Standard Method of Test for

Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor

AASHTO Designation: T 312-15

AASHTO

1. SCOPE

1.1. This standard covers the compaction of cylindrical specimens of asphalt mixtures using the Superpave gyratory compactor.

1.2. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns 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. *AASHTO Standards*:

- M 231, Weighing Devices Used in the Testing of Materials
- R 30, Mixture Conditioning of Hot Mix Asphalt (HMA)
- R 35, Superpave Volumetric Design for Asphalt Mixtures
- R 47, Reducing Samples of Hot Mix Asphalt (HMA) to Testing Size
- T 166, Bulk Specific Gravity (G_{mb}) of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens
- T 168, Sampling Bituminous Paving Mixtures
- T 209, Theoretical Maximum Specific Gravity (G_{mm}) and Density of Hot Mix Asphalt (HMA)
- T 275, Bulk Specific Gravity (G_{mb}) of Compacted Hot Mix Asphalt (HMA) Using Paraffin-Coated Specimens
- T 316, Viscosity Determination of Asphalt Binder Using Rotational Viscometer
- T 344, Evaluation of Superpave Gyratory Compactor (SGC) Internal Angle of Gyration Using Simulated Loading

2.2. *Other Standards*:

- ANSI/ASME B89.1.6, Measurement of Qualified Plain Internal Diameters for Use as Master Rings and Ring Gages
- ANSI/ASME B89.4.19, Performance Evaluation of Laser-Based Spherical Coordinate Measurement Systems
- ASME B46.1, Surface Texture (Surface Roughness, Waviness, and Lay)

3. SIGNIFICANCE AND USE

3.1. This standard is used to prepare specimens for determining the mechanical and volumetric properties of asphalt mixtures. The specimens simulate the density, aggregate orientation, and structural characteristics obtained in the actual roadway when proper construction procedure is used in the placement of the paving mix.

3.2. This test method may be used to monitor the density of test specimens during their preparation. It may also be used for field control of an asphalt mixture production process.

4. APPARATUS

4.1. *Superpave Gyratory Compactor*—An electrohydraulic or electromechanical compactor with a ram and ram heads as described in Section 4.3. The axis of the ram shall be perpendicular to the platen of the compactor. The ram shall apply and maintain a pressure of 600 ± 18 kPa perpendicular to the cylindrical axis of the specimen during compaction (Note 1). The compactor shall tilt the specimen molds at an average internal angle of 20.2 ± 0.35 mrad (1.16 ± 0.02 degrees), determined in accordance with T 344. The compactor shall gyrate the specimen molds at a rate of 30.0 ± 0.5 gyrations per minute throughout compaction.

Note 1—This stress calculates to 10 600 ± 310 N total force for 150-mm specimens.

4.1.1. *Specimen Height Measurement and Recording Device*—When specimen density is to be monitored during compaction, a means shall be provided to continuously measure and record the height of the specimen to the nearest 0.1 mm during compaction once per gyration.

4.1.2. The system may include a connected printer capable of printing test information, such as specimen height per gyration. In addition to a printer, the system may include a computer and suitable software for data acquisition and reporting.

4.1.3. The loading system, ram, and pressure indicator shall be capable of providing and measuring a constant vertical pressure of 600 ± 60 kPa during the first five gyrations, and 600 ± 18 kPa during the remainder of the compaction period.

4.2. *Specimen Molds*—Specimen molds shall have steel walls that are at least 7.5 mm thick and are hardened to at least a Rockwell hardness of C48. The initial inside finish of the molds shall have a root mean square (rms) of 1.60 μm or smoother when measured in accordance with ASME B46.1 (see Note 2). New molds shall be manufactured to have an inside diameter of 149.90 to 150.00 mm. The inside diameter of in-service molds shall not exceed 150.2 mm. Molds shall be at least 250 mm in length. The inside diameter and length of the molds shall be measured in accordance with Annex A.

Note 2—One source of supply for a surface comparator, which is used to verify the rms value of 1.60 μm, is GAR Electroforming, Danbury, Connecticut.

