1900-1999 - Occupational Safety and Health Administration (OSHA), Department of Labor

"(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)"

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM)

- C33 - Concrete Aggregates
- C150 - Portland Cement
- C192 - Making and Curing Concrete Test Specimens in the Laboratory, Methods of
- D5 - Penetration of Bituminous Materials, Test Method for
- D140 - Sampling Bituminous Materials, Methods of
- D217 - Cone Penetration of Lubricating Grease, Test Methods for

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

Technical Association of the Pulp and Paper Industry

- T431 om - Ink Absorbency of Blotting Paper

(Application for copies should be addressed to the Technical Association of the Pulp and Paper Industry, Technology Park/Atlanta, P.O. Box 105113, Atlanta, GA 30348.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Description.

3.1.1 Material. The sealant shall be a fully polymerized and cured thermoplastic material, furnished as a solid. It shall be composed of a mixture of asphalt and rubber, with additives. The manufacturer's specified application or pouring temperature shall not exceed 232 degrees Celsius ($^{\circ}\text{C}$) (450 degrees Fahrenheit ($^{\circ}\text{F}$)), and shall be at least 11°C (20°F) lower than the safe heating temperature. The sealant shall meet the requirements of this specification when poured after being held at the application temperature for no more than 10 minutes, and shall retain all of its properties with up to 3 hours of continuous heat.

3.1.2 Performance. The sealant shall form a resilient and adhesive compound, which effectively seals joints and cracks in pavements against the infiltration of moisture throughout repeated cycles of expansion and contraction. The sealant shall not flow from the joint or be picked up by pneumatic tires at in-place joint seal temperatures of 52°C (125°F) or below. The sealant shall have a uniform application or pouring consistency suitable for filling the joint without inclusion of blisters, bubbles, or discontinuities.

3.2 Safe heating temperature. The safe heating temperature is the highest use temperature permitted by the manufacturer (see 5.3.3) and is a temperature to which the sealant can be heated for a duration of at least 3 hours, and still conform to all of the requirements specified herein.

3.3 Penetration. Penetration shall not exceed 9.0 millimeters (mm) (90 test units) (0.354 inch) when the sealant is tested as specified in 4.4.3.

3.4 Flow. Flow shall not exceed 3.0 mm (0.118 inch), for either specimen, when the sealant is tested as specified in 4.4.4.

3.5 Resilience. Recovery shall be a minimum of 60 percent when the sealant is tested as specified in 4.4.5. The initial penetration shall not exceed 1.5 mm (0.059 inch) and shall be not less than 0.5 mm (0.020 inch).

3.6 Bond to concrete. No specimen shall develop any surface crack, separation, or other opening in the sealant, or between the sealant and the concrete blocks, when the sealant is tested as specified in 4.4.6.

3.7 Compatibility with asphalt. There shall be no failure in adhesion, formation of an oily exudate at the interface between the sealant and the asphaltic concrete, or softening or other deleterious effect on the asphaltic concrete, when the sealant is tested as specified in 4.4.7.

3.8 Storage stability. When specified (see 6.2), the Government will retain samples for verification of these requirements: The sealant, when stored for 2 years from the date of delivery, at temperatures from -18° to 46°C (0° to 115°F), and tested in accordance with this specification, shall meet all of the requirements herein.

3.9 Toxicity. The material shall have no adverse effect on the health of personnel when used for its intended purpose. Questions pertinent to this effect shall be referred by the acquiring activity to the appropriate medical service who will act as advisor to the acquiring activity. The manufacturer's instructions shall provide personnel protection to meet OSHA requirements, including 29 CFR 1910.1000, 1910.1001, 1910.1002, and 1910.1017, as applicable (see 4.5).

3.10 Material Safety Data Sheets (MSDS). MSDS shall be prepared in accordance with FED-STD-313 and submitted as directed in the contract or order at the time of acquisition award (see 6.2, 6.3, and 6.5).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Material inspection. The contractor is responsible for insuring that supplies and materials are inspected for compliance with all the requirements specified herein and in applicable referenced documents.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Quality conformance inspection (see 4.2.1).
- b. Inspection of preparation for delivery (see 4.6).

