GDT 62

A. Scope

For a complete list of GDTs, see the Table of Contents.

This method of test covers the procedure for testing hot poured joint sealing material.

B. Apparatus

1. Containers—Ointment boxes (OC-10) of 3 and 6 oz.(89 and 177 ml) capacity.
2. Penetrometer Cone—Stainless steel or brass cone with a detachable hardened steel or stainless steel tip, conforming to the dimensions shown in Figure 1 (metric). The outside surface of the cone and tip shall have a smooth finish. The total moving weight of the cone and attachments shall be 5.3 ± 0.0000035 oz (150 + 0.1 g).
3. Penetrometer—Standard penetrometer except with penetration tool as shown in Figure 2 (metric).
4. Oven—A forced draft oven capable of maintaining a temperature of 158 ± 2 °F (70 °C ± 1 °C) for 168 ± 2 hours, and/or a temperature of 140 ± 2 °F (60 °C ± 1°C) for 5 hours.
5. Extension Machine—Used in the bond test and so designated that the specimen can be expanded 6.35 mm at a uniform rate of approximately 3.175 mm per hour. Consists essentially of one or screws rotated by an electric motor through suitable gear reductions. Provide self-aligning plates or grips, one fixed and the other carried by the rotating screw or screws, for holding the test specimen in position during the test.
6. Concrete Test Block Molds—A metal mold with a metal base plate with means provided for securing the base plate to the mold in a watertight condition. The inside measurement of the mold shall be 254 mm, 444.5 mm long, and 76.2 mm deep.
7. Molds and Metal Plates—Molds and metal plates as specified in 6.1 Method 223.11, Federal Specifications SS-R-406.
8. Water Bath—A water bath of approximately 5.3 gal (20 liter) capacity.
9. Freezer—A freezer with inside dimensions sufficient for accommodating tension machine and capable of maintaining a temperature of - 0 °F ± 2 °F (-17.8 ± 1° C).

C. Sample Size and Preparation

Select a portion of the sample weighing approximately 800 g using a method that avoids inclusion of the surface layer. Of this quantity, heat 0.44 lb (200 g) to a pouring consistency with continued stirring, and work in a clean container placed in an oil bath or similar heating unit. Do not allow the temperature of the bath to exceed the recommended pouring temperature by more than 75 °F (24 °C), and never more than 550 °F (288 °C.

Add the remaining 1.3 lb (600 g) in quantities of approximately 0.1 lb (50 g) at a time to the melted material with continued stirring and working. Occasionally observe the temperature of the material, and continue heating and working until the temperature of the sample reaches the manufacturer's recommended pouring temperature. When the recommended pouring temperature is not supplied by the manufacturer, continue heating and working until the entire sample has a fluid consistency that allows easy pouring. In this case, the temperature of the oil bath shall be initially 400 °F (204 °C), and allowed to increase as necessary to reach the proper pouring consistency within a reasonable time. Never allow the temperature of the bath be more than 75 °F (24° C) greater than the ultimately determined pouring temperature.

Discard the first 0.1 lb (50 or 60 g) of material discharged from the melting pot. Pour all test specimens from the remaining material within 10 minutes.

