



# Standard Practice for Preparation of Bituminous Mixture Specimens for Dynamic Modulus Testing<sup>1</sup>

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## 1. Scope

1.1 This practice covers the preparation of cylindrical specimens of bituminous paving mixture suitable for dynamic modulus tests. The practice is intended for dense-graded bituminous concrete mixtures containing aggregate up to 25.0-mm maximum size.

1.2 The values stated in SI units are the standard.

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:*<sup>2</sup>

**D 1560** Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus

**D 1561** Practice for Preparation of Bituminous Mixture Test Specimens by Means of California Kneading Compactor

**D 3387** Test Method for Compaction and Shear Properties of Bituminous Mixtures by Means of the U.S. Corps of Engineers Gyratory Testing Machine (GTM)

## 3. Apparatus

3.1 *California Kneading Compactor*—When the California kneading compactor is used to prepare specimens, the apparatus shall be in accordance with Practice **D 1561**, except steel molding cylinders with [6-mm] wall thickness having an inside diameter of 100 mm and height of 250 mm shall be used.

3.2 *Corps of Engineers Gyratory Testing Machine*—When the Corps of Engineers gyratory testing machine is used to prepare specimens, the apparatus shall be as specified by Test

Method **D 3387**, except that only those models capable of producing 100-mm diameter by 200-mm high specimens are applicable. The dimensions of the molding cylinders for this machine shall be 100 mm in diameter by 300-mm long.

## 4. Test Specimens

4.1 *Preparation of Mixture*—Prepare approximately 4000 g of the bituminous mixture in accordance with Test Methods **D 1560** or Test Method **D 3387** to produce specimens 100 mm in diameter by 200 mm in height.

4.2 *Size of Specimens*—The cylindrical specimens shall be 100 mm in diameter by 200 mm in height.

## 5. Procedure

5.1 *Compaction Temperature*—The compaction temperature for bituminous mixtures shall be in accordance with Practice **D 1561** or Test Method **D 3387**, depending on which set of equipment is used.

5.2 *Molding Specimens*—Heat the compaction molds to the temperatures specified in 5.1.

5.2.1 Specimens prepared using the California kneading compactor shall be prepared using the following procedure for molding specimens. Place the compaction mold in position in the mold holder and insert a paper disk 100 mm in diameter to cover the base plate of the mold holder. Weigh out one half of the required amount of bituminous mixture for one specimen at the specified temperature and place uniformly in the insulated feeder trough, which has been preheated to the compaction temperature for the mixture. By means of the variable transformer controlling the heater, maintain the compactor foot sufficiently hot to prevent the mixture from adhering to it. By means of a paddle of suitable dimensions to fit the cross section of the trough, push 30 approximately equal portions of the mixture continuously and uniformly into the mold while 30 tamping blows at a pressure of 1.7 MPa are applied. Immediately place the remaining one half of the mixture uniformly in the feeder trough. Push 30 approximately equal portions of the mixture continuously and uniformly into the mold while 30 tamping blows at pressure of 1.7 MPa are applied (**Note 1**).

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.26 on Fundamental/Mechanistic Tests.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

NOTE 1—If sandy or unstable material is involved and there is undue movement of the mixture under the compactor foot, reduce compaction temperature and compactor foot pressure until kneading compaction can be accomplished.

5.2.1.1 *Application of Static Load*—Immediately after compaction in the California kneading compactor, apply a static load to the specimen using a compression testing machine. Apply the load by the double-plunger method in which metal followers are used as free-fitting plungers on top and bottom of the specimen. Apply the load on the specimen at a rate of 1.27 mm/min until an applied pressure of 6.9 MPa is reached. Release the load immediately. After the compacted specimen has cooled sufficiently so that it will not deform on handling, remove it from the mold. Place the specimen on a smooth flat surface and allow to cool to room temperature.

NOTE 2—Modifications in compactor foot pressure and number of tamping blows may be required to reproduce field pavement density or density values of specimens fabricated in accordance with Practice **D 1561**.

5.2.2 Specimens prepared using the U.S. Corps of Engineers gyratory testing machine shall be prepared using the following procedure for molding specimens. Follow the applicable portions of the procedure in accordance with Test Method **D 3387** with the exceptions noted in Sections **3** and **4**. Additionally, the compacted specimen shall be cooled to room temperature before ejection from the mold. Ejection can be facilitated greatly by placing the mold containing the specimen in a water bath at 60°C for about 5 min immediately before ejection.

NOTE 3—Attention is called to the fact that since the height of the specimen is monitored continuously, the density can be readily controlled to a predetermined value.

## 6. Keywords

6.1 bituminous; dynamic; mixture; modulus

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