4.2.1 Quality conformance inspection. The quality conformance inspection shall be as specified in 4.4. Sampling shall be in accordance with 4.3.

4.3 Sampling. Unless otherwise specified (see 6.2), samples for testing shall be taken at the point of manufacture in accordance with ASTM D140. It shall be the responsibility of the contractor to determine that the samples taken are representative of the batches proposed for shipment. The representative composite sample of the sealant shall consist of not less than 7 kilograms (15 pounds) from each batch. A lot consisting of a single batch, if taken from filled containers, shall be sampled by withdrawing approximately

equal portions from three containers, selected at random, to make up the composite sample. Sample identification shall include the name of the testing agency, contract or purchase order number, and special marking as specified in 5.3.3. Each container from which sample material has been taken shall be resealed and marked for identification.

4.4 Testing. Testing shall be conducted at a Government-approved facility (see 6.2). Samples taken as specified in 4.3 shall be tested as specified in 4.4.1 through 4.4.7. Individual test values, and results of failure analyses of individual specimens, shall be recorded. Failure of the sealant to pass any test shall be cause for rejection of the lot, except as noted for bond specimen casting defects in 4.4.6.3, and as noted for a marginal test result, following: Where results of only one of the specified tests are judged by the testing agency to be marginal as to meeting requirements, the testing agency has the option to perform a retest. If the testing agency does not exercise its option to retest, either the contractor or Government may request that a retest for that property be made at the requester's expense. Such a test will be made only when an adequate quantity of the original sample is available or where additional material can be obtained from the previously marked sampled containers.

4.4.1 Standard conditions. Laboratory atmospheric conditions, hereinafter referred to as standard conditions, shall be $23 \pm 2^{\circ}\text{C}$ ($73 \pm 4^{\circ}\text{F}$) temperature and 50 ± 5 percent relative humidity. Specimens shall be stored and tested at standard conditions unless otherwise specified.

4.4.2 Specimen preparation.

4.4.2.1 Equipment. The unit for melting laboratory samples shall be of the double-boiler type, with two melting pots (see 6.6.1). The unit shall employ a high flash-point oil as the heat transfer medium, and be designed and built so that the oil will completely surround the sides of the inner or material chambers. Heating shall be thermostatically controlled to maintain the temperature of the oil within 3°C (5°F) of that required to maintain the sample at the safe heating temperature set by the manufacturer of the sealant under test. The melting unit shall be equipped with a bottom discharge controlled by a knife or blade valve to permit drawing off the melted material. Mechanical stirring shall be provided both in the material chambers and in the oil bath. Continuous temperature readings shall be provided for both the samples being melted and the heat-transfer oil.

4.4.2.2 Melting. The portion of the sample selected for testing shall provide approximately 1.6 cubic decimeter (1.7 quarts) of melted material. Divide the test sample into segments of 25 ± 2 grams each. Add segments to each of two melting pots at the rate of one segment per minute. Stop the stirrers in the melting pots for an interval not to exceed 10 seconds when adding a segment. Keep pots covered, with continuous stirring of the material during the heating period, except when adding segments. The temperature of the oil bath during the time the segments are being added to the melting pots shall not exceed the safe heating temperature as specified by the manufacturer. As the segments are added, raise the oil-bath temperature to bring the sample to the safe heating temperature within 1 hour from the time the first segment has been added. In no case however, shall the oil bath temperature be more than 11°C (20°F) higher than the safe heating temperature. Continue heating of the sample at the safe heating temperature until 3 hours have elapsed since the first segment was added to the melters.

SS-S-1401C

4.4.2.3 Pouring. Pour all test specimens as specified in 4.4.3 through 4.4.7 within a period of 10 minutes. Discard the first 50 to 60 grams of material discharged from each melting pot.