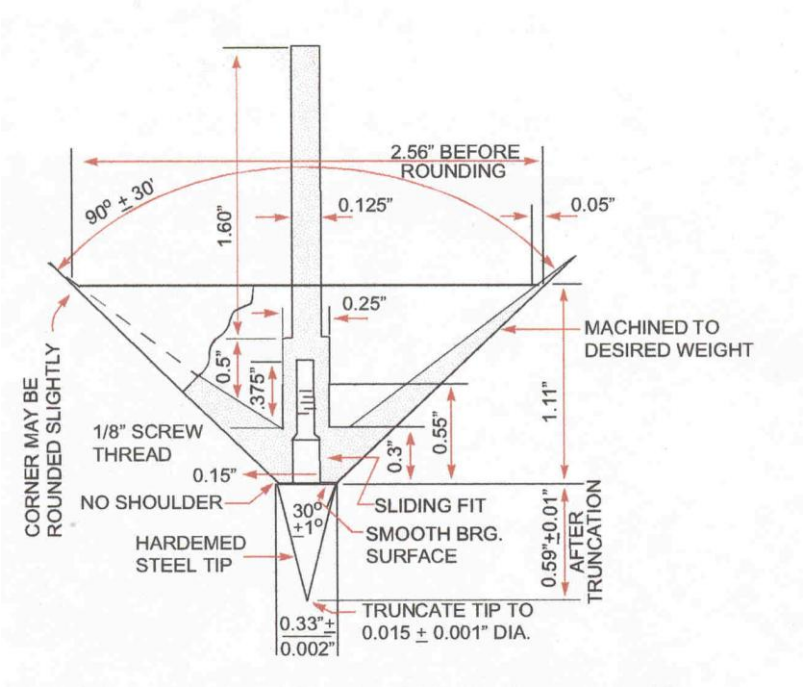

Figure 1

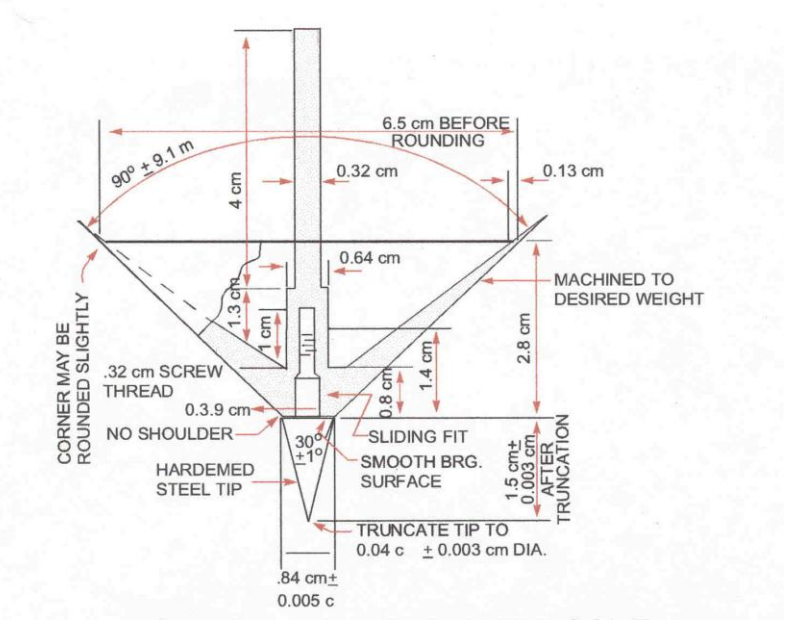

Figure 1 (metric)

