



Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus¹

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1. Scope

1.1 This practice covers preparation and compaction of 102 mm (4 in.) diameter by nominal 64 mm (2.5 in.) high cylindrical bituminous paving mixture specimens by means of the original manual Marshall method and subsequent variations of the method (Test Method [D6927](#)). This practice is intended for use with laboratory and plant produced bituminous mixtures with aggregate up to 25 mm (1 in.) maximum size and for recompaction of asphalt pavement samples.

1.2 There are three types of Marshall compaction apparatus in use. The following types of hammer arrangements are included in this practice:

1.2.1 Manually held hammer handle attached to a flat compaction foot through a spring loaded swivel and is hand operated (original standard developed by the Corps of Engineers).

1.2.2 Hammer handle restrained laterally (fixed) but not vertically attached to a flat compaction foot through a spring loaded swivel and is either mechanically or hand operated. There may or may not be a constant surcharge on top of the hammer handle. Mechanical hammers are available that operate at (1) nominal 55 blows per minute and (2) equal to or greater than 75 blows per minute.

1.2.3 Hammer handle restrained laterally (fixed) with constant surcharge on top of hammer, a slanted compaction foot, rotating mold base, and is mechanically operated.

1.3 Although the mass and height of mass drop for each apparatus are the same, density achieved in compacted specimens with the same number of blows will be different. It is up to the user to establish the specific required number of blows to be used for compaction of the specimen in relation to the field.

1.4 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

¹ This practice is under the jurisdiction of ASTM Committee [D04](#) on Road and Paving Materials and is the direct responsibility of Subcommittee [D04.20](#) on Mechanical Tests of Bituminous Mixtures.

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1.5 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

2. Referenced Documents

2.1 *ASTM Standards*:²

- [D2493](#) Standard Viscosity-Temperature Chart for Asphalts
- [D3666](#) Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
- [D6927](#) Test Method for Marshall Stability and Flow of Asphalt Mixtures
- [E11](#) Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Significance and Use

3.1 Compacted bituminous mixture specimens molded by this procedure are used for various physical tests such as stability, flow, indirect tensile strength, fatigue, creep, and modulus. Density and voids analysis are also conducted on specimens for mixture design and evaluation of field compaction.

NOTE 1—Uncompacted mixtures are used for determination of theoretical maximum specific gravity.

4. Apparatus

4.1 *Specimen Mold Assembly*—Mold cylinders, base plates, and extension collars shall conform to the details shown in [Fig. 1](#).

4.2 *Specimen Extractor*—The specimen extractor shall have a steel disk that will enter the mold without binding and not be less than 3.95 in. (100 mm) in diameter and ½ in. (12.5 mm) thick. The steel disk is used for extracting compacted specimens from molds with the use of the mold collar. Any suitable extraction device such as a hydraulic jack apparatus or a lever arm device may be used, provided the specimens are not deformed during the extraction process.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.