



Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6 inch-Diameter Specimen)¹

This standard is issued under the fixed designation D5581; 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 test method covers the measurement of the resistance to plastic flow of cylindrical specimens of bituminous paving mixture loaded on the lateral surface by means of the Marshall apparatus. This test method is for use with mixtures containing asphalt cement and aggregate up to 1½ in. (37.5 mm) nominal maximum size.

1.2 The values stated in inch-pound units are to be regarded as standard except for reference to sieve sizes and size of aggregate as measured by testing sieves in which SI units are standard according to Specification E11. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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:²

- C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- D2493 Standard Viscosity-Temperature Chart for Asphalts
- D6926 Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
- D6927 Test Method for Marshall Stability and Flow of Asphalt Mixtures
- E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

¹ This test method 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 Asphalt Mixtures.

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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.

2.2 AASTHO Standards:³

- T 316 Viscosity Determination of Asphalt Binder Using Rotational Viscometer

3. Significance and Use

3.1 This test method is used in the laboratory mix design of bituminous mixtures. Specimens are prepared in accordance with the method and tested for maximum load and flow. Density and voids properties may also be determined on specimens prepared in accordance with the method. The testing section of this method can also be used to obtain maximum load and flow for bituminous paving specimens cored from pavements or prepared by other methods. These results may differ from values obtained on specimens prepared by this test method.

4. Apparatus

4.1 *Specimen Mold Assembly*—Mold cylinders nominal 6.5-in. (165.1-mm) outside diameter steel tubing with 6.000 ± 0.008 in. (152.4 ± 0.2 mm) inside diameter by 4.5 in. (114.3 mm) in height, base plates, and extension collars shall conform to the details shown in Fig. 1. Nine mold cylinders are recommended.

4.2 *Specimen Extractor*—steel, in the form of a disk with a diameter from 5.950 to 5.990 in. (151.1 to 152.1 mm) and 0.5 in. (13 mm) thick for extracting the compacted specimen from the specimen mold with the use of the mold collar. A suitable bar is required to transfer the load from the ring dynamometer adapter to the extension collar while extracting the specimen.

4.3 *Mechanical Compactor and Compaction Hammer*—Compactor with ⅓ hp (250W) minimum motor, chain lift, frame, and automatic sliding weight release. The compaction hammer (Fig. 2) shall have a flat, circular tamping face 5.88 in. (149.4 mm) in diameter and a 22.50 ± 0.02 lb (10.21 ± 0.01 kg) sliding weight with a free fall of 18.0 ± 0.1 in. (457.2 ± 2.5 mm). Two compaction hammers are recommended.

³ Available from American Association of State Highway and Transportation Officials (AASHTO), 444 N. Capitol St., NW, Suite 249, Washington, DC 20001, <http://www.transportation.org>.