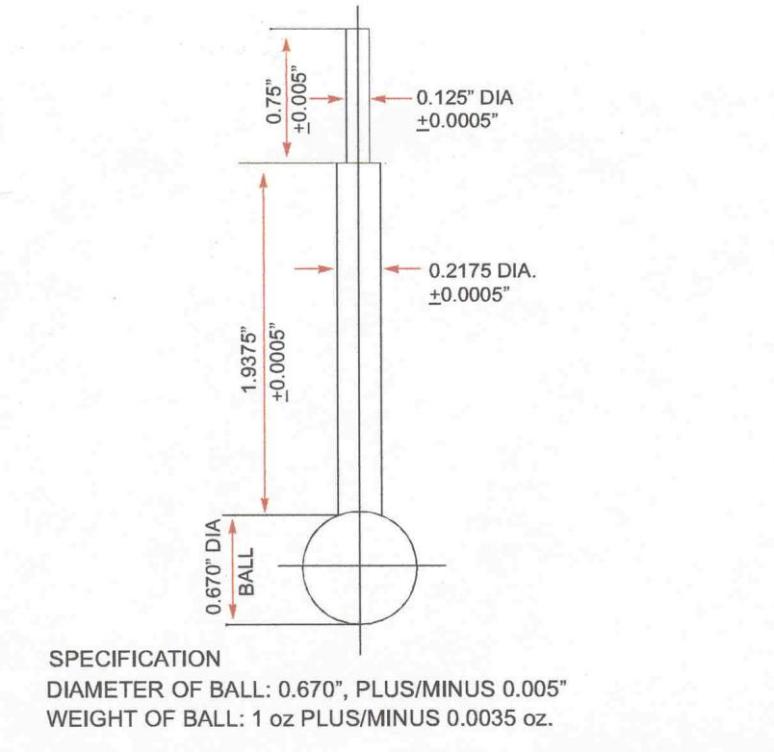

Figure 2

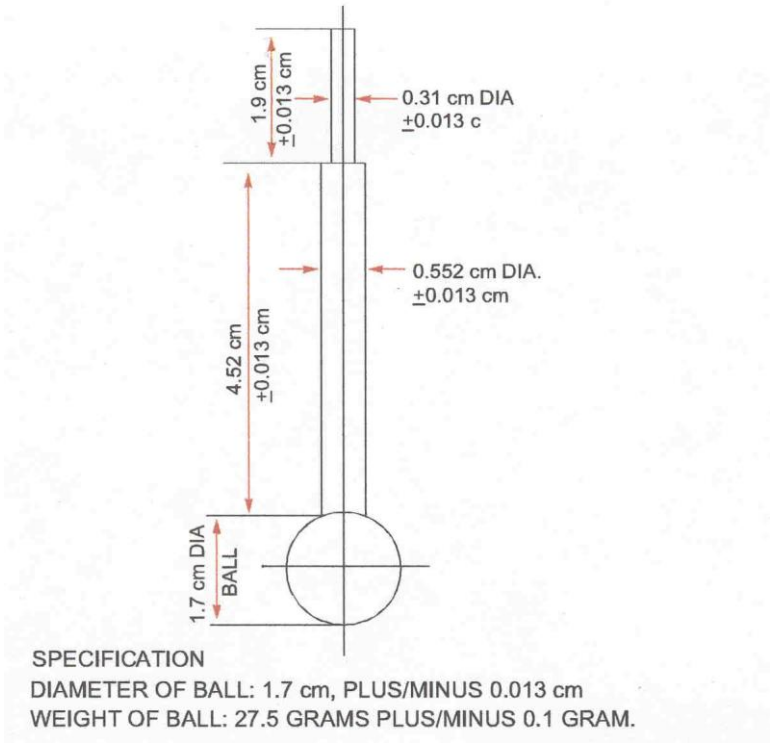

Figure 2 (metric)

D. Procedures

Procedures consist of several areas, including test blocks, safe heating temperature, penetration, flow, resilience, bond to concrete, compatibility, and retests.

1. Test Blocks

   For concrete, the coarse aggregate shall consist of crushed limestone having water absorption as determined by AASHTO T-85 of not more than 1.5 percent. The fine aggregate shall consist of crushed limestone manufactured from the same parent rock as the coarse aggregate. Gradation of the aggregate shall be shown in Table I. The Portland cement shall conform to ASTM C-150, Type II.

   The concrete shall have a water-cement ratio of 5.5 gal (20.8 liters) per 94 lb (42.6 kg) bag of cement, a cement factor of 6 + 0.5 bags per cubic meters of concrete, and a slump of 2.5 + 1/2 in (63.5 + 12.7 mm). The ratio of fine aggregate to total aggregate shall be approximately 40% by solid volume. The air content shall be 5.0 ± 0.5% and shall be obtained by the addition to the batch of an approved air-entraining admixture.

