



Standard Practice for Sampling Bituminous Paving Mixtures¹

This standard is issued under the fixed designation D979/D979M; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This practice covers sampling of bituminous paving mixtures at points of manufacture, storage, delivery, or in place.

1.2 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 *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

- D2041 Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
- D2234/D2234M Practice for Collection of a Gross Sample of Coal
- D2726 Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
- D3665 Practice for Random Sampling of Construction Materials
- D5361 Practice for Sampling Compacted Bituminous Mixtures for Laboratory Testing
- D5444 Test Method for Mechanical Size Analysis of Extracted Aggregate
- D6307 Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method

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

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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.

- D6925 Test Method for Preparation and Determination of the Relative Density of Asphalt Mix Specimens by Means of the Superpave Gyratory Compactor
 - D6926 Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
 - D6927 Test Method for Marshall Stability and Flow of Asphalt Mixtures
 - E105 Practice for Probability Sampling of Materials
 - E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process
 - E141 Practice for Acceptance of Evidence Based on the Results of Probability Sampling
- 2.2 AASHTO Standard:³
- R 47 Standard Practice for Reducing Samples of Hot Mix Asphalt (HMA) to Testing Size

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

- 3.1.1 *field sample, n*—a quantity of the material to be tested of sufficient size to provide an acceptable estimate of the average quality of a unit.
- 3.1.2 *increment, n*—part of a sample.
- 3.1.3 *lot, n*—a sizable isolated quantity of bulk material from a single source, assumed to have been produced by the same process (for example, a day's production or a specific mass or volume).
- 3.1.4 *test portion, n*—a quantity of the material of sufficient size extracted from the larger field sample by a procedure designed to ensure accurate representation of the field sample, and thus of the unit sampled.
- 3.1.5 *unit, n*—a batch or finite subdivision of a lot of bulk material (for example, a truck load or a specific area covered).

4. Significance and Use

4.1 General:

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>.

4.1.1 Sampling is equally as important as the testing, and the sampler shall take every precaution to obtain samples that will yield an acceptable estimate of the nature and conditions of the materials which they represent.

4.1.2 Samples for the development of preliminary data are obtained by the party responsible for the development of the data. Samples for control of the product at the source of manufacture or storage, or at the site of use, are obtained by the manufacturer, contractor, or other parties responsible for accomplishing the work. Samples for tests to be used in acceptance or rejection decisions by the purchaser are obtained by the purchaser or his authorized representative.

4.1.3 This standard shall not be used for the sampling of compacted bituminous paving mixtures. Practice **D5361** shall be used.

5. Apparatus

5.1 *Container*—A bucket, pan, box, or other vessel of a sufficient size to contain the sample.

5.2 *Release Agent*—A non-stick product that promotes an easy separation of the bituminous paving mixture from the sampling tools without degrading the material being sampled.

5.3 *Sampling Tool*—A shovel, scoop, or other device used to obtain samples.

5.4 *Truck Sampling Device (optional)*—A mechanical apparatus that enables the user to retrieve material from the bed of a truck without standing in the bed of the truck. An example of one type of truck sampling device is shown in **Fig. 1**.

6. Procedure

6.1 *Inspection*—The material shall be inspected to determine discernible variations. The seller shall provide equipment needed for safe and appropriate inspection and sampling.

6.2 *Release Agents*—The user and producer of the bituminous paving mixtures must mutually agree upon the use of a release agent. If used, the approved release agent shall be

lightly applied to the sampling tools and truck sampling device. Diesel fuel shall not be used.

6.3 *Sampling*—The procedures for selecting locations or times for sampling are described in Practice **D3665**.

6.3.1 *Sampling from a Conveyor Belt*—Stop the conveyor belt. Randomly select at least three areas of approximately equal size on the belt for sampling. In each of the locations to be sampled, insert templates, the shape of which conform to the shape of the belt. From the selected areas obtain approximately equal increments of material which will form a sample whose quantity equals or exceeds the minimum recommended in **6.4.2**. Carefully scoop all material between templates into a suitable container.

