Designation: D 3407 – 78 (Reapproved 1994)$^{\epsilon 1}$

An American National Standard

AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 Race St Philadelphia, Pa 19103
Reprinted from the Annual Book of ASTM Standards Copyright ASTM
If not listed in the current combined index, will appear in the next edition

Standard Test Methods for Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements[1]

This standard is issued under the fixed designation D 3407; 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.

$^{\epsilon 1}$ NOTE—Keywords were added editorially in June 1994.

1. Scope

1.1 These test methods cover the following tests for bituminous hot-poured types of joint sealants for portland cement concrete and asphaltic concrete pavements: cone penetration, flow, bond at low temperatures, resilience, asphalt compatibility, and prolonged heating.

1.2 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 33 Specification for Concrete Aggregates[2]
C 150 Specification for Portland Cement[3]
C 192 Practice for Making and Curing Concrete Test Specimens in the Laboratory[2]
D 5 Test Method for Penetration of Bituminous Materials[4]
D 217 Test Method for Cone Penetration of Lubricating Grease[5]
D 1074 Test Method for Compressive Strength of Bituminous Mixtures[4]
D 1559 Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus[4]
D 1561 Practice for Preparation of Bituminous Mixture Test Specimens by Means of California Kneading Compactor[4]

3. Sample Preparation

3.1 Select a sample of the fresh material, weighing approximately 600 g, in such a manner as to avoid inclusion of the surface layer or any container liner. Heat 200 g of the sample in a clean oil-jacketed melter equipped with mechanical agitation (see Figs. 1 and 2) to a pouring consistency. The temperature of the oil bath shall not exceed the safe heating temperature by more than 75°F (42°C) and, in no case, shall be more than 550°F (288°C). Add the remaining 400 g, in quantities of approximately 50 g at a time, to the melted material, continuing agitation. Continue the heating and stirring until the entire sample is at the maximum safe heating temperature.

4. Standard Conditions

4.1 The laboratory atmospheric conditions, hereinafter referred to as standard conditions, shall be: temperature 75 ± 7°F (24 ± 4°C), and relative humidity 50 ± 10 %. The specimens prepared as hereinafter prescribed shall be stored under standard conditions until needed for testing.

5. Penetration

5.1 Make this test in accordance with Test Method D 5, except use a penetration cone in place of the standard penetration needle. The cone shall conform to the requirements given in Test Methods D 217, except that the interior construction may be modified as desired. The total moving weight of the cone and attachments shall be 150.0 ± 0.1 g.

6. Flow

6.1 *Test Specimens*—Pour a portion of the sample prepared in accordance with Section 3 into a suitable (See Note 1) mold of 40 mm wide by 60 mm long by 3.2 mm deep, placed on a bright tin panel. Fill the mold with an excess of material. Allow the test specimen to cool at room temperature for at least ½ h; then trim the specimen flush with the face of the mold with a heated metal knife or spatula.

NOTE 1—A release agent should be used where it is necessary to separate the material being tested from the metal. A nontoxic, water-washable, release agent recommended for this purpose is prepared by grinding into a smooth paste a mixture of approximately 50 % talc, 35 % glycerin and 15 % by weight of a water-soluble medical lubricant.[6]