4.3. *Ram Heads and End Plates*—Ram heads and end plates shall be fabricated from steel with a minimum Rockwell hardness of C48. The ram heads shall stay perpendicular to their axis. The platen side of each end plate shall be flat and parallel to its face. All ram and end plate faces (the sides presented to the specimen) shall be flat to meet the smoothness requirement in Section 4.2 and shall have a diameter of 149.50 to 149.75 mm.

4.4. *Thermometers*—Armored, glass, or dial-type thermometers with metal stems for determining the temperature of aggregates, binder, and HMA between 10 and 232°C.

4.5. *Balance*—A balance meeting the requirements of M 231, Class G 5, for determining the mass of aggregates, binder, and asphalt mixtures.

4.6. *Oven*—An oven, thermostatically controlled to ±3°C, for heating aggregates, binder, asphalt mixtures, and equipment as required. The oven shall be capable of maintaining the temperature required for mixture conditioning in accordance with R 30.

4.7. *Miscellaneous*—Flat-bottom metal pans for heating aggregates, scoop for batching aggregates, containers (grill-type tins, beakers, containers for heating asphalt), large mixing spoon or small trowel, large spatula, gloves for handling hot equipment, paper disks, mechanical mixer (optional), lubricating materials recommended by the compactor manufacturer.

4.8. *Maintenance*—In addition to routine maintenance recommended by the manufacturer, check the Superpave gyratory compactor's mechanical components for wear, and perform repair, as recommended by the manufacturer.

5. HAZARDS

5.1. Use standard safety precautions and protective clothing when handling hot materials and preparing test specimens.

6. STANDARDIZATION

6.1. Items requiring periodic verification of calibration include the ram pressure, angle of gyration, gyration frequency, LVDT (or other means used to continuously record the specimen height), and oven temperature. Verification of the mold and platen dimensions and the inside finish of the mold are also required. When the computer and software options are used, periodically verify the data-processing system output using a procedure designed for such purposes. Verification of calibration, system standardization, and quality checks may be performed by the manufacturer, other agencies providing such services, or in-house personnel. Frequency of verification shall follow the manufacturer's recommendations.

6.2. The angle of gyration refers to the internal angle (the tilt of the mold with respect to the end plate surface within the gyratory mold). The calibration of the internal angle of gyration shall be verified in accordance with T 344.

7. PREPARATION OF APPARATUS

7.1. Immediately prior to the time when the asphalt mixture is ready for placement in the mold, turn on the main power for the compactor for the manufacturer's required warm-up period.

7.2. Verify the machine settings are correct for angle, pressure, and number of gyrations.

7.3. Lubricate any bearing surfaces as needed per the manufacturer's instructions.

7.4. When specimen height is to be monitored, the following additional item of preparation is required. Immediately prior to the time when the asphalt mixture is ready for placement in the mold, turn on the device for measuring and recording the height of the specimen, and verify the readout is in the proper units, mm, and the recording device is ready. Prepare the computer, if used, to record the height data, and enter the header information for the specimen.

8. HMA MIXTURE PREPARATION

8.1. *Laboratory Prepared*:

8.1.1. Weigh the appropriate aggregate fractions into a separate pan, and combine them to the desired batch weight. The batch weight will vary based on the ultimate disposition of the test specimens. If a target air void level is desired, as would be the case for Superpave mix analysis and performance specimens, batch weights will be adjusted to create a given density in a known volume. If the specimens are to be used for the determination of volumetric properties, the batch weights will be adjusted to result in a compacted specimen having dimensions of 150 mm in diameter and 115 ± 5 mm in height at the desired number of gyrations.

Note 3—It may be necessary to produce a trial specimen to achieve this height requirement. Generally, 4500 to 4700 g of aggregate are required to achieve this height for aggregates with combined bulk specific gravities of 2.550 to 2.700, respectively.

8.1.2. Place the aggregate and binder container in the oven, and heat them to the required mixing temperature.

8.1.2.1. The mixing temperature range is defined as the range of temperatures where the unaged binder has a viscosity of 0.17 ± 0.02 Pa·s when measured in accordance with T 316.

Note 4—Modified asphalts may not adhere to the equiviscosity requirements noted, and the manufacturer's recommendations should be used to determine mixing and compaction temperatures.

