Method of Test for
DETERMINATION OF ASPHALT ABSORPTION FACTOR OF AGGREGATE AND EFFECTIVE ASPHALT CONTENT FOR ASPHALTIC MIXTURES
DOTD Designation: TR 320-87

Scope

1. This method of test is intended to determine both the asphalt absorption of coarse, fine or combined aggregates and the effective asphalt content of the asphaltic mixture. This method is to be used for aggregates having a water absorption greater than 2.0 percent or an asphalt absorption greater than 0.5 percent such as slag, shell, porous stone, recycled portland cement concrete, expanded clay, etc.

Apparatus

2. Same as DOTD Designation: TR 300, Method C, and AASHTO Designation: T 84 or T 85.

Sample

3. Same as DOTD Designation: TR 300, Method C, and AASHTO Designation: T 84 or T 85.

Procedure

4. (a) Determine the effective specific gravity of the aggregate in accordance with DOTD Designation: TR 300, Method C.

(b) Determine the bulk specific gravity of the aggregate in accordance with AASHTO Designation: T 84 or T 85.

(c) Determine the asphalt absorption as described in paragraph 5(a).

(d) Determine the effective asphalt content of the paving mixture as described in paragraph 5(b).

NOTE: The effective asphalt content (AC_e) of a paving mixture is the total asphalt content minus the quantity of asphalt lost by absorption into the aggregate particles. It is the portion of the total asphalt content that remains as a coating on the outside of the aggregate particles, and is the asphalt content on which service performance of an asphaltic paving mixture depends.

Calculations

5. (a) Calculate the asphalt absorption (AC_a) using the following formula:

$$AC_a = 100 \left(\frac{G_e - G_b}{G_e G_b} \right) G_a$$

where:

AC_a = absorbed asphalt, % by weight of aggregate

G_e = effective specific gravity of aggregate

G_b = bulk specific gravity of aggregate

G_a = specific gravity of asphalt (AASHTO Designation: T 228)

example:

effective specific gravity, G_e = 2.59
bulk specific gravity, G_b = 2.45
asphalt specific gravity, G_a = 1.03

$$AC_a = 100 \left(\frac{2.59 - 2.45}{(2.59)(2.45)} \right) 1.03$$

$$= 100 \left(\frac{0.14}{6.345} \right) 1.03 = 2.266$$

Absorbed Asphalt by Weight of Aggregate = 2.3%

(b) Calculate the effective asphalt content (AC_e) using the following formula:

$$AC_e = AC_m - \left(\frac{AC_a}{100} \times AGG \right)$$

where:

AC_e = effective asphalt content, % by total weight of mixture

AC_m = asphalt content, % by total weight of mixture; taken from job mix formula (JMF)

AC_a = absorbed asphalt content, % by weight of aggregate

AGG = aggregate, % by total weight of mixture; taken from JMF

example:

AC_m = 5.3% taken from JMF
AC_a = 2.3% determined by step 4(c)
AGG = 30.0% taken from JMF

$$AC_e = 5.3 - (\frac{2.3}{100} \times 30.0) = 5.3 - 0.690 = 5.3 - 0.7 = 4.6\%$$

Report

6. Report asphalt absorption (AC_a) and effective asphalt content of mixture (AC_e) to the nearest one-tenth of one percent (0.1%).

NOTE: Use effective asphalt content of the mixture to calculate percent voids filled with asphalt (% VFA) in the asphaltic concrete mixture. (See DOTD Designation: TR 304 Method B.)

Normal testing time is 2 days.