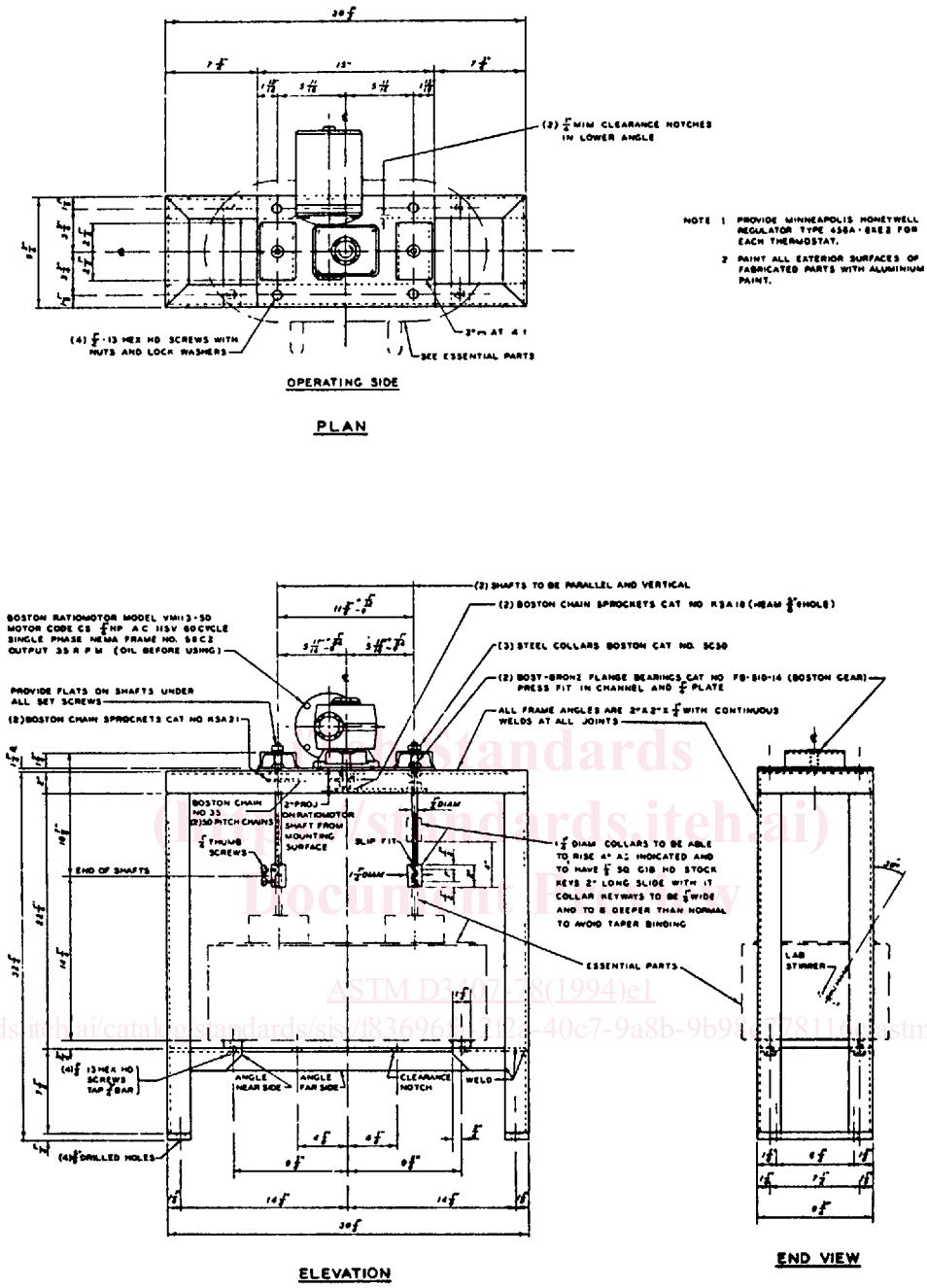
6.2 *Procedure*—Remove the mold and place the panel containing the sample in a forced-draft oven maintained at 140 ± 2°F (60 ± 1.1°C) for 5 h. During the test, mount the panel so that the longitudinal axis of the specimen is at an angle of 75 ± 1° with the horizontal, and the transverse axis is horizontal. Measure the change in length in millimetres of the specimen during the 5-h test period, and report as the flow.

[1] These test methods are under the jurisdiction of ASTM Committee D-4 on Road and Paving Materials and are the direct responsibility of Subcommittee D04.33 on Formed-In-Place Sealants for Joints and Cracks in Pavements.

Current edition approved Dec. 29, 1978. Published February 1979. Originally published as D 3407 – 75 T. Last previous edition D 3407 – 75 T.