4.4.3 Penetration. Penetration testing shall be in accordance with ASTM D5, except as specified herein. Use a penetrometer as specified in ASTM D217, with a cone conforming to the Optional Cone therein in place of the needle. Prepare specimens in 177 cubic centimeter (cc) (6 ounce) containers, and cast flush with the top edge. Make determinations at locations on 120° radii, and halfway between the center and outside of the specimen. Determine conformance to the requirement of 3.3.

4.4.4 Flow.

4.4.4.1 Specimen preparation. Prepare duplicate specimens in molds 40 by 60 by 3.2 mm (1.56 by 2.34 by 0.125 inches) deep, placed on a bright tin panel. The release molds shall have nonadherent, nonreactive surfaces. A metal mold, coated with a release agent, such as a thin, cured film of heat-stable silicone (see 6.6.2), or equivalent, shall be used. Fill the mold with excess material. Allow the specimen to cool at laboratory temperature for at least one-half hour, then trim flush with the face of the mold with a heated metal knife or spatula.

4.4.4.2 Test. Remove the molds and mark reference lines across the panels coincident with the transverse edges of the specimens. Mount the specimens, with the long axis at an angle of $75 \pm 1^\circ$ with the horizontal, and the transverse axis horizontal, in a forced-draft oven maintained at $60 \pm 1^\circ\text{C}$ ($140 \pm 2^\circ\text{F}$). After 5 hours, remove the specimens and mark another reference line on each specimen, coincident with the lowest point of sag or flow, and parallel to the line directly above it. Measure the indicated change in length of the specimen, and report as flow. Determine conformance to the requirements of 3.4.

4.4.5 Resilience.

4.4.5.1 Specimen preparation. Prepare duplicate specimens as specified in 4.4.3, except cure the specimens for 24 hours at standard conditions prior to testing. Oven-age one specimen in a forced-draft oven at $70 \pm 1^\circ\text{C}$ ($158 \pm 2^\circ\text{F}$) for 168 ± 2 hours, cool under standard conditions for 1 hour, and then condition for 1 hour in a water bath maintained at $25 \pm 0.3^\circ\text{C}$ ($77 \pm 0.5^\circ\text{F}$) prior to testing. Condition the unaged specimen for 1 hour in a water bath maintained at $25 \pm 0.3^\circ\text{C}$ prior to testing.

4.4.5.2 Procedure. Use a penetrometer as specified in ASTM D217, substituting the ball penetration tool of figure 1 for the needle. Lightly dust the surface of the specimen with talc and immediately remove the excess by blowing. Place the ball in contact with the surface of the specimen and set the indicating dial to zero. Position a light so that initial contact of the ball with the surface of the specimen can be observed readily. Release the ball penetration tool, allow it to penetrate the specimen for 5 seconds, and record the reading as penetration (P) in tenth-millimeter units. Without

returning the dial pointer to zero, press the ball penetration tool down an additional 100 units (i.e., to a reading of $P + 100$) at a uniform rate in 10 seconds. Re-engage the clutch to hold the tool down for an additional 5 seconds and during this time return the dial to zero. Release the clutch, allow the specimen to recover for 20 seconds, and record the final dial reading (F). Make determinations at three points equally spaced from each other and not less than 13 mm (0.5 inch) from the container rim. Calculate the recovery, a measure of resilience, as follows:

$$\text{Recovery, percent} = P + 100 - F$$

Report averages of three determinations of recovery, and three determinations of initial penetration, for each specimen. Determine conformance to the requirements of 3.5.

4.4.6 Bond to concrete.

4.4.6.1 Extension machine. The extension machine used in the bond test shall be so designed that the specimen can be maintained at the test temperature while being extended at a uniform rate as specified. It shall consist essentially of one or more screws rotated by an electric motor through suitable gear reductions. Self-aligning plates or grips, one of each pair fixed and the other carried by the rotating screw or screws, shall be provided for holding the test specimen in position during the test.