   a. Prepare the concrete according to ASTM C-192.
   b. Fill the mold to overflowing with concrete, and vibrate externally at approximately 4,600 vibrations per minute for 30 seconds. Screed (level) to a smooth surface with a wooden float, and level off with a metal straightedge drawn across the top surface with a sawing motion. Cure according to ASTM C-192.
   c. After the concrete blocks are cured for not less than 28 days, cut the concrete blocks into 1 in (25 mm) x 2 in (50 mm) x 3 in (75 mm) test blocks using a concrete saw having a diamond cutting edge, as follows:
      1) Cut the block in half, that is, divide the 10 in (250 mm) face yielding two blocks 17.5 in (445 mm) long.
      2) Cut each of these blocks into two 2 in (50 mm) x 17.5 in (445 mm) x 3 in (75 mm) blocks by taking cuts at a distance of mm from the sawed face.
      3) Saw each of the four 2 in (50 mm) x 17.5 in (445 mm) x 3 in (75mm) slabs into twelve 1 in (25 mm) x 2 in (50 mm) x 3 in (75 mm) blocks. Discard the 2 in (50 mm) x 3 in (75 mm) selvage that was in contact with the mold.
      4) While the blocks are still wet from the sawing operation, lightly scrub the surfaces with a stiff-bristle brush while holding under a stream of running water. Store the blocks under laboratory-controlled atmospheric conditions.

2. Safe Heating Temperature

   Safe heating temperature is the highest temperature to which the joint sealing material can be heated and still conform to the flow requirements. Determine the safe heating temperature by further heating the material that remains after preparing the flow, penetration, bond, and compatibility test specimens, raising the temperature of the bath, if necessary, and preparing additional flow test specimens. Prepare 3 or more such additional flow test specimens from the material, and increase the temperature of the material by 20 °F (-6.6 °C) intervals. The first specimen in this series must pass the flow test.

3. Penetration

   Perform this test according to AASHTO T-49, except use a penetration cone in place of the standard penetration needle.

4. Flow

   Pour a portion of the sample (prepared according to Procedures) into a suitable amalgamated mold 4 cm wide by 6 cm long by 0.32 cm deep placed on a clean metal panel. Fill the mold with an excess of material. Allow the test specimen to cool at room temperature for at least 30 minutes; then trim the specimen flush with the face of the mold using a heated metal knife or spatula. Remove the mold and place the panel containing the sample in a forced draft oven maintained at 140 °F + 2 ° F (60 °C + 1 °C) for 5 hours. During the test, mount the panel so that the longitudinal axis of the specimen is at an angle of 75 °F ± 1 °F (24 °C ± 0.5 °C) with the horizontal, and the transverse axis is horizontal. Measure the change in length in centimeters of the specimen during the 5 hour test period, and report as the flow.

5. Resilience

   Prepare specimens and then perform the procedure.

   a. Preparation of Specimens

      Prepare two specimens using 6 ounce (177 ml) ointment boxes filled to within 1/4 in (6 mm) of the top. Cure these specimens 24 hours under standard laboratory conditions before testing. Further condition the specimens to be oven-aged in a forced draft oven, and maintain at a temperature of 158 °F ± 2 °F (70 °C ± 1 °C) for 168 ± 2 hours. Follow this with conditioning at room temperature for 1 1/2 hours, and then immerse in a water bath maintained at 77 °F ± 0.2 °F (25° ± 0.1 °C).

   b. Procedure

      Test the unaged specimen conditioned for 1 1/2 hours in a water bath maintained at 77 °F ± 0.2 °F (25 °C + 0.1 °C) and the oven-aged specimen with a standard penetrometer in which the ball penetration tool shown in Figure 1 (metric) has been substituted for the needle. You may lightly dust the surface of the specimen with talc, and immediately remove the excess by blowing, or you may lightly coat the ball of the penetrometer with glycerine.