8.1.3. Charge the mixing bowl with the heated aggregate from one pan and dry-mix thoroughly. Form a crater in the dry-blended aggregate, and weigh the required amount of binder into the mix. Immediately initiate mixing.

8.1.4. Mix the aggregate and binder as quickly and thoroughly as possible to yield an asphalt mixture having a uniform distribution of binder. As an option, mechanical mixing may be used.

8.1.5. After completing the mixture preparation, perform the required mixture conditioning in accordance with R 30.

8.1.6. Place the compaction mold(s) and base plate(s) in an oven at the required compaction temperature for a minimum of 30 min prior to the estimated beginning of compaction (during the time the mixture is being conditioned in accordance with R 30).

8.1.7. Following the mixture conditioning period specified in R 30, if the mixture is at the compaction temperature, proceed immediately with the compaction procedure as outlined in Section 9. If the compaction temperature is different from the mixture conditioning temperature used in accordance with R 30, place the mix in another oven at the compaction temperature for a brief time (maximum of 30 min) to achieve the required temperature.

8.1.7.1. The compaction temperature is the midpoint of the range of temperatures where the unaged binder has a viscosity of 0.28 ± 0.03 Pa·s when measured in accordance with T 316. (See Note 4.)

8.2. *Plant Produced*:

8.2.1. Place the compaction mold(s) and base plates(s) in an oven at the required compaction temperature (see Section 8.1.7.1).

8.2.2. Obtain the sample in accordance with T 168.

8.2.3. Reduce the sample in accordance with R 47.

8.2.4. Place the sample into a pan to a uniform thickness.

8.2.5. Bring the HMA to the compaction temperature range by careful, uniform heating in an oven immediately prior to molding.

9. COMPACTION PROCEDURE

9.1. When the compaction temperature is achieved, remove the heated mold, base plate, and upper plate (if required) from the oven. Place the base plate and a paper disk in the bottom of the mold.

9.2. Place the mixture into the mold in one lift. Care should be taken to avoid segregation in the mold. After all the mix is in the mold, level the mix, and place another paper disk and upper plate (if required) on top of the leveled material.

9.3. Load the charged mold into the compactor, and center the loading ram.

9.4. Apply a pressure of 600 ± 18 kPa on the specimen.

9.5. Apply a 20.2 ± 0.35 mrad (1.16 ± 0.02 degrees) average internal angle to the mold assembly, and begin the gyratory compaction.

9.6. Allow the compaction to proceed until the desired number of gyrations specified in R 35 is reached and the gyratory mechanism shuts off.

9.7. Remove the angle from the mold assembly, remove the ram pressure, and retract the loading ram in the order specified by the SGC manufacturer (the preceding steps may be done automatically by the compactor on some models of SGCs). Remove the mold from the compactor (if required), and extrude the specimen from the mold.

Note 5—No additional gyrations with the angle removed are required unless specifically called for in another standard referencing T 312. The extruded specimen may not be a right angle cylinder. Specimen ends may need to be sawed to conform to the requirements of specific performance tests.

Note 6—The specimens can be extruded from the mold immediately after compaction for most asphalt mixtures. However, a cooling period of 5 to 10 min in front of a fan may be necessary before extruding some specimens to ensure the specimens are not damaged.

9.8. Remove the paper disks from the top and bottom of the specimens.

Note 7—Before reusing the mold, place it in an oven for at least 5 min. The use of multiple molds will speed up the compaction process.

10. DENSITY PROCEDURE

10.1. Determine the maximum specific gravity (G_{mm}) of the loose mix in accordance with T 209 using a companion sample. The companion sample shall be conditioned to the same extent as the compaction sample.

10.2. Determine the bulk specific gravity (G_{mb}) of the specimen in accordance with T 166 or T 275 as appropriate.

10.3. When the specimen height is to be monitored, record the specimen height to the nearest 0.1 mm after each revolution.