6.3.2 *Sampling from Truck Transports*—By a random method, select the units to be sampled from the production of materials delivered. Obtain at least three approximately equal increments. Avoid sampling the extreme top surface. Select at random from the unit being sampled and combine to form a field sample whose quantity equals or exceeds the minimum recommended in **6.4.2**. The sample may be obtained by collecting the increments with a truck sampling device, scoop, or shovel.

NOTE 1—Users should refer to the manufacturer's instructions to learn how to properly operate and maintain a truck sampling device, if used.

6.3.3 *Sampling from the Roadway Prior to Compaction*—When only one sample is to be taken, obtain at least three approximately equal increments, selected at random from the unit being sampled, and combine to form a field sample whose quantity equals or exceeds the minimum recommended in **6.4.2**.

6.3.3.1 When three or more samples are to be taken in order to evaluate a lot of material, utilize a random method to determine the locations to be sampled. Select a sample, consisting of approximately three equal increments, from each location, assuring the quantity of each sample exceeds the minimum recommended in **6.4.2**.

6.3.3.2 Take all increments or samples from the roadway for the full depth of the material, taking care to exclude any underlying material. When necessary, place templates on the existing roadway to exclude any underlying material. Clearly mark the specified area from which each increment or sample is to be removed. Templates which are placed before the mixture is spread will be a definite aid securing increments of approximately equal mass.

6.3.4 *Sampling from a Skip Conveyor Delivering Mixture to Bin Storage*—Select the units to be sampled from the skip conveyor by a random method based on the bin's storage capacity. Stop the skip conveyor immediately following pug mill discharge. Dig a furrow 150 mm [6 in.] in depth extending from the top to the bottom of the pile. Obtain three approximately equal increments from the top, middle, and bottom of the furrow depositing each increment in a container. The combined increments should form a field sample whose quantity equals or exceeds the minimum recommended in **6.4.2**.

6.3.5 *Sampling from a Funnel Device Feeding a Conveyor for Mixture Delivery to Storage*—Select the units to be sampled

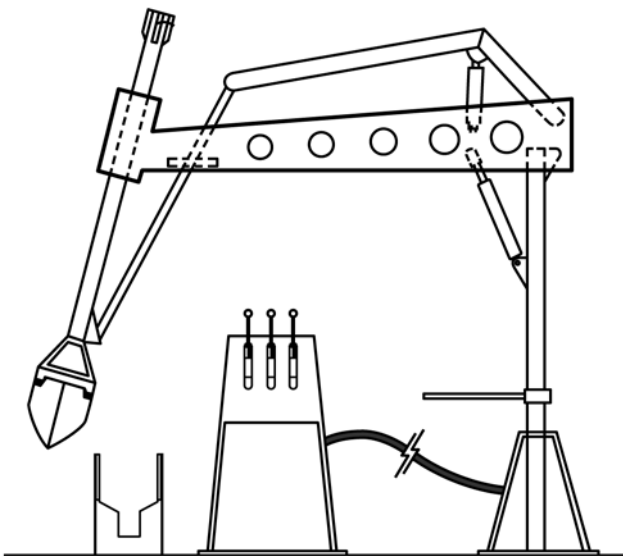


FIG. 1 Example of One Type of Truck Sampling Device



from the funnel device by a random method based on the bin's maximum storage capacity. Obtain at least three approximately equal increments of material for each sample by passing a bucket or pan or other suitable container across the full flow of materials as it drops from the funnel device onto the conveyor. The combined portions should form a field sample whose quantity equals or exceeds the minimum recommended in 6.4.2.

6.3.6 *Sampling from Bituminous Cold Mix Stockpiles*—Cold mixes that are in a stockpile for some time may develop a crust on the surface of the pile. This crust should be removed to a depth of 100 mm, over an area of one square meter, to expose the unweathered mix. Stir the exposed stockpile and obtain three approximately equal samples selected at random from the unit being sampled, and combine to form a field sample whose quantity equals or exceeds the minimum recommended in 6.4.2.

