



# Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing<sup>1</sup>

This standard is issued under the fixed designation D5361/D5361M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice describes a procedure for removal of a sample of compacted asphalt mixture from a pavement for laboratory testing.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 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.

1.4 *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>

D8 Terminology Relating to Materials for Roads and Pavements

D3665 Practice for Random Sampling of Construction Materials

D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

## 3. Terminology

3.1 Refer to Terminology D8

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.30 on Methods of Sampling.

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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.

## 4. Significance and Use

4.1 Samples obtained in accordance with the procedure given in this practice may be used to measure many different properties of a compacted asphalt pavement including, but not limited to, pavement thickness, density, resilient or dynamic modulus, tensile strength, Marshall or Hveem stability, or for extraction testing, to determine asphalt content, asphalt properties, and mix gradation.

NOTE 1—The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of Specification D3666 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with Specification D3666 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of Specification D3666 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.

## 5. Apparatus

5.1 To minimize distortion of the compacted asphalt course(s), power equipment shall be used to secure the sample. The equipment may be either a core drill or power saw.

5.2 The cutting edge of the core drill bit shall be of hardened steel or other suitable material with diamond chips embedded in the metal cutting edge.

5.3 Saw blades used in a power saw shall be either a hardened metal blade with diamond chips embedded or an abrasive blade such as carborundum or similar material.

5.4 A source of cooling water, dry ice, liquid nitrogen, or other cooling material is normally required but in some cases may be omitted when only a single sample is to be secured. If at any time there is evidence of damage to the edge of the sample due to the generation of heat caused by friction, a cooling material shall be applied to the cutting tool or to the pavement surface to minimize sample distortion or other damage.

5.5 A device (core debonder) for separating core samples from underlying layers is not required to be used. If such device is employed, it shall be a metal semicircle with an inside radius equal to the outside radius of the core and shall have a rigidly attached handle. A split core barrel of the required



radius cut in half vertically and welded to a strap iron handle is suitable for this purpose. (See Fig. 1.)

NOTE 2—Differences in manufacturers' tolerances of core barrels' diameters and thicknesses may result in a particular barrel not fitting into the kerf. In such cases, other means may have to be used for debonding.

5.6 A lifting device (core lifter) for removing core samples from holes will preserve the integrity of the core. The device shall be a steel rod of suitable length and with a diameter that will fit into the space between the core and the pavement material. There shall be a 90° [1.57 rad] bend at the top to form a handle and a 90° [1.57 rad] bend at the bottom, approximately 50 mm [2 in.] long, to form the lifter.

## 6. Sampling

6.1 Select the locations to be sampled by a random method from the material in place. Random sampling procedures as outlined in Practice D3665 shall be followed when samples obtained will be used in conducting quality control/quality assurance tests. Obtain at least three samples (cores) selected at random from the lot being sampled. Test each sample and average the test results to determine the acceptability. Take all samples from the roadway for the full depth of the material, taking care to exclude any underlying material. Each sample

shall be obtained in such a manner as to ensure a minimum disturbance of the material. Samples obtained using non-random procedures must be used for informational purposes only and not included in statistically based quality control/quality assurance programs

6.2 The sampling plan must include a clear definition as to whether samples shall be taken adjacent to the pavement edge or construction joints where density may be slightly lower than in the main portion of the paving lane.

NOTE 3—Variations in the pavement condition that can be detected by visual inspection may dictate that samples be taken from areas so identified, apart from the random sampling plan. However, non-random samples violate the principles behind statistically based quality control/quality assurance testing programs.

6.3 The number of samples to be secured will be in accordance with governing specifications or sampling plan for the lot size involved. When no specific guidelines are available, take a sufficient number of samples to achieve the desired statistical confidence level, but no less than three.

## 7. Sampling Compacted Asphalt Pavement

7.1 Samples taken from the compacted pavement by core drill shall have a minimum nominal diameter of 100 mm [4 in.] and extend the full depth of the lift(s) being sampled. If test results appear to be erratic or biased in a way attributable to sample size, take larger samples. In order to minimize damage, use a lifting device as described in 5.5 and 5.6 to remove the core from the hole.