11. DENSITY CALCULATIONS

11.1. Calculate the uncorrected relative density ($\%G_{mmux}$) at any point in the compaction process using the following equation:

$$\%G_{mmux} = \frac{W_m}{V_{mx} G_{mm} G_m} \times 100 \qquad (1)$$

where:

$\%G_{mmux}$	=	uncorrected relative density at any point during compaction expressed as a percent of the maximum theoretical specific gravity;
W_m	=	mass of the specimen, g;
G_{mm}	=	theoretical maximum specific gravity of the mix;
G_m	=	unit weight of water, 1 g/cm^3;
x	=	number of gyrations; and
V_{mx}	=	volume of the specimen, in cm^3, at any point based on the diameter (d) and height (h_x) of the specimen at that point (use "mm" for height and diameter measurements).

It can be expressed as:

$$V_{mx} = \frac{\pi d^2 h_x}{4 \times 1000} \qquad (2)$$

Note 8—This formula gives the volume in cm^3 to allow a direct comparison with the specific gravity.

11.2. At the completion of the bulk specific gravity test (G_{mb}), determine the relative density ($\%G_{mmx}$) at any point in the compaction process as follows:

$$\%G_{mmx} = \frac{G_{mb} h_m}{G_{mm} h_x} \times 100 \qquad (3)$$

where:

$\%G_{mmx}$	=	corrected relative density expressed as a percent of the maximum theoretical specific gravity;
G_{mb}	=	bulk specific gravity of the extruded specimen;
h_m	=	height in millimeters of the extruded specimen; and
h_x	=	height in millimeters of the specimen after x gyrations.

12. REPORT

12.1. *Report the following information in the compaction report, if applicable*:

12.1.1. Project name;

12.1.2. Date of the test;

12.1.3. Start time of the test;

12.1.4. Specimen identification;

12.1.5. Percent binder in specimen, nearest 0.1 percent;

12.1.6. Average diameter of the mold used (d), nearest 1.0 mm;

12.1.7. Mass of the specimen (W_m), nearest 0.1 g;

12.1.8. Maximum specific gravity (G_{mm}) of the specimen by T 209, nearest 0.001;

12.1.9. Bulk specific gravity (G_{mb}) of the specimen by T 166 or T 275, nearest 0.001;

12.1.10. Height of the specimen after each gyration (h_x), nearest 0.1 mm;

12.1.11. Relative density ($\%G_{mm}$) expressed as a percent of the theoretical maximum specific gravity (G_{mm}), nearest 0.1 percent; and

12.1.12. Gyration angle, nearest 0.2 mrad (0.01 degrees), and the method used to determine or verify the gyration angle.

13. PRECISION AND BIAS

13.1. *Precision*:

13.2. *Single-Operator Precision*—The single operator standard deviations (1s limits) for relative densities at N_{ini} and N_{des} for mixtures containing aggregate with an absorption of less than 1.5 percent are shown in Table 1. The results of two properly conducted tests on the same material, by the same operator, using the same equipment, should be considered suspect if they differ by more than the d2s single operator limits shown in Table 1.

13.3. *Multilaboratory Precision*—The multilaboratory standard deviations (1s limits) for relative densities at N_{ini} and N_{des} for mixtures containing aggregate with an absorption of less than 1.5 percent are shown in Table 1. The results of two properly conducted tests on the same material, by different operators, using different equipment, should be considered suspect if they differ by more than the d2s multilaboratory limits shown in Table 1.

Table 1—Precision Estimates[a]

	1s limit Relative Density, %	d2s limit Relative Density, %
Single-operator precision:		
12.5-mm nominal max agg.	0.3	0.9
19.0-mm nominal max agg.	0.5	1.4
Multilaboratory precision:		
12.5-mm nominal max agg.	0.6	1.7
19.0-mm nominal max agg.	0.6	1.7

[a] Based on an interlaboratory study described in NCHRP Research Report 9-26 involving 150-mm diameter specimens with 4 to 5 percent air voids, 26 laboratories, two materials (a 12.5-mm mixture and a 19.0-mm mixture), and three replicates. Specimens were prepared in accordance with T 312-04. The angle of gyration was verified using Method A, external angle.

13.4. *Bias*—No information can be presented on the bias of the procedure because no material having an accepted reference value is available.

