Designation: D 3202 – 94

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Practice for Preparation of Bituminous Mixture Beam Specimens by Means of the California Kneading Compactor[1]

This standard is issued under the fixed designation D 3202; 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 practice covers the preparation of beams of bituminous paving mixtures by means of a mechanical compactor that imparts a kneading action compacting the beam by a series of individual impressions made with a ram.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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:*

D 1561 Practice for Preparation of Bituminous Mixture Test Specimens by Means of California Kneading Compactor[2]

3. Significance and Use

3.1 This practice provides a standard method for compaction useful to practitioners and researchers engaged in testing and evaluation of bituminous mixtures using beam form specimens.

4. Apparatus

4.1 *California Kneading Compactor*, mechanical, in accordance with Practice D 1561.

4.2 *Compactor Foot*—A ram 2.0 by 3.0 in. (50.8 by 76.2 mm).

4.3 *Rod*—A round-nose steel rod, ⅜-in. (9.5-mm) in diameter by 16-in. (406.4-mm) long.

4.4 *Mold*—A beam mold with inside dimensions 15 in. (381 mm) long by 3¼ in. (82.6 mm) wide and 4½ in. (114.3 mm) high as shown in Fig. 1.

4.5 *Leveling Bar*—A steel bar 14.94 in. (379.5 mm) long by 3.19 in. (81.0 mm) wide by 1.00 in. (25.4 mm) deep, stiffened by a beveled-ended spline 12.94 in. (328.6 mm) long by 1.00 in. wide by 1.00 in. deep, centered on and welded to the top of the bar; or a solid steel bar of equal length and width having depth sufficient to provide at least equal stiffness as determined by the moment of inertia about the neutral axis.

4.6 *Sliding Base Assembly*—An assembly attached to the kneading compactor with a hand wheel or other means for moving the mold laterally during compaction.

4.7 *Extraction Assembly*—A beam specimen extraction assembly as shown in Fig. 2.

NOTE 1—Copies of working drawing of the mold, sliding base assembly, leveling bar and extraction assembly suitable for construction of these pieces of apparatus are available as adjunct material.[3]

4.8 *Paper*, heavy sheets, 3.25 by 15 in. (82.6 by 381 mm).

4.9 *Ovens*, electric, capable of maintaining temperatures of 200 to 325 ± 5°F (93.3 to 162.8 ± 2.8°C).

4.10 *Testing Machine*, compression, having a minimum capacity of 50 000 lbf (222 kN).

4.11 *Balance*, having a capacity of 5 kg or more and sensitive to 1.0 g or less.

4.12 *Miscellaneous Apparatus*—Thermometer, spatulas, spoons, gloves, metal pans, and mechanical mixer.

5. Test Specimens

5.1 *Preparation of Mixture*—Prepare approximately 6800 g of the bituminous mixture in accordance with 5.1 and 5.2 of Practice D 1561 except for specific requirements given in 5.2 and 6 of this practice.

5.2 *Size of Specimens*—The beam test specimens shall have a rectangular cross section of 3¼ in. (82.6 mm) in width by 3½ in. (88.9 mm) in depth and a length of 15 in. (381 mm).

6. Procedure

6.1 *Temperatures*—The mixing temperatures shall be that corresponding to an asphalt viscosity of 170 ± 20 cSt. Compaction temperature shall be that corresponding to an asphalt viscosity of 500± 50 cSt.

6.2 *Molding Specimens*:

6.2.1 Heat the mold and the round-nose rod to the compaction temperature specified in 6.1. Lightly oil the mold and

---

[1] This recommended practice is under the jurisdiction of ASTM Committee D-4 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.20on Mechanical Tests of Bituminous Mixes.

Current edition approved July 15, 1994. Published September 1994. Originally published as D 3202 – 73. Last previous edition D 3202 – 83.

[2] *Annual Book of ASTM Standards*, Vol 04.03.

[3] Drawings are available at a nominal charge from ASTM Headquarters, 1916 Race St., Philadelphia, PA 19103. Request Adjunct No. 12-432020-08.