4.4.6.2 Concrete block preparation. Prepared blocks are available (see 6.6.3).

4.4.6.2.1 Materials. Use aggregate conforming to ASTM C33 except as specified herein. Use aggregate grading specified in table I, with coarse aggregate consisting of crushed limestone (+ 95 percent CaCO_3) having a water absorption of not more than 1.5 percent, with fine aggregate of crushed limestone manufactured from the same parent rock as the coarse aggregate, and with fine aggregate approximately 40 percent of the total aggregate solid volume. Use portland cement conforming to ASTM C150, Type II. Make a concrete mix with a water-cement ratio of 5.5 gallons of water per bag of cement, a cement factor of 6.0 ± 0.5 bags of cement per cubic yard of concrete, a slump of 64 ± 13 mm (2.5 ± 0.5 inches), and an air content of 5 ± 0.5 percent by addition of an air-entraining agent such as a neutralized thermoplastic resin (see 6.6.4), or equivalent. Use a 250 by 450 by 75 mm (10 by 17.5 by 3 inch) metal mold, secured to a metal base plate to form a watertight assembly, and oiled with mineral oil before use.

TABLE I. Aggregate grading.

Type	Sieve size	Percent passing
Coarse aggregate	(19.0 mm) 3/4 inch	97 - 100
	(12.5 mm) 1/2 inch	63 - 69
	(9.5 mm) 3/8 inch	30 - 36
	(4.75 mm) No. 4	0 - 3
Fine aggregate	(4.75 mm) No. 4	100
	(2.36 mm) No. 8	82 - 88
	(1.18 mm) No. 16	60 - 70
	(600 μm) No. 30	40 - 50
	(300 μm) No. 50	16 - 26
	(150 μm) No. 100	5 - 9

4.4.6.2.2 Block preparation. Prepare and cure the blocks in accordance with ASTM C192 except as specified herein. Fill the mold to overflowing, vibrate externally 30 seconds, screed (level) to a smooth surface with a wooden float, and level off with a metal straightedge drawn across the top with a sawing motion. Cure for not less than 14 days, then cut the block into 25 by 50 by 75 mm (1 by 2 by 3 inch) test blocks, using a 40 to 60 grit diamond saw blade at a peripheral speed of 50.8 ± 1.3 meters per second ($10,000 \pm 250$ feet per minute), cutting the face to be bonded in a vertical plane and allowing vertical selvages of 1 inch or more for discard. While the blocks are still wet from the sawing operation, scrub the surfaces lightly with a stiff-bristle brush, under running water. Store the blocks under lime-saturated water maintained at standard-condition temperature. Stocks of prepared blocks may be stored under standard conditions indefinitely, but blocks shall be immersed in lime-saturated water for not less than 7 days prior to use.

