

Method of Test For  
**WATER SUSCEPTIBILITY OF ASPHALTIC CONCRETE MATERIALS**

DOTD Designation: TR 317

This method of test describes the procedure for qualifying anti-strip additives to be incorporated into the asphalt cement to be used in asphaltic mixtures. The additives are proportioned in an asphaltic-additive mixture at a rate of 0.5 percent by weight, or other designated rate, of asphalt cement.

DOTD TR 317 is identical to ASTM D3625 except for the following provisions:

A. Section 2, Referenced Documents is amended to include:

DOTD TR 610 – Infrared Spectrophotometric Analysis

B. Section 5, Apparatus is amended as follows:

5.6 Oven – of constant temperature, capable of maintaining a temperature of  $160\pm 3^{\circ}\text{C}$  ( $325\pm 5^{\circ}\text{F}$ ).

5.7 Balance – having a minimum capacity of 200g and sensitive to 0.1g.

5.8 Containers – disposable, approximately 0.5L (1.25 pint) (No. 2) metal containers, 1L (1 quart) metal containers and friction top, and 4L (1 gallon) metal containers and friction top

5.9 Sheet aluminum, heavy-duty aluminum foil, or parchment paper – approximately 18” x 18” or of sufficient size to accommodate the aggregate-asphalt mixture.

C. Insert Materials Section after Section 5 as follows:

1. Reference aggregates – three standard aggregates of known past performance taken from approved aggregate sources. The aggregates shall be crushed, unwashed, and of such size that 100 percent passes a 9.5mm (3/8 in.) sieve and is retained on a 4.75mm (No. 4) sieve.
2. Reference asphalt cements – two standard asphalt cements, PG 67-22, taken from approved refinery sources.
3. Anti-strip additive – approximately 0.5L (1 pint), or as supplied by manufacturer.

D. Section 6, Sample, is modified as follows:

The first sentence of Section 6.1 is modified to read: “Prepare an un-compacted bituminous-coated aggregate mixture following the procedure in Section 6.2, or obtain a sample of plant-produced mixture in accordance with Practice D979 or approved DOTD procedure.”

Insert Section 6.2 as follows:

- 6.2 Prepare the laboratory-blended aggregate-asphalt mixture as follows, using the anti-strip additive with a combination of each reference asphalt and each reference aggregate for a total of 6 mixture combinations.
  - 6.2.1 Heat the asphalt cement until it is readily pourable, approximately 135°C (275°F), but not to exceed 175°C (350°F).
  - 6.2.2 Pour 50.0g of asphalt cement into a clean tared liter (quart) can
  - 6.2.3 Add 0.5g of anti-strip additive
  - 6.2.4 Pour an additional 50.0g of asphalt cement into the mixture
  - 6.2.5 Transfer the mixture from the balance to the hot plate and, while stirring, return the material to 135°C (275°F) oven.
  - 6.2.6 Place a friction top loosely on the liter (quart) can (being careful not to seal the can); put the liter (quart) can inside an empty four liter (gallon) can; and place a perforated friction top on the four-liter (gallon) can.
  - 6.2.7 Put the four-liter (gallon) can in an oven operating at 160±3°C (320±5°F) for 24±2 hours.
  - 6.2.8 Place 95.0g of oven dried unwashed aggregate into a clean 0.5 L mixing can and put the can in the oven operating at 160±3°C (320±5°F) for 1 to 1½ hours.
  - 6.2.9 Remove both containers from the oven. Add 5.0g of the asphalt-additive mixture to the aggregate container. Mix thoroughly so that all aggregate surfaces are coated.
  - 6.2.10 Immediately empty the aggregate-asphalt mixture onto a clean piece of aluminum sheeting or parchment paper and allow to cool at room temperature for 2 hours ± 5 minutes.

E. Section 7, Procedure, is modified as follows:

The first sentence of Section 7.2 is modified to read “With an appropriate implement (as described in 5.1) place approximately 250 g (1/2 lb) of the plant-produced bituminous-coated aggregate mixture or the entire laboratory-prepared mixture in the boiling water while the container is exposed to the heat source.”

Section 7.5 is inserted as follows:

7.5 Allow three laboratory personnel to visually determine the percent coating without manipulating the sample in any way.

F. Insert Calculations Section after Section 7 as follows:

1. For laboratory-produced mixtures, calculate the average rating of each combination (Tax, Tay, Taz, Tbx, Tby, Tbz) to the nearest 1% using the following formula:

$$Tax = \frac{Tax_1 + Tax_2 + Tax_3}{3}$$

$$Tay = \frac{Tay_1 + Tay_2 + Tay_3}{3}$$

$$Taz = \frac{Taz_1 + Taz_2 + Taz_3}{3}$$

$$Tbx = \frac{Tbx_1 + Tbx_2 + Tbx_3}{3}$$

$$Tby = \frac{Tby_1 + Tby_2 + Tby_3}{3}$$

$$Tbz = \frac{Tbz_1 + Tbz_2 + Tbz_3}{3}$$

Where:

x, y, z = aggregate sources

a, b = asphalt cement sources

1, 2, 3 = individual rater

Calculate the average percent of visible surface area coated with asphalt to the nearest 1% using the following formula:

$$\text{Retained Asphalt Coating, \%} = \frac{Tax + Tay + Taz + Tbx + Tby + Tbz}{6}$$

2. For plant-produced samples, average the three individual ratings to the nearest 1% using the following formula:

$$\text{Retained Asphalt Coating, \%} = \frac{T1 + T2 + T3}{3}$$

G. Insert Sample Identification Section after Calculations as follows:

If the product meets specification and does not have a fingerprint analysis on file, perform an infrared spectrophotometric analysis of the anti-strip additive according to DOTD TR 610 to record a permanent identification of the material.

Normal Test Reporting Time is 2 days.