
Standard Practice for

Preparation of Small Cylindrical Performance Test Specimens Using the Superpave Gyratory Compactor (SGC) or Field Cores

AASHTO Designation: PP 99-23¹

Technically Revised: 2023

**Technical Subcommittee: 2d, Proportioning
of Asphalt–Aggregate Mixtures**



American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This practice covers the use of a Superpave gyratory compactor (SGC) or field cores to prepare 38-mm (1.50-in.) diameter by 110-mm (4.33-in.) height performance test specimens for use in a variety of axial compression and tension performance tests. This practice is intended for dense-graded asphalt mixtures with nominal maximum aggregate sizes up to 19.0 mm (0.75 in.).
- 1.2. *This standard may involve hazardous material, operations, and equipment. This standard does not purport to address all safety problems associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.*
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2. REFERENCED STANDARDS

- 2.1. *AASHTO Standards:*
- < R 30, Mixture Conditioning of Asphalt Mixtures
 - < T 119M/T 119, Slump of Hydraulic Cement Concrete
 - < T 166, Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
 - < T 209, Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures
 - < T 269, Percent Air Voids in Compacted Dense and Open Asphalt Mixtures
 - < T 312, Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor
 - < T 331, Bulk Specific Gravity (G_{mb}) and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method
 - < T 411, Determining the Damage Characteristic Curve and Failure Criterion Using Small Specimens in the Asphalt Mixture Performance Tester (AMPT) Cyclic Fatigue Test
 - < TP 132, Determining the Dynamic Modulus for Asphalt Mixtures Using Small Specimens in the Asphalt Mixture Performance Tester (AMPT)
- 2.2. *ASTM Standard:*
- < D3549/D3549M, Standard Test Method for Thickness or Height of Compacted Asphalt Mixture Specimens

3. TERMINOLOGY

- 3.1. *end flatness*—maximum departure of the test specimen end from a plane. This dimension is checked using a straightedge and 0.5-mm (0.02-in.) diameter wire or feeler gauges.
- 3.2. *end perpendicularity*—the degree to which an end surface departs from being perpendicular to the axis of the cylindrical test specimen. This configuration is measured using a precision square with the beam touching the cylinder parallel to its axis and the blade touching the highest point on the end of the cylinder. The distance between the blade of the square and the lowest point on the end of the cylinder is checked with 0.5-mm (0.02-in.) diameter wire or feeler gauges.
- 3.3. *SGC specimen*—a 150-mm (5.91-in.) diameter by 180-mm (7.09-in.) tall (minimum) cylindrical specimen prepared in an SGC meeting the requirements of T 312.
- 3.4. *test specimen*—a 38-mm (1.50-in.) diameter by 110-mm (4.33-in.) tall cylindrical specimen cored and sawed from an SGC specimen.

4. SUMMARY OF PRACTICE

- 4.1. This practice presents methods for extracting 38-mm (1.50-in.) diameter by 110-mm (4.33-in.) tall cylindrical test specimens from SGC specimens and field cores for use in a variety of axial compression and tension performance tests.

5. SIGNIFICANCE AND USE

- 5.1. This practice should be used to prepare 38-mm (1.50-in.) diameter by 110-mm (4.33-in.) tall cylindrical test specimens for TP 132 and T 411.
- 5.2. This practice may also be used to prepare 38-mm (1.50-in.) test specimens for other tests requiring 38-mm (1.50-in.) diameter by 110-mm (4.33-in.) tall cylindrical test specimens.

6. APPARATUS

- 6.1. *Superpave Gyratory Compactor*—Meeting the requirements of T 312 and capable of preparing 150-mm (5.91-in.) diameter SGC specimens that are at least 180 mm (7.09 in.) tall.
- 6.2. *Mixture Preparation Equipment*—Balances, ovens, thermometers, mixer, pans, and other miscellaneous equipment needed to prepare SGC specimens in accordance with T 312, perform bulk specific gravity (G_{mb}) measurements in accordance with T 166 or T 331, and perform maximum specific gravity (G_{mm}) measurements in accordance with T 209.
- 6.3. *Core Drill*—An air- or water-cooled, diamond-bit core drill capable of cutting cores to a nominal diameter of 38 mm (1.50 in.) and meeting the dimensional requirements of Section 9.4.4. The core drill shall be equipped with a fixture for holding the SGC specimens or field cores from which the test specimens are being extracted.
- Note 1**—Core drills with fixed and adjustable rotational speed have been used successfully to prepare test specimens meeting the dimensional tolerances given in Section 9.4.4. Rotational speeds from 450 to 750 rpm have been used.
- Note 2**—Core drills with automatic and manual feed rate have been used successfully to prepare test specimens meeting the dimensional tolerances given in Section 9.4.4.