4.4.6.3 Specimen preparation. Prepare six bond test specimens (12 blocks) as follows: Remove blocks from the storage water individually, scrub the 50- by 75-mm (2- by 3-inch) faces lightly with a stiff bristle brush, under running water, and resubmerge in fresh tap water until all blocks have been scrubbed. Remove all blocks from the water and lightly blot with an oil-free, soft, absorbent cloth or paper to remove all free surface water. Place the blocks, three each, with 50- by 75-mm faces down, centered and uniformly spaced 25 mm (1 inch) apart on sheets of blotting paper placed on a plane, solid, nonabsorbent surface. The sheets shall be approximately 100- by 240-mm (4- by 9.5-inch) size, cut from material having a maximum absorption time of 28 seconds as measured by TAPPI T431 (see 6.6.5). Three blocks shall be placed on each sheet. At the end of 1 hour, assemble pairs of concrete blocks to provide test specimens. Complete setup and pour within 1 hour. Spacers and base plate shall have nonadherent, nonreactive surfaces (see 4.4.4.1). Place spacer strips not less than 6.35-mm (0.25-inch) thick on a base plate to form an open space 12.7-mm (0.5-inch) wide and 50-mm long. Place pairs of the concrete blocks on the spacers so that the 25- by 75-mm faces are on the spacers, and the 50- by 75-mm faces which were against the blotting paper form the space to be filled with sealant. Space the blocks 12.7 ± 0.1 mm (0.500 ± 0.005 inch) apart with 12.7 ± 0.1 mm square by 75-mm long spacers. Corners may be slightly rounded, but discard spacers having a diagonal dimension of less than 16.51 mm (0.650 inch). Place these spacers at a distance from the ends of the blocks so that an opening 12.7 ± 0.1 by 50 by 50 mm (0.500 ± 0.005 by 2.0 by 2.0 inches) is formed. Place spacer strips not less than 12.7-mm thick on top of the blocks to provide for an overfill. Clamps or other suitable means may be used to hold the blocks and overfill spacers in position. Pour sealant prepared in accordance with 4.4.2 into the space between the blocks in sufficient quantity to bring it at least even with the top of the overfill spacers, and in a manner essentially to exclude air pockets. After specimens have cooled to room temperature, remove the excess sealant protruding beyond the top and bottom of the blocks by trimming with a hot knife or spatula. If the material shrinks on cooling below the top of the blocks, or if other casting defects are apparent, discard the specimens and prepare additional ones. Cool the specimens for at least 2 hours, but no more than 24 hours, at standard conditions before subjecting them to test conditions.

4.4.6.4 Nonimmersed bond. Condition three bond test specimens, with spacers maintaining the 12.7-mm (0.500-inch) dimensions, at the test temperature, $-29 \pm 1^\circ\text{C}$ ($-20 \pm 2^\circ\text{F}$), with forced air circulation, for not less than 4 hours. Then extend the specimens 6.35 mm (0.25 inch) at a uniform rate of 3.18 mm (0.125 inch) per hour, while maintaining the specimens at the test temperature. Remove the specimens from the extension machine, reinsert the 12.7-mm spacers, and examine the specimens as described in 4.4.6.6. Then permit the specimens to return to the original dimensions at standard conditions, resting each specimen on one concrete block so that the weight of the top block recompresses the joint sealant. Three cycles of conditioning, extension, and recovery shall be completed within 5 days after the start of the first cycle, and shall constitute one complete test for nonimmersed bond (see 4.4.6.6). When initiation of the second or third cycle is delayed, store the specimens at the test temperature.

4.4.6.5 Water-immersed bond. Insert thinner spacers between the concrete blocks of the other three bond specimens, so that an opening of not less than 6.35 by 12.7 by 50 mm (0.25 by 0.5 by 2 inches) will be produced and maintained between the spacers and the sealant. Using covered containers deep enough to provide a minimum of 12.7 mm of water cover, immerse the specimens for 96 hours in 500 cc (16.9 ounces) of distilled or deionized water per specimen, and maintain at standard conditions. Place the specimens with the concrete blocks in a horizontal position. Three specimens may be placed in one container provided the water-to-specimen ratio is maintained. At the end of the 96-hour immersion period, remove the specimens from the water, remove the spacers, and remove the excess surface water from the specimens with a soft, dry absorbent material. Subject the specimens to conditioning and extension test as specified in 4.4.6.4. Three cycles of immersion, conditioning, extension, and recovery shall constitute one complete test for water-immersed bond (see 4.4.6.6).

4.4.6.6 Bond-test results. Remove the bond-test specimens from the extension machine within 30 minutes after the completion of the extension of each of the first two test cycles, and examine the specimens for obvious separations within the sealant and between the sealant and the blocks, without distorting or manually causing extension of the specimens. Immediately upon completion of the final extension, insert both sets of spacers, or otherwise maintain 50 percent extension during examination, and examine the specimens thoroughly, while still frozen, for separations between the sealant and the blocks, and within the sealant, including surface cracks. This shall be accomplished without distorting the specimens, but after recovery as specified in 4.4.6.4, the specimens may be extended uniformly up to 6.35 mm (0.25 inch) to permit further detailed examination. Determine conformance to the requirements of 3.6.