14. KEYWORDS

14.1. Compaction; density; gyratory.

ANNEX A—EVALUATING SUPERPAVE GYRATORY COMPACTOR (SGC) MOLDS

(Mandatory Information)

A1. SCOPE

A1.1. This Annex covers the evaluation of the molds as a check for compliance with the requirements outlined in Sections 4.2 and 4.3. Measurements of the mold inside diameter and end-plate diameters as well as visual inspection of critical surface conditions are included.

Minimum frequency of this evaluation is 12 months or 80 hours of operation.

The inside diameter of the molds may be measured using a three-point bore gauge or a Coordinate Measuring Machine (CMM). See Annexes A4 and A5 for additional procedures for using these devices.

Note A1—Because CMMs are typically limited to manufacturers, it is considered best practice for a lab to also use the three-point bore method as a check before putting a mold into service.

A2. APPARATUS

A2.1. *Three-Point Internal Bore Gauge*—Minimum resolution shall be 0.0025 mm (0.0001 in.). This equipment is applicable only if measuring the inside diameter of molds according to Annex A4.

A2.2. *Calibrated Master Ring*—A calibrated master ring of the same nominal size as the mold diameter shall be used to set the measuring instrument reference for each series of measurements. A 150-mm ANSI/ASME B89.1.6 Class Z (0.00635 mm/0.00025 in.) standard is acceptable for 150-mm sized molds. The master ring shall be calibrated at a frequency no less than every 36 months, measured to a minimum resolution of 0.001 mm (0.00004 in.). This equipment is applicable only if measuring the inside diameter of molds according to Annex A4.

A2.3. *Length Measurement Instrument (Outside Calipers or Micrometer)*—With appropriate range and a minimum resolution of 0.025 mm (0.001 in.). The length measurement instrument shall be standardized annually.

A2.4. *Coordinate Measuring Machine (CMM)*—Capable of performing the three-point diametral measurement at the vertical locations specified in Figure A4.2 with a minimum resolution of 0.0025 mm (0.0001 in.). The CMM shall be calibrated annually per ASME B89.4.19 (or equivalent for CMM type). This equipment is applicable only if measuring the inside diameter of molds according to Annex A5 or measuring the outside diameter of the mold end plates according to Annex A6.

A3. PROCEDURE FOR VISUALLY INSPECTING THE CONDITION OF THE MOLD

A3.1. *Perform a visual inspection of the mold*:

A3.1.1. Confirm that the molds are thoroughly cleaned and identified with a unique serial number or other unique identifier. Allow the molds to achieve a temperature of 18 to 28°C (64 to 82°F).

Note A2—This temperature range can be confirmed with an infrared thermometer.

A3.1.2. The mold bore shall be free of residue and deep gouges. Mold bores without gouges typically have an acceptable surface finish. Identify any wear area that may be visible in the mold.

Note A3—Do not attempt to clean an SGC mold in an ignition oven. Extreme heat may cause the mold to soften or become "out of round" and unrepairable.

A4. PROCEDURE FOR MEASURING THE INSIDE DIAMETER OF SUPERPAVE GYRATORY MOLDS WITH A THREE-POINT BORE GAUGE

A4.1. *Standardize the bore gauge*—The three-point bore gauge shall be standardized with the master ring prior to each use.

A4.1.1. Allow the gauge and calibrated master ring to achieve a temperature of 18 to 28°C (64 to 82°F) (Note A2).

A4.1.2. Place the master ring on a flat surface. Position the gauge inside the ring without contacting the surface. Engage the contact points with the ring internal diameter. On some gauges, this operation requires turning an adjuster knob to extend the contact points; other gauge types may have alternate engagement operation. (See Figure A4.1.) While extending the gauge contacts, use a small circular motion at the top of the gauge to align the contact tips with the master ring bore. As the bore gauge contacts engage the master ring, the circular movement will reduce until the contacts seat against the ring bore. This engagement should be firm but not overly tight.