[2] *Annual Book of ASTM Standards*, Vol 04.02.
[3] *Annual Book of ASTM Standards*, Vol 04.01.
[4] *Annual Book of ASTM Standards*, Vol 04.03.
[5] *Annual Book of ASTM Standards*, Vol 05.01.

[6] KY Jelly, available at drug stores, has been found suitable for this purpose.



DRIVE AND FRAME

FIG. 1 Joint Sealant Laboratory Melting Unit

7. Bond

7.1 *Extension Machine*—The extension machine used in the bond test shall be so designed that the specimen can be expanded 0.50 in. (12.7 mm) at a uniform rate of approximately ⅛ in. (3.2 mm)/h. It shall consist essentially of one or more screws rotated by an electric motor through suitable gear reductions. Self-aligning plates or grips, one fixed and the other carried by the rotating screw or screws, shall be provided for holding the test specimen in position during the test. A machine suitable for testing three specimens simultaneously is shown in Fig. 3.

7.2 *Concrete-Block Preparation:*

7.2.1 The aggregate shall conform to Specification C 33, except as specified herein. The aggregate grading shall be as shown in Table 1. The coarse aggregate shall consist of crushed limestone (plus 95 % $CaCo_3$) having a water absorption of not more than 1.5 %. The fine aggregate shall consist of crushed limestone and shall be manufactured from the same parent rock as the coarse aggregate. The portland cement shall conform to Specification C 150, Type II. The