4.4.7 Compatibility with asphalt.

4.4.7.1 Specimen preparation. Prepare duplicate specimens of hot-mix asphaltic concrete, not less than 100 mm (4 inches) in diameter and 64 mm (2.5 inches) high, using 85-100 penetration asphalt cement. Density and asphalt content of the specimens shall be for an asphaltic concrete pavement

mix design and design method as specified (see 6.2 and 6.7). Specimens other than circular, but of similar dimensions and properties may be used. Allow the specimens to cool to room temperature, then cut a groove 100 mm (4 inches) long by 13 ± 3.2 mm (0.5 ± 0.125 inch) wide by 19 ± 3.2 mm (0.75 ± 0.125 inch) deep in the top surface of each specimen by wet sawing with a power-driven masonry saw. Remove all residue from the grooves by scrubbing with a stiff-bristle brush under running water. Allow the specimens to return to room temperature, then securely wrap with cloth-backed adhesive tape, or otherwise reinforce to prevent slumping during the test period. Caulk the ends of the grooves to prevent leaking. Pour sealant, prepared in accordance with 4.4.2, into the groove, overflowing slightly but not allowing overflow onto the adjacent asphaltic concrete surface. Allow the specimens to cool to room temperature, then trim any overflow flush, using a hot knife blade.

4.4.7.2 Procedure. Place the specimens in a forced-draft oven maintained at $60 \pm 3^\circ\text{C}$ ($140 \pm 5^\circ\text{F}$) for 168 ± 2 hours. Inspect at least once each day to prevent slumping. Immediately after removing from the oven, and again after cooling to standard conditions, examine the specimens for incompatibility of sealant with the asphaltic concrete. Determine conformance to the requirements of 3.7.

4.5 Toxicological data and formulations. The manufacturer shall provide a listing of the components in the sealant that could give off hazardous vapors, when heated (see 5.3.3). Where precautions need to be taken relative to the inhaling of, or skin and eye contact with the vapors, these precautions shall be included in the manufacturer's instructions (see 3.9 and 5.3.3.1).

4.6 Inspection of preparation for delivery.

4.6.1 Sampling. Sampling for inspection of filled containers shall be in accordance with MIL-STD-105, inspection level II. The unit of product shall be one unit prepared for shipment.

4.6.2 Examination. Each filled container selected shall be inspected for conformance to the requirements of section 5. Inspection shall be based on an Acceptable Quality Level of 2.5 percent defective.

5. PREPARATION FOR DELIVERY

5.1 Packing. Packing shall be level A, B, or commercial as specified (see 6.2).

5.1.1 Level A. Material shall be packed in a close-fitting, tapered 24-gage metal pail with gasket and lug cover. Pails shall be provided with a polyethylene liner. Pails shall have a wire handle securely attached to ears or clips which shall be attached to the body of the pails. The exterior surfaces of the pails shall be coated as specified in PPP-P-704. The unit pack quantity shall be one unit of issue quantity specified in the contract or purchase order.

5.1.2 Level B. Material shall be packed the same as for level A except that the exterior surfaces of the pail shall be coated with a commercial coating.

5.1.3 Commercial. The material shall be packed to insure carrier acceptance and safe delivery at destination in containers complying with the rules and regulations applicable to the mode of transportation.

5.2 Palletization.

5.2.1 Level A. Unless otherwise specified (see 6.2), material shall be palletized in accordance with MIL-STD-147.

5.2.2 Level B and Commercial. When specified (see 6.2), material shall be palletized in accordance with MIL-STD-147.

5.3 Marking.

5.3.1 Civil agencies. Shipments to civil agencies shall be marked in accordance with FED-STD-123.

5.3.2 Military agencies. Shipments to military agencies shall be marked in accordance with MIL-STD-129.

5.3.3 Special marking. In addition to the marking of 5.3.1 or 5.3.2, and any special marking of the contract or order, the following information shall be shown on each pail:

- a. Name of sealant
- b. Specification number
- c. Manufacturer's name and material designation
- d. Manufacturer's lot and batch number
- e. Date of manufacture (month and year)
- f. List of hazardous components (see 4.5)
- g. Quantity of sealant in pail (net weight)
- h. Application or pouring temperature
- i. Safe heating temperature
- j. Instructions for use

5.3.3.1 Instructions for use. The instructions for use (see 6.8) shall include, but not be limited to: ambient temperature and humidity ranges, and moisture conditions of joints, for successful installation; essential requirements for preparation of joints, heating of the sealant, handling, placing, and disposal of the hot materials; and any restrictions to be adhered to in order to reduce hazards to personnel or to the environment. If it is not feasible to include all the instructions on the container without sacrificing legibility, the most important information shall be shown on the container and the full instructions referenced and furnished separately.

6. NOTES

6.1 Intended use. This sealant is intended for sealing joints and cracks in pavements not subject to spillage of jet fuels and lubricating oils. It is not intended to be resistant to the heat and blast of jet aircraft engines, except when aircraft are moving at moderate speeds.

6.2 Ordering data. Purchasers shall select the preferred options permitted herein, and include the following information in procurement documents:

- a. Title, number, and date of this specification.
- b. When stability samples are required, quantity to be retained, and by what activity (see 3.8 and 6.4).
- c. Addressees for submission of MSDS (see 3.10 and 6.5).
- d. Sampling, if other than as specified (see 4.3).
- e. Designation of Government-approved test facility (see 4.4).
- f. Density and asphalt content values for asphaltic concrete pavement mix design and design method required (see 4.4.7.1).
- g. Level of packing required (see 5.1).
- h. If palletization is not required for level A (see 5.2.1).
- i. When palletization is required for level B or commercial (see 5.2.2).

6.3 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL) and invokes the provisions of paragraph 52.227-7031 of the Federal Acquisition Regulations (FAR), the data requirements will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL (DD Form 1423) incorporated into the contract. When the provisions of FAR 52.227-7031 are not invoked, the data shall be delivered in accordance with the contract requirements (see 3.10).

6.4 Stability samples. The date of delivery will be marked on samples submitted for stability testing (see 3.8).

6.5 MSDS submission and forwarding. MSDS copies will be forwarded to the designated Industrial Hygienist and the focal point of the activity that purchased the item, and the focal point of the using activity if different. After review and acceptance of MSDS by designated recipients, approved copies will be forwarded to arrive at destinations prior to material delivery (see 3.10).

6.6 Availability of testing materials and apparatus. Known suppliers of specified testing materials and apparatus are as follows:

6.6.1 Melting unit. A unit as specified in 4.4.2.1: Laboratory Melter Model BLM-100, Berry Corporation, P.O. Box 337, Nicholasville, KY 40356.

6.6.2 Release agent. An agent as specified in 4.4.4.1: Dow Corning 20 release coating, Dow Corning Corporation, Midland, MI 48640.

6.6.3 Concrete blocks. Blocks as specified in 4.4.6.2: U.S. Army Corps of Engineers, Missouri River Division Laboratory, 420 South 18th Street, Omaha, NE 68102.

6.6.4 Thermoplastic resin. A resin as specified in 4.4.6.2.1: Vinsol NVX resin, Hercules, Inc., Hercules Plaza, Wilmington, DE 19894.

6.6.5 Blotting paper. Paper as specified in 4.4.6.3: White Reliance Blotting Paper, Product Code 13-01-12, James River Paper Co., Inc., 145 James Way, Southampton, PA 18966.

6.7 Asphalt compatibility specimens. The specimens of hot-mix asphaltic concrete as specified in 4.4.7.1 may be prepared by the methods of ASTM D1074, D1559, or D1561.