7.1.1 When cored samples are to be used for resilient or dynamic modulus tests, the sample must form a right cylinder with the top and bottom perpendicular to the axis. The sample shall comply with the requirements of the particular test method involved.

7.1.2 To separate the sample from the underlying layer, insert the device described in 5.5 into the kerf and exert a gentle pressure toward the sample. Do not attempt to pry upward on the sample. If the bond is not broken between the pavement courses, it will be necessary to secure a sample for the entire pavement depth.

7.1.3 To remove the sample from the hole, insert the device described in 5.6 into the kerf, turn the device approximately 90°, and lift gently until the sample can be grasped by hand.

7.2 Samples taken from the compacted pavement by sawing shall have a minimum surface area of 10 000 mm<sup>2</sup> [16 in.<sup>2</sup>] and be cut in such a manner as not to disturb the sample density. Cutting and removing a 50 mm [2 in.] wide section surrounding the sample will aid in removal of the portion(s) to be tested. Screwdrivers, chisels, and other sharpened tools used to break the bond between a compacted course and the underlying pavement may cause distortion that will result in an erroneous density determination. If test results appear to be erratic or biased in a way attributable to sample size, take larger samples.

7.3 Transport samples obtained using procedures described in 7.1 or 7.2 on a smooth board, top side down, to retain the shape of the original surface. Careless handling may nullify any test results obtained.

NOTE 4—When the weather is very hot, an ice chest or similar device

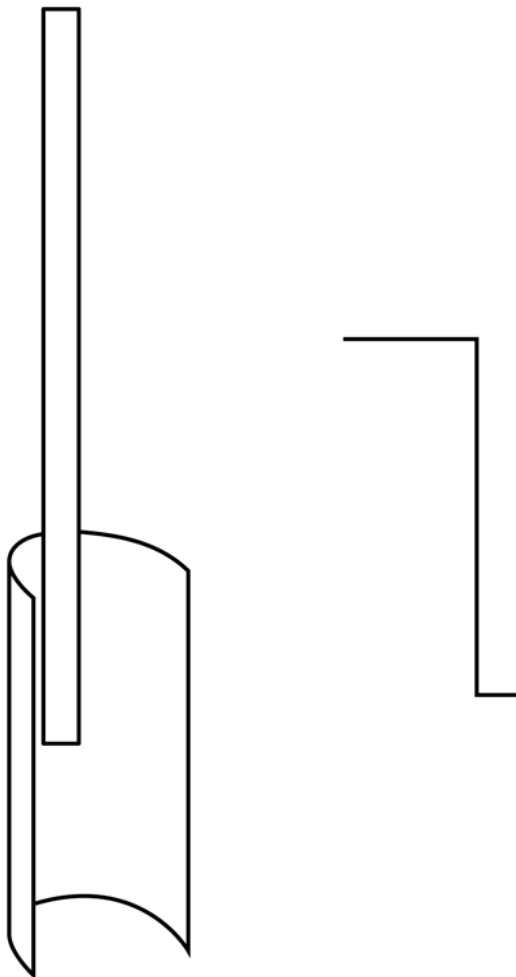


FIG. 1 Core Debonder



may be considered for use while transporting the sample to the laboratory.

7.4 When the only purpose of sampling is to measure pavement thickness, samples of smaller dimensions than prescribed in 7.1 and 7.2 are not prohibited from being used.

## 8. Separation of Pavement Courses

8.1 If more than one pavement course exists, separation shall be by one of the methods listed:

8.1.1 Separate the pavement courses by cutting apart with a saw blade while spraying cooling water on the saw blade to minimize the generation of excessive heat. As an alternative, freeze the core and separate the courses with the saw blade while frozen. When using this method, it is recommended that the saw operator wear all necessary safety equipment (that is, safety glasses, gloves, etc.).

8.1.2 As an alternative, separation of two pavement courses shall be achieved by striking a swift heavy blow on a chisel at the point of bonding between the two courses. Separation by this procedure is more effectively achieved if the sample is cooled below freezing.

## 9. Report

9.1 The test report(s) shall include a statement as to the method employed for removal of the sample from the compacted pavement.

## 10. Keywords

10.1 asphalt; compacted; coring asphalt pavement; equipment for sampling asphalt pavement; pavement sampling; sawing asphalt pavement

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