      Follow this procedure to perform the test:

      1) Place the ball of the penetrometer in contact with the surface of the specimen and set the indicating dial to zero. Position a light so that you can readily observe initial contact of the ball with the surface of the specimen.
      2) Release the ball penetration tool, and allow it to penetrate the specimen for 5 seconds. Record the reading as Ball Penetration (P) in centimeters to the nearest hundredth.
      3) Without returning the dial pointer to zero, press the ball penetration tool down an additional 1.00 centimeter (i.e. to a reading of P + 1.00) at a uniform rate in 10 seconds.
      4) Reengage the clutch to hold the tool down for an additional 5 seconds. During this time, return the dial to and record the final dial reading (F in centimeters).
      5) Make determinations at 3 points equally spaced from each other and not less than 1/2 in (13 mm) from the container rim. Compute the recovery (a measure of resilience) as follows:

         Recovery, percent - (F + 1.00 - F) x 100

      6) Record the average of the 3 determinations as the resilience.

6. Bond to Concrete

   Bond Test Specimens—Prepare 6 bond test specimens using the concrete blocks made as specified herein.

   Preparation of Specimens—When removing the blocks from storage, scrub the 2 in (50 mm) x 3 in (75 mm) faces of the blocks with a stiff bristle brush.

   A specimen shall consist of two blocks assembled as follows:

   a. Assemble pairs of the dry concrete blocks to provide test specimens as follows.
      1) Place spacer strips not less than 1/4 in (6 mm) thick on a base plate having a nonadherent and nonreactive surface to form an open space 1/2 in.(13 mm) wide and (50 mm) long.
      2) Place pairs of the concrete blocks on the spacers so that the 1 in (25 mm) x 3 in (75 mm) faces are in contact with the spacers and the 2 in (50 mm) x 3 in (75 mm) faces to be filled with the sealing compound.
      3) Space the concrete blocks 1/2 in (13 mm) apart using 1/2 in (13 mm x 1/2 in (13 mm) x 3 in (75 mm) spacers of metal or other suitable material with nonadherent surfaces. Corners may be slightly rounded, but discard spacers that have a diagonal dimension of less than 5/8 inch (16 mm) of the 1/2 in (13 mm) x 1/2 in (13 mm) cross-section. Place these spacers at a distance from the ends of the blocks so that an opening 1/2 in (13 mm) x 1/2 in (13 mm) x 2 in (50 mm) is formed.
      4) Place spacer strips not less than 1/2 in (13 mm) thick on top of the blocks to provide an over-fill. You may use rubber bands, clamps, or other suitable means to hold the blocks and the over-fill spacers in position.
      5) Pour sealer into the space between the blocks in sufficient quantity to bring it in at least even with the top of the over-fill spacers, and in a manner to essentially exclude air pockets.
      6) Cool the specimens to room temperature, then remove the excess sealer 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 preparation defects are apparent, discard the specimens and prepare additional ones.

7) Cool the specimen for at least 2 hours at standard conditions before subjecting them to test temperatures.

7. Non-immersed Bond

   a. Place 3 bond test specimens in an atmosphere maintained at 0 °F ± 2 °F (-17.8 ± 1 °C) for not less than 4 hours. Use a method that maintains the original 12.7 mm spacing during this period.

   b. Extend the specimen 6.35 mm at a uniform rate during the 2-hour extension period while maintaining at 0 °F ± 2 °F (-17.8 ± 1 °C) atmospheric temperature.

   c. Remove the test specimen from the extension machine, reinsert the 1/2 in (13 mm) spacers, and permit the specimen to return to its original dimensions at room temperature.

   d. Complete the 3 cycles of extension and recovery within 5 days after the start of the first cycle. This constitutes one complete test for non-immersed bond.

8. Water-immersed Bond

   a. Insert spacers between the concrete blocks of 3 conditioned bond specimens to produce and maintain a 1/2 in (13 mm) x 2 in (50 mm) opening between the spacers and the sealer.

   b. Immerse the specimen in suitable covered containers to provide a 1/2 in (13 mm) water cover for 96 hours in 16.9 oz (500 ml) of distilled or deionized water per specimen. Store under standard conditions. You may place 3 specimens in one container provided the water-to-specimen ratio is maintained.

   c. At the end of the 96-hour water-immersion period, remove the specimen from the water and remove the spacers. Remove the excess surface water from the specimen with a soft, dry, absorbent material. After removing the surface water, subject the specimen to the extension test as specified above.

   d. Two additional cycles shall constitute one complete test for water-immersed bond.