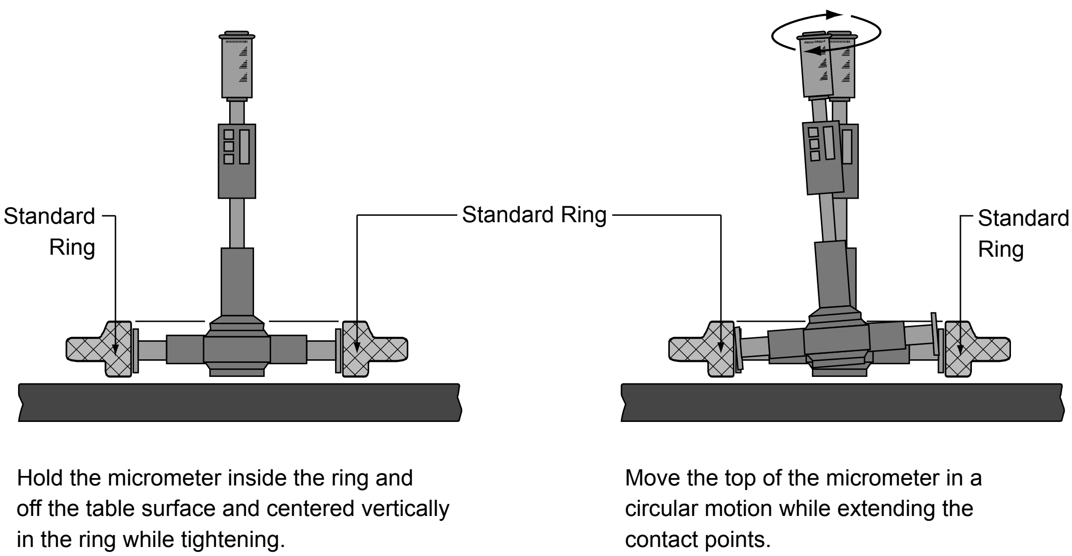

Figure A4.1—Techniques for Using the Three-Point Bore Gauge with the Calibrated Master Ring

Note A4—The circular motion depicted in Figure A4.1, applied to the top of the gauge while tightening the contact tips against the bore surface, is necessary to eliminate errors from misalignment.

A4.1.3. Reset (zero) the bore gauge. On mechanical gauges without an electronic reset, confirm the gauge reads within 0.0025 mm (0.0001 in.) of the master ring. Release the gauge from the ring by retracting the contact points.

If the mechanical bore gauge does not read correctly, measurements taken with the gauge require the addition of an offset to compensate for the bias (amount of error from the standard), or the gauge can be recalibrated.

A4.2. Identify the rotational orientation of the measurements. Position the mold on a flat surface with the bore vertical. Place a mark on the top of the mold to identify the rotational orientation of the measurements to be taken.

A4.3. *Measurements*—The inside diameter of the mold shall be measured at three locations (elevations) along its axis. Designate these elevations as 1, 2, and 3. The first measurement location (elevation) shall be approximately 50 mm from the top of the mold. The second measurement shall be in the visible wear area approximately 100 mm from an end of the mold (top or bottom) as determined by the wear area. The third elevation shall be approximately 50 mm from the end opposite the first measurement.

The diameter shall be measured three times at each elevation, resulting in a total of nine individual diameter measurements. Each measurement is identified by a number (1, 2, or 3) corresponding to the elevation and a letter (A, B, or C) corresponding to the angular orientation of the gauge. At each elevation, measurements designated as "A" shall have one of the three contacts aligned with the mark made in Section A4.2, measurements designated as "B" shall have the contact rotated 90 degrees from the mark, and measurements designated as "C" shall have the contact oriented 180 degrees from the mark.

For best accuracy and consistency, each bore measurement should use the same firmness and technique applied in Section A4.1.2 for gauge standardization.

Record each measurement to at least the nearest 0.0025 mm (0.0001 in.). Record the value to the nearest 0.001 mm (0.00004 in.) if the gauge resolution permits.

A4.3.1. Position the bore gauge at the first measurement elevation with one of the contact points aligned with the mark made in Section A4.2. Obtain the measurement, and record this reading as "1A."

A4.3.2. Release the gauge; rotate it 90 degrees and obtain the measurement in this orientation. Record this measurement as "1B."

A4.3.3. Rotate the bore gauge an additional 90 degrees (180 degrees from "1A") to obtain a third reading at the same elevation. Record this reading as "1C."

Note A5—Figure A4.2 shows the gauge in the mold positioned for each measurement. The wear zone is represented in this figure at the top of the mold. Take care not to position the bore gauge probe at the sloped edge of the wear zone.