6.8 Precautions. Sealant will be damaged by heating at too high a temperature, reheating, or by heating for too long a time. The temperature of the sealant in the heating equipment should never exceed the safe heating temperature set by the manufacturer. Any given quantity of material should never be heated at the application or pouring temperature for more than 3 hours and should never be reheated. Sealant left in the equipment at the end of the day's work should be removed and discarded. The sealant should be heated in a kettle or tank constructed as a double boiler, with the space between the inner and outer shells filled with heat transfer oil. Positive thermostatic control, mechanical agitation, and recirculating pumps should be provided to maintain uniform temperature of the oil and sealant. Direct heating is not permitted. Thermometers should be provided for continuous temperature readings of both oil and sealant. The kettle or tank should be covered at all times possible during use in order to minimize release of volatile and particulate material (see 5.3.3.1).

MILITARY CUSTODIANS:

Army - CE
Navy - YD
Air Force - 99

Review Activities

Army - MD, MR
Navy - MS

CIVIL AGENCY COORDINATING ACTIVITIES:

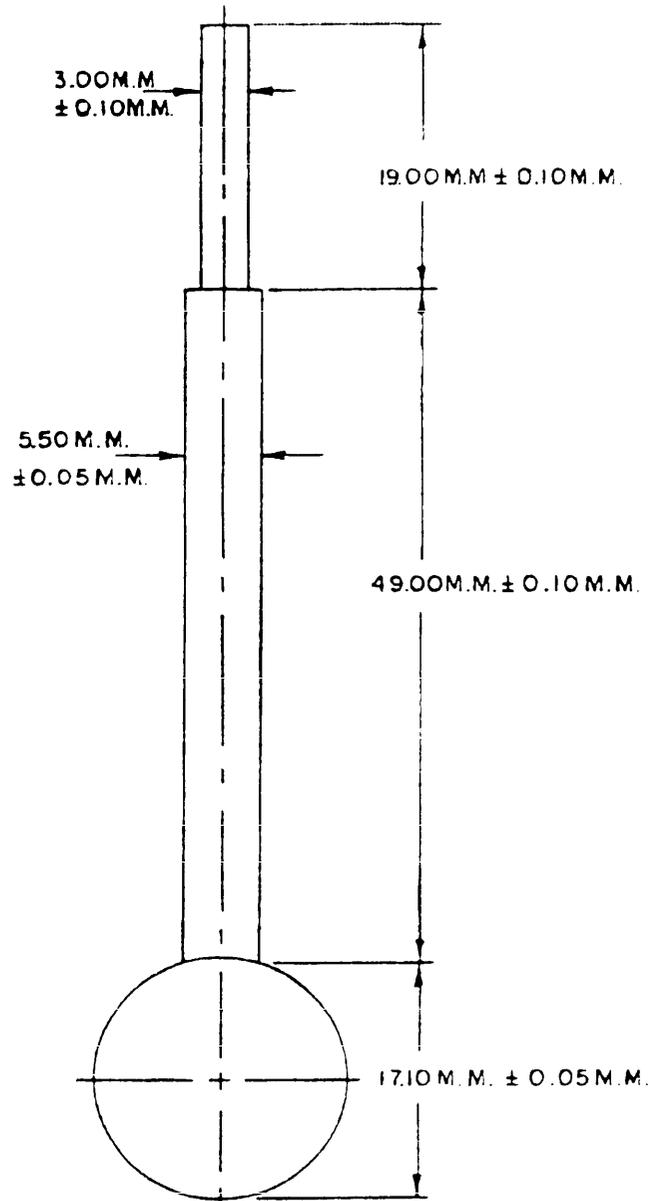
GSA - FSS
COM - NBS

PREPARING ACTIVITY:

Navy - YD

DoD project 8030-0463

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein.



NOTES:

MATERIAL: STEEL

TOOL WEIGHT: 27.50 GRAMS PLUS OR MINUS 0.10 GRAMS

TOTAL WEIGHT ON SPECIMEN: 75.00 GRAMS PLUS OR MINUS 0.01 GRAM.

Figure 1 BALL PENETRATION TOOL

BX1590A