9. Bond-Test Results

   a. After the initiation of the bond tests specified, remove the bond-test specimens from the extension machine within 30 minutes after completing each extension of the test cycle.

      1) Examine the specimens for obvious separations within the sealer and between the sealer and the blocks without distorting or manually causing extension of the specimens.

      2) After completing the third extension and recovery, thoroughly examine the specimens for separations between the sealer and the blocks and within the sealer. Perform this step without distorting the specimens, but you may extend the specimens uniformly up to 1/4 in (6 mm) to permit detailed examination.

      3) The sealing compound shall have failed the tests if any specimen develops any surface crack, separation, or other opening in the sealing compound or between the sealing compound and the concrete blocks.

10. Compatibility

   a. Preparation of Specimens

      1) Prepare duplicate test specimens not less than 4 in (100 mm) in diameter and 1/4 in (6 mm) in height of hot mix asphaltic concrete, using 85-100 penetration grade asphalt cement. Prepared specimens according to ASTM Standard D-1561 are suitable for this purpose. Specimens that are other than circular, but with similar dimensions and properties are also acceptable.

         a) Density and asphalt content of the specimens will be those values which would be specified in a asphaltic concrete pavement mix design.

         b) Allow the test specimens to cool to room temperature. Afterwhich, cut a groove 4 in (100 mm) long by 1/2 in + 1/8 in (13 mm + 3 mm) wide by 3/4 in + 1/8 in (19 mm + 3 mm) deep in the top surface of each specimen by wet sawing with a power driven masonry saw. Scrub these grooves with a stiff-bristle brush while holding the specimens under running water to remove all residue from sawing.

         c) Allow the specimens to dry and return to room temperature. Afterwhich, securely wrap them with cloth-back adhesive tape, or otherwise reinforce them to prevent slumping or collapse during the ensuring test period.

d) Caulk the ends of the grooves to prevent leaking. Pour joint sealing compound prepared as described in Procedures into the grooves, overfill the grooves slightly. However, do not allow sealing compound to overflow onto the surface of the asphaltic concrete adjacent to the grooves.

e) After the sealing compound has cooled to room temperature, remove any overfill of sealing compound with a hot knife so that the surface of the sealing compound is even with the surface of the specimens.

b. Test Procedures

Place the duplicated specimens in a forced draft oven and maintain at a temperature of 140 °F ± 5 °F (60 °C ± 3 °C) for 168 hours. Inspect the specimens at least once each day to prevent slumping or collapse during test period.

c. Compatibility Test Results

Immediately after removing from the oven and again after cooling to room temperature, examine the specimens for incompatibility of the sealing compound with the asphaltic concrete. Any evidence of failure in adhesion, formation of an oily exudate at the interface between the sealing compound and the asphaltic concrete, and softening or other deleterious effects on the asphaltic concrete shall be caused for rejection of the sealing compound.

d. Retests

Retest any sample which, when prepared and tested according to this method, fails to meet all of the requirements. Perform the retest as follows:

Submit 2 additional samples from which 2 series of specimens shall be prepared and tested. Both series shall be required to meet all of the requirements of the Specifications. Failing of either or both series shall mean rejection of the material. See Table 1, below.

Aggregate for Bond Test Blocks		
Type Aggregate	**Sieve Size**	**Passing Percent**
Coarse	3/4 in (19 mm)	97 to 100
	1/2 in (12.5 mm)	63 to 69
	3/8 in (9.50 mm)	30 to 36
	No. 4 (4.75 mm)	0 to 3
Fine	No. 4 (4.75 mm)	100
	No. 8 (2.36 mm)	82 to 88
	No. 16 (1.18 mm)	60 to 70
	No. 30 (600 µm)	40 to 50
	No. 50 (300 µm)	16 to 26
	No. 100 (150 µm)	5 to 9

E. Calculations

No calculations are needed.

F. Report

No report is listed for this method.