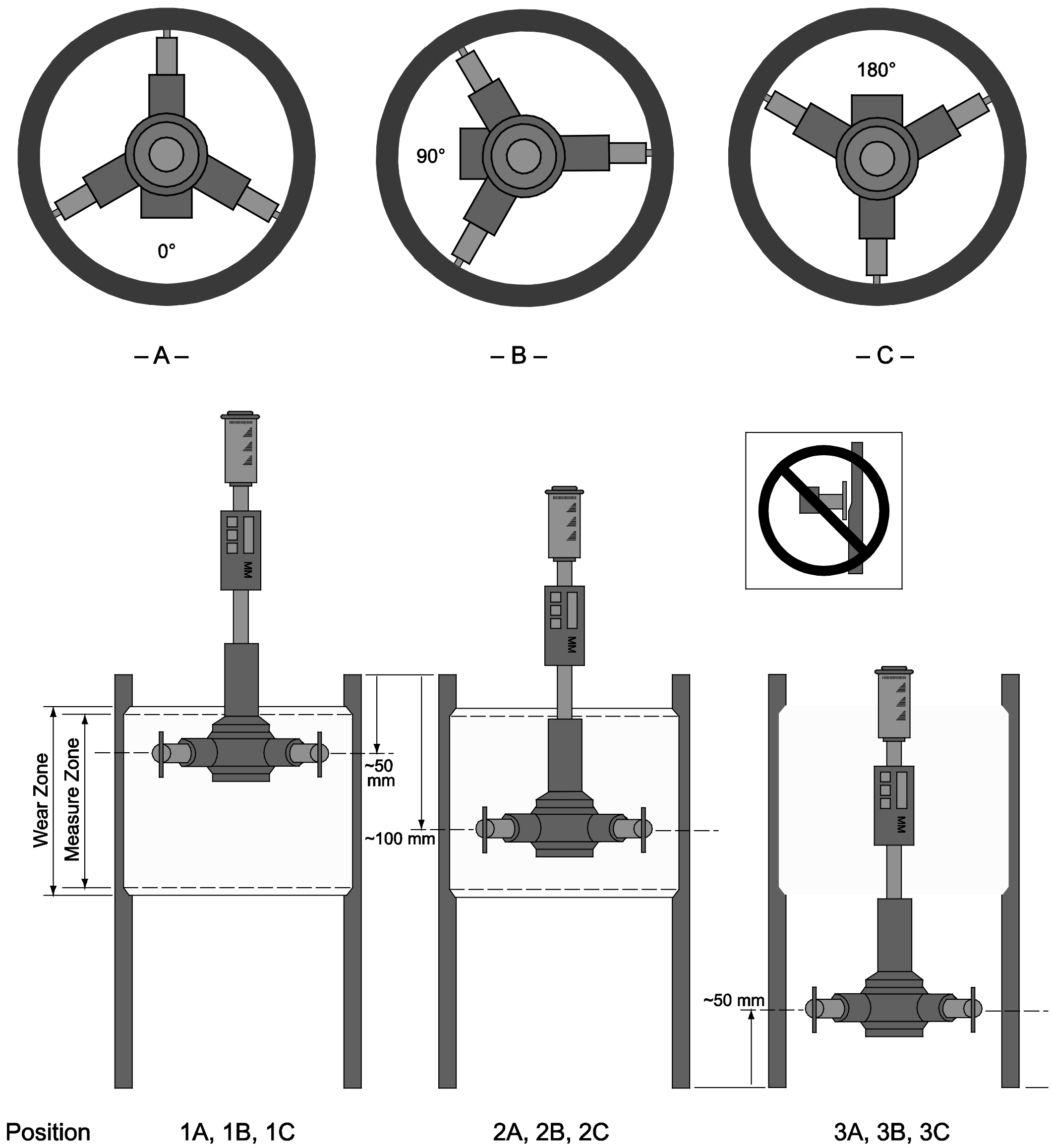

Figure A4.2—Bore Gauge Measurement Positions within the Mold Bore

A4.3.4. Release the bore gauge, and position it for the measurements at the second elevation. Repeat Sections A4.3 through A4.3.3 for elevations 2 and 3. Record the readings, and designate them as "2A," "2B," and "2C" and "3A," "3B," and "3C," respectively.