6.3.6.1 When three or more samples are to be taken, sample in accordance with 6.3.3.1.

6.4 Number and Quantities of Field Samples:

6.4.1 The number of field samples (obtained by one of the methods described in 6.3) required depends on the criticality of, and variation in, the properties to be measured. Designate each unit from which a field sample is to be obtained prior to sampling. The number of field samples from the production should be sufficient to give the desired confidence in test results.

NOTE 2—Guidance for determining the number of samples required to obtain the desired level of confidence in test results may be found in Practices D2234/D2234M, E105, E122, and E141.

NOTE 3—The unit to be represented by a single field sample should not be so large as to mask the effects of significant variability within the unit. Nor should a unit be so small as to be affected by the inherent variability between small portions of any bulk material.

NOTE 4—A unit of bulk material composed of graded aggregate or aggregate mixtures might consist of a full truckload. If it were possible, the entire load might be tested as a practical matter. A field sample is composed of three or more increments chosen at random from the material as it is loaded or unloaded from the truck. Research has shown that such a procedure permits an acceptable estimate to be made of the average gradation that might be measured from 15 or 20 increments from the truck.

NOTE 5—Significant variability within a lot of material, where it might exist, should be indicated by statistical measures, such as the standard deviation between units selected at random from within the lot.

6.4.2 The quantities of the material in the sample depend on the type and number of tests to which the material is to be subjected, and sufficient material must be obtained to provide for the proper execution of these tests. Standard control and acceptance tests are covered by ASTM standards and specify the portion of the field sample required for each specific test. Table 1 provides a guide of the minimum amounts of bituminous mixture that will be needed for routine testing for Test Methods D6307, D5444, D2041, D2726, D6925, and D6927,

TABLE 1 Guide for Estimating Minimum Sample Quantity

Maximum Size of Aggregates ^A	Uncompacted Mixture	
	Approximate Mass min, kg [lb]	Approximate Volume L [Gal]
2.36-mm (No. 8)	10 [22]	8 [2]
4.75-mm (No. 4)	10 [22]	8 [2]
9.5-mm (3/8-in.)	16 [35]	12 [3]
12.5-mm (1/2-in.)	20 [45]	15 [4]
19.0-mm (3/4-in.)	20 [45]	15 [4]
25.0-mm (1-in.)	24 [52]	18 [5]
37.5-mm (1 1/2-in.)	30 [66]	22 [6]
50-mm (2-in.)	35 [75]	22 [6]

^A The maximum size of aggregate is the largest sieve size listed in the applicable specification upon which any material is permitted to be retained.

and Practice D6926. If there are to be additional tests, the sample size must be increased. If there are fewer tests to be performed, adjust the size of the sample accordingly. Extract test portions from the field sample by quartering or splitting in a similar manner to AASHTO Standard Practice R 47 or as required by other applicable test methods.

7. Shipping Samples

7.1 Transport samples in containers so constructed as to preclude loss or contamination of any part of the sample, or damage to the contents from mishandling during shipment.

7.2 Samples shall have individual identification attached giving the information required by the sample user. Typical information that may be useful could include, but not necessarily be limited to, the following:

7.2.1 Job for which the material is to be used, giving project number, highway route number, county, and other pertinent geographical information,

7.2.2 Source of sample, including for plant-mixed samples the name of owner or operator of plant, location of plant, type of plant, size of batch, and identification of bitumen and mineral aggregates used in the mixture,

7.2.3 Point at which sampled, for samples taken from roadway, both by station number and location transversely in pavement; also whether sampled from completed pavement, windrow, etc.,

7.2.4 Quantity represented,

7.2.5 By whom sampled and title,

7.2.6 Date of most recent mixing, if road-mixed,

7.2.7 Date sampled,

7.2.8 By whom submitted and address,

7.2.9 Purpose for which sample was taken, and

7.2.10 To whom report is to be made.

8. Keywords

8.1 asphalt paving mixture; bituminous paving mixture; mechanical truck sampling device; sampling



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