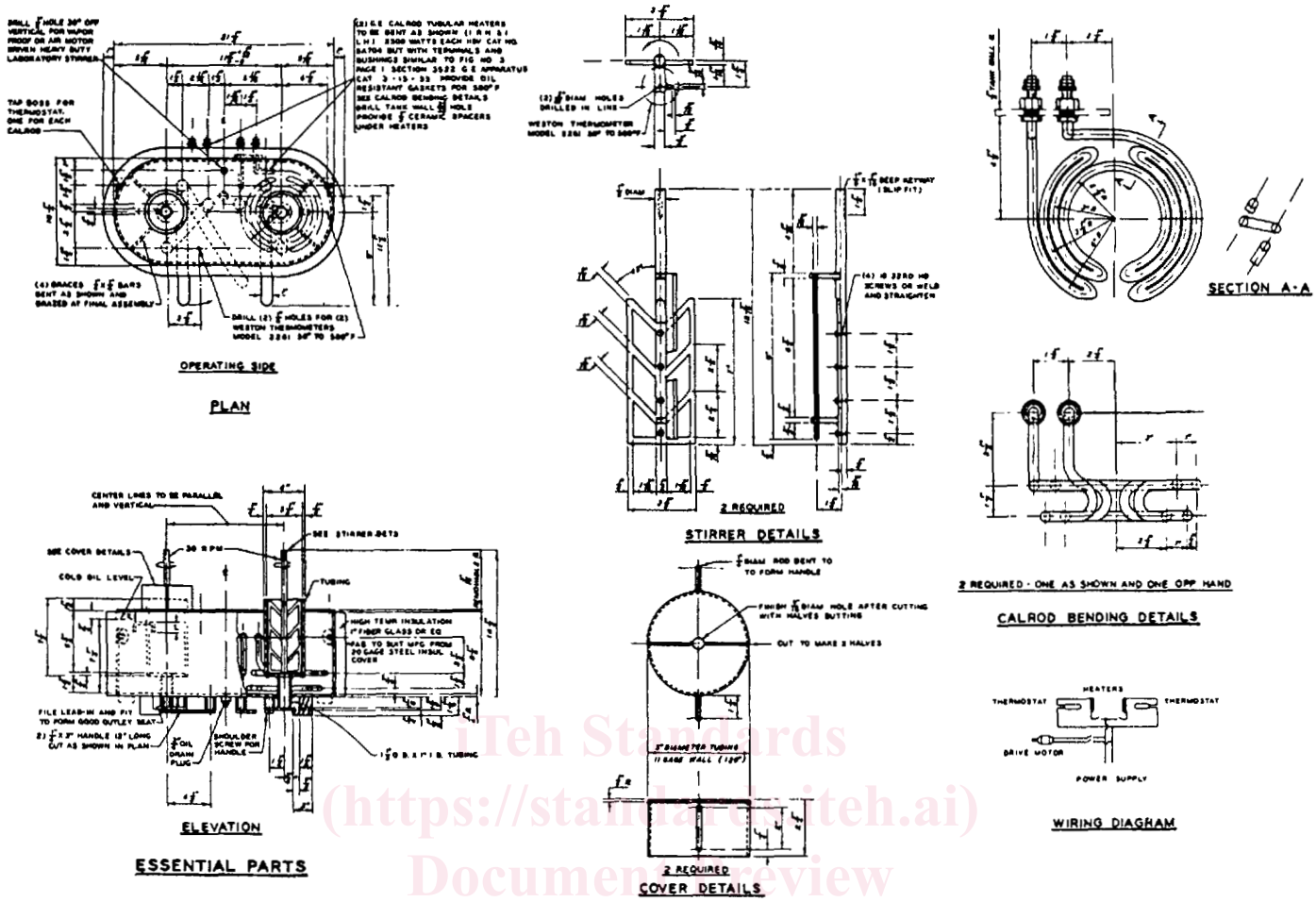


FIG. 2 Joint Sealant Laboratory Melting Unit

concrete shall have a water-cement ratio of 0.49, a cement factor of 6.0 ± 0.5 bags of cement per cubic yard (335 ± 30 kg/m^3), and a slump of 2½ ± ½ in. (63 ± 13 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 air-entraining agent such as a neutralized thermoplastic resin.[7] The mold shall be of metal and shall be provided with a metal base plate. Means shall be provided for securing the base plate to the mold. The assembled mold and base plate shall be water-tight and shall be oiled with mineral oil before use. The inside depth of the mold shall be 3 in. (75 mm). Prepare the concrete in accordance with the procedure described in Specification C 192.

7.2.2 Fill the mold with concrete to overflowing and vibrate externally for 30 s. Screed (level) the concrete to a smooth surface with a wooden float and finally level off with a metal straightedge drawn across the top with a sawing motion. Cure as specified in Specification C 192.

7.2.3 After curing for not less than 14 days, cut the concrete blocks into 1 by 2 by 3-in. (25 by 50 by 75-mm) test blocks, discarding the 1-in., (25-mm) strips that were in contact with the vertical sides of the mold using a 40 by 60-grit diamond saw blade at a peripheral speed of 10 000 ± 250 ft/min (3050 ± 75 m/min). While the blocks are still wet from the sawing operation, scrub the surfaces of the blocks lightly with a stiff-bristle brush while holding under a stream of 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 immerse such blocks in lime-saturated water for not less than 7 days prior to use.

7.2.4 On removal from the storage water, again scrub the 2 by 3-in. (50 by 75-mm) faces of the blocks lightly with a stiff-bristle brush while holding the blocks under running water. When this operation is completed on individual blocks, again place them under water until all blocks to be used are prepared. When all blocks are scrubbed, remove them from the water and lightly (under laboratory standard conditions) blot with an oil-free, soft, absorbent cloth or paper to remove all free surface water.

7.3 *Test Specimens*—Prepare three test specimens. Mold each test specimen between two concrete blocks, as follows: Place four treated[5] brass spacer strips, approximately ¼ in. (6.4 mm) thick, on a treated metal plate base to enclose an open space ½ in. (13 mm) wide and 2 in. (50 mm) long. Place the blocks on the spacer strips and space them 0.500 ± 0.005 in. (12.70 ± 0.13 mm) apart by means of treated metal

[7] Vinsol resin, made by Hercules Inc., has been found satisfactory for this purpose.