A4.3.5. Each individual bore measurement shall be compared to the specified range and given a pass/fail rating. If any of the individual bore measurements are assigned a "fail" rating, the mold is considered to be out of conformance and shall not be used.

A4.4. *Calculations*:

A4.4.1. For instruments that indicate the measured value directly, no calculation is required.

A4.4.2. For instruments for which the diameter measurement is an increment from the master ring size, calculate the mold diameter for each measurement by the following equation:

measurement = $M + D$ *(A1.1)*

where:

M = master ring diameter, mm; and
D = instrument reading, mm (retain the positive or negative sign).

Note A6—A negative reading for "D" indicates that the mold diameter is smaller than the master ring, and a positive reading indicates that the mold diameter is larger than the master ring.

A4.4.3. Measurements taken with instruments measuring in inches shall be converted and reported as millimeters (mm) using the following equation:

mm = in. × 25.40 *(A1.2)*

A5. PROCEDURE FOR MEASURING THE INSIDE DIAMETER OF SUPERPAVE GYRATORY MOLDS WITH A COORDINATE MEASUREMENT MACHINE (CMM)

A5.1. Take measurements in accordance with the operating instructions provided by the equipment manufacturer. Measurements shall be obtained at the vertical locations specified in Figure A4.2.

A5.1.1. Report information in accordance with the requirements in Section A7 of this Annex.

A6. PROCEDURE FOR MEASURING THE OUTSIDE DIAMETER OF SUPERPAVE GYRATORY COMPACTOR MOLD END PLATES

A6.1. *Perform a visual inspection of the mold end plates*:

A6.1.1. Confirm that the end plates are thoroughly cleaned and properly identified. Allow the end plates and outside measuring instrument (caliper, micrometer, or CMM) to achieve a temperature of 18 to 28°C (64 to 82°F) (Note A2).

A6.1.2. The plates shall be free of residue and deep gouges. Surfaces in contact with the asphalt mixture shall be flat. Minor abrasion marks from aggregates are acceptable. Surfaces in contact with the SGC frame or compaction ram shall be free of raised burrs that may cause the plate to wobble during gyration. Small recesses on the side of the plate interfacing the SGC (opposite the asphalt mixture) can reduce rocking and are acceptable.

A6.2. Determine the maximum diameter of the end plate by measuring it at several locations. Place a removable mark at this position. Record the maximum plate diameter to the nearest 0.025 mm (0.001 in.). Designate this measurement as "A."

A6.2.1. Measure the diameter at a 90-degree orientation to the maximum diameter. Record this diameter as "B."

A6.2.2. Each individual diameter measurement shall be compared to the specified range and given a pass/fail rating. If any of the individual bore measurements are assigned a "fail" rating, the mold is considered to be out of conformance and shall not be used.

A7. INSPECTION REPORT

A7.1. *Record and report the following information*:

A7.1.1. Name of evaluator;

A7.1.2. Date;

A7.1.3. Mold owner;

A7.1.4. Location of evaluation;

A7.1.5. Superpave gyratory compactor model;

A7.1.6. Measurement system for the inside diameter measurements;

A7.1.6.1. Bore gauge information, if used (manufacturer and model);

A7.1.6.2. Master ring information, if using three-point bore gauge (diameter to the nearest 0.001 mm [0.00004 in.], calibration certificate number, and calibration date);

A7.1.6.3. CMM information, if used (manufacturer, model, last calibration date);

A7.1.7. Length-measuring instrument information (model, serial number, range, and calibration date);

A7.1.8. *Mold and End Plate Identification*—Mold identification (serial number or other identifying mark) and end plate identification(s) (serial number or other identifying mark);

A7.1.9. Individual inside diameter measurements of the mold to the nearest 0.0025 mm (0.0001 in.) and the corresponding pass/fail rating;

A7.1.10. Individual outside diameter measurements of the end plate to the nearest 0.025 mm (0.001 in.) and the corresponding pass/fail rating; and

A7.1.11. Length measurement of the mold to the nearest 0.1 mm (0.004 in.).