- 6.4. *Masonry Saw*—An air- or water-cooled, diamond-bladed masonry saw capable of cutting test specimens to a nominal length of 110 mm (4.33 in.) and meeting the tolerances for end perpendicularity and end flatness given in Section 9.4.4.
- Note 3**—Heavy-duty tile saws with good stability have been found effective for sawing 38-mm (1.50-in.) diameter specimens. Larger masonry saws may be used, provided the test specimens meet the dimensional tolerances. Saws require a fixture to securely hold the specimen during sawing and to control the feed rate.
- 6.5. *Square*—Precision square with 101.6-mm (4-in.) beam and 152.4-mm (6-in.) blade, McMaster Carr Catalog Number 2278A14 or equivalent.
- 6.6. *0.5-mm (0.02-in.) Diameter Carbon Steel Wire*—0.5-mm (0.02-in.) diameter carbon steel wire, McMaster Carr Catalog Number 8907K21 or equivalent.
- 6.7. *Feeler Gauges*—Tapered-leaf feeler gauges in 0.05-mm (0.002-in.) increments.
- 6.8. *Metal Ruler*—Capable of measuring 150-mm (5.91-in.) long (nominal) specimens to the nearest 1 mm (0.39 in.).
- 6.9. *Calipers*—Capable of measuring 38-mm (1.50-in.) diameter (nominal) specimens to the nearest 0.1 mm (0.004 in.).
- 6.10. *Spatula*—Stainless steel spatula with blade approximately 254-mm (10-in.) long and 38-mm (1.50-in.) wide, McMaster Carr Catalog Number 3660A16 or equivalent.
- 6.11. *Mixture Transfer Funnel*—A funnel capable of receiving mixture poured from pans centered above the specimen mold and used to transferring ensure that loose asphalt mixture falls directly in the center of the compaction mold. The exact geometry of the funnel can vary, but it should have sufficient volume to contain the mixture that is being charged into the mold.

7. HAZARDS

- 7.1. This practice and associated standards involve handling of hot asphalt binder, aggregates, and asphalt mixtures. It also includes the use of sawing and coring machinery. Use standard safety precautions, equipment, clothing, and personal protection equipment when handling hot materials and operating machinery.

8. STANDARDIZATION

- 8.1. Items associated with this practice that require calibration or verification are included in the AASHTO standards referenced in Section 2. Refer to the pertinent section of the referenced standards for information concerning calibration or verification.

9. PROCEDURE A—FABRICATION FROM SGC SPECIMENS

- 9.1. *Asphalt Mixture Preparation:*
- 9.1.1. Prepare asphalt mixture for each SGC specimen in accordance with T 312 and prepare a companion mixture sample for determining theoretical maximum specific gravity (G_{mm}) in accordance with T 209.

- 9.1.2. The mass of asphalt mixture needed for each SGC specimen will depend on the SGC specimen height, the G_{mm} of the mixture, the nominal maximum aggregate size, gradation (coarse or fine), and target air void content of the test specimens.

Note 4—Appendixes X1 and X2 describe procedures for determining the mass of asphalt mixture required to reach a specified test specimen target air void content.

- 9.1.3. Perform conditioning on the asphalt mixture for the test specimens and companion G_{mm} sample in accordance with R 30.

9.2. *SGC Specimen Compaction:*

- 9.2.1. Compact the SGC specimens to a height of 180 mm (7.09 in.) or higher, in accordance with T 312, carefully following the exceptions noted in Sections 9.2.2 through 9.2.4.

- 9.2.2. A mixture transfer funnel centered over the specimen mold is required for pouring the mixture into the specimen mold.

Note 5—One transfer funnel that has been successfully used is shown in Figure 1 and another in Figure 2. The funnel in Figure 1 is a slump cone consistent with the specifications of T 119M/T 119 and the bottom of the cone is 2.5 cm (1 in.) above the top of the mold. A collar may be needed to avoid spilling mixture during the transfer. The bottom of the funnel in Figure 2 extends approximately 7.5 cm (3 in.) inside the mold. The funnel has a total height of 25.4 cm (10 in.), a top diameter of 40 cm (16 in.), and a bottom diameter of 12.5 cm (5 in.).

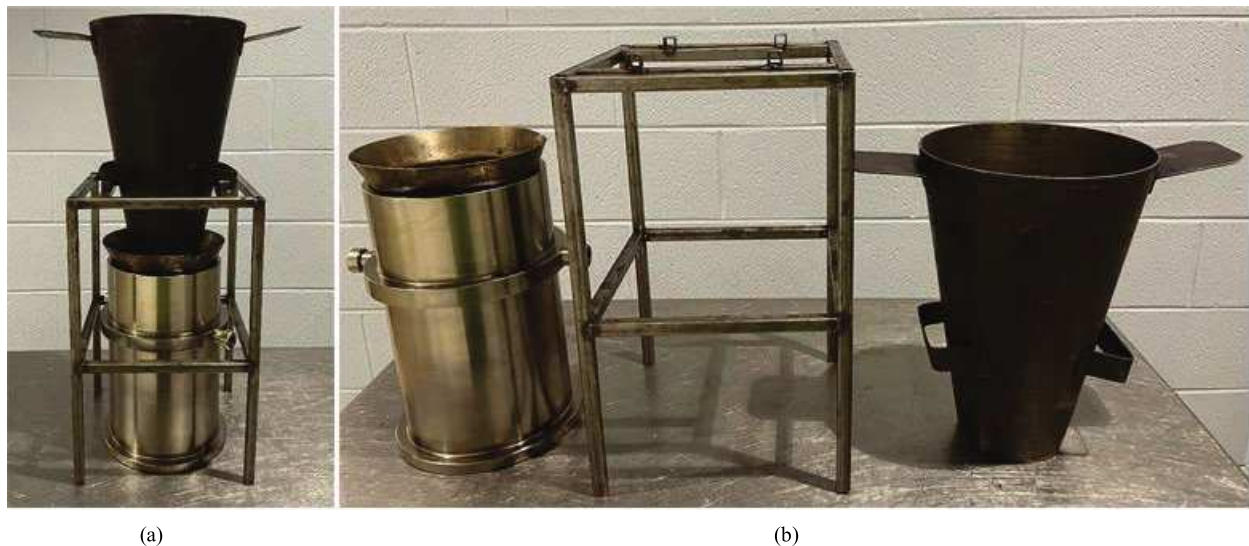


Figure 1—Mixture Transfer Funnel: (a) One Option and (b) Optional Interior Collar