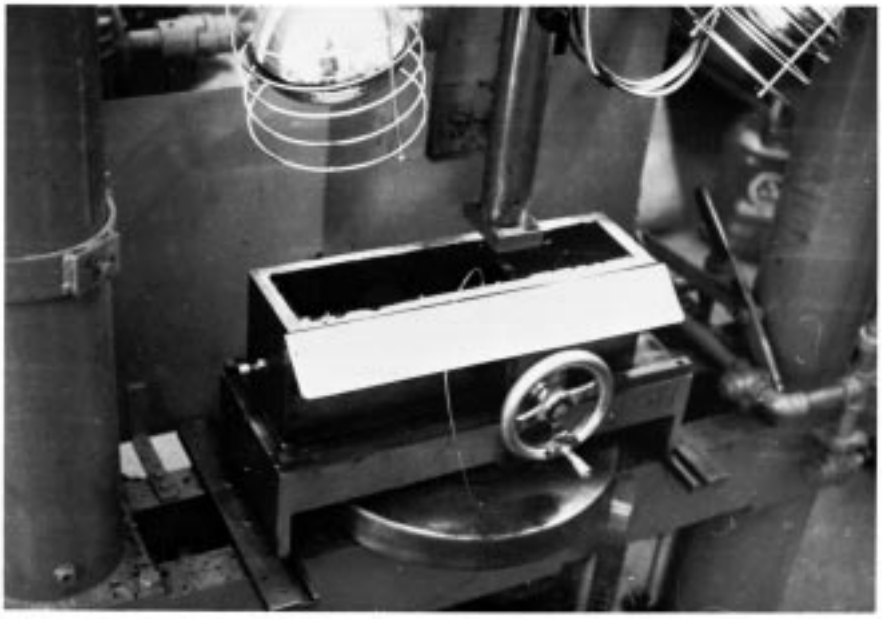

FIG. 1 Beam Mold Assembly in California Kneading Compactor

FIG. 2 Beam Extraction Assembly

tamping foot. Place three sheets of 3 ¼(82.6) by 15-in. (381-mm) paper on the mold base plate. Maintain the compactor foot sufficiently hot prevent the mixture from adhering to it.

6.2.2 The compaction process is in three layers with each layer having three levels of compaction. Each of the three layers is composed of one third of the required amount of

mixture for one specimen. After pouring the material for each layer into the mold in a uniform layer, rod the mixture 20 times in the center of the mass and 20 times around the edge by means of the round-nose rod. When applying tamping blows to the mixture, turn the base assembly hand wheel in order to move the mold laterally 1½-in. (38.1-mm) after each tamping blow. The first level of compaction for each layer is achieved by 20 tamps at 75 psi (517 kPa) foot pressure to allow the loose mix to settle. The second level of compaction is as follows: for the first layer, 15 tamps at 150 psi (1035 kPa); for the second layer, increase the number of tamps at the same pressure (150 psi or 1035 kPa); for the third layer, further increase the number of tamps at 150 psi (1035 kPa). The third level of compaction is as follows: for the first layer, 15 tamps at 300 psi (2070 kPa); for the second layer, at the same pressure (300 psi or 2070 kPa), increase the number of tamps; for the third layer, further increase the number of tamps at 300 psi (2070 kPa). The exact number of increased tamps depends on the air void content required and the type of mixture. If unstable material is involved and there is undue movement of the mixture under the compactor foot, reduce the foot pressure until the kneading compaction can be accomplished.

6.2.3 It is likely that there will be a buildup of mixture at one side of the compaction foot while the mold is progressively moved in one direction alone. This buildup of material leads to nonuniform compaction of the specimen. In order to avoid this buildup of material, start the compaction at one end of the mold and continue the compaction towards the center of the mold. After compaction to the center of the mold, start the compaction process from the other end of the mold and continue the compaction towards the center of the mold agian. Repeat this process until the required number of tamping blows is completed.

6.3 *Application of Static Load*—Immediately after compaction in the California kneading compactor, place the heated and slightly oiled leveling bar on top of the specimen. Using a compression testing machine, apply a static load on the specimen at the rate of 0.25 in. (6.4 mm)/min until an applied pressure of 300 psi (2070 kPa) is reached. Apply an increased pressure if the resulting air void content is higher than what is required. Maintain the applied pressure for a period of 1 min and then slowly release the pressure. After the compacted specimen has cooled sufficiently so that it will not deform on handling, remove it from the mold by means of the extraction assembly. Place the specimen on a smooth flat surface and allow it to cool to room temperature.