



## Standard Practice for Sampling Bituminous Paving Mixtures<sup>1</sup>

This standard is issued under the fixed designation D 979; 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 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 *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.*

1.3 The values stated in SI units are to be regarded as the standard. The values in parentheses are provided for information purposes only.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

C 702 Practice for Reducing Samples of Aggregate to Testing Size<sup>2</sup>

D 2234 Test Method for Collection of a Gross Sample of Coal<sup>3</sup>

D 3665 Practice for Random Sampling of Construction Materials<sup>4</sup>

E 105 Practice for Probability Sampling of Materials<sup>5</sup>

E 122 Practice for Calculating Sample Size to Estimate, With a Specified Tolerable Error, the Average for a Characteristic of a Lot or Process<sup>5</sup>

E 141 Practice for Acceptance of Evidence Based on the Results of Probability Sampling<sup>5</sup>

### 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 of 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:

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.

### 5. Procedure

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

5.2 *Sampling*—The procedures for selecting locations or times for sampling are described in Practice D 3665.

5.2.1 *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 4.3.2. Carefully scoop all material between templates into a suitable container.

5.2.2 *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

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<sup>2</sup> Annual Book of ASTM Standards, Vol 04.02.

<sup>3</sup> Annual Book of ASTM Standards, Vol 05.06.

<sup>4</sup> Annual Book of ASTM Standards, Vol 04.03.

<sup>5</sup> Annual Book of ASTM Standards, Vol 14.02.

field sample whose quantity equals or exceeds the minimum recommended in 5.3.2. The sample may be obtained by collecting the increments with a scoop or shovel.

**5.2.3 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 5.3.2.

**5.2.3.1** 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 5.3.2.

**5.2.3.2** 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.

**5.2.4 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 5.3.2.

**5.2.5 Sampling from a Funnel Device Feeding a Conveyor for Mixture Delivery to Storage**—Select the units to be sampled 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 5.3.2.

**5.2.6 Sampling from Roadway after Compaction**—Select the units to be sampled by a random method from the material in place. Obtain at least three approximately equal samples selected at random from the unit 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 increment shall be obtained by coring, sawing, or other methods in such a manner as to ensure a minimum disturbance of the material.

**5.2.7 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 5.3.2.

**5.2.7.1** When three or more samples are to be taken, sample in accordance with 5.2.3.1.

### 5.3 Number and Quantities of Field Samples:

**5.3.1** The number of field samples (obtained by one of the methods described in 5.2) 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 1**—Guidance for determining the number of samples required to obtain the desired level of confidence in test results may be found in Method D 2234, Practice E 105, Practice E 122, and Practice E 141.

**NOTE 2**—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 3**—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 4**—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.

**5.3.2** A guide to the quantity of material in field samples is given in Table 1. The quantities 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. Generally, the amounts specified in Table 1 will provide adequate material for routine testing. Extract test portions from the field sample by quartering or splitting in a similar manner to Practice C 702 or as required by other applicable test methods.

## 6. Shipping Samples

**6.1** 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.

**TABLE 1 Guide for Estimating Quantity of Sample**

Nominal Maximum Size of Aggregates <sup>A</sup>	Approximate Mass of Uncompacted Mixture, min, kg (lb)
2.36-mm (No. 8)	2 (4)
4.75-mm (No. 4)	2 (4)
9.5-mm (3/8-in.)	4 (8)
12.5-mm (1/2-in.)	5 (12)
19.0-mm (3/4-in.)	7 (16)
25.0-mm (1-in.)	9 (20)
37.5-mm (1 1/2-in.)	11 (25)
50-mm (2-in.)	16 (35)

<sup>A</sup> The nominal maximum size of aggregate is the largest sieve size listed in the applicable specification upon which any material is permitted to be retained.

6.2 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:

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

6.2.2 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,

6.2.3 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.,

6.2.4 Quantity represented,

6.2.5 By whom sampled and title,

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

6.2.7 Date sampled,

6.2.8 By whom submitted and address,

6.2.9 Purpose for which sample was taken, and

6.2.10 To whom report is to be made.

## 7. Keywords

7.1 asphalt paving mixture; bituminous paving mixture; sampling

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