

## ASPHALT FILM THICKNESS IN BITUMINOUS MIXTURES

### 1.0 SCOPE

- 1.1 This procedure is used to estimate the asphalt film thickness for a bituminous mixture. The calculated asphalt film thickness is the volume of the effective asphalt divided by the calculated surface area of the aggregate.
- 1.2 The calculated surface area of the aggregate consists of multiplying the total percentage passing each sieve size by a "surface-area factor". The accumulated products represent the equivalent surface area in terms of square meters per kilogram. All surface-area factors must be used in the calculation. Also, a different series of sieves will require different surface-area factors.

### 2.0 APPLICABLE DOCUMENTS

- 2.1 AASHTO T270 Centrifuge Kerosene Equivalent and Approximate Bitumen Ratio (ABR)
- 2.2 California Test 303 Method of Test for Centrifuge Kerosene Equivalent and Approximate Bitumen Ratio (ABR)
- 2.3 Asphalt Institute's MS-2, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types

### 3.0 PROCEDURE

- 3.1 Determine the job mix formula gradation, bulk specific gravity of the aggregate and the compacted mixture, asphalt content, specific gravity of the asphalt and the asphalt absorption.

### 4.0 CALCULATE

- 4.1 Calculate the volume of effective asphalt as follows:

$$\text{Volume of effective asphalt (m}^3\text{)} = \frac{\frac{\text{wt. of effective asphalt}}{\text{specific gravity of asphalt}}}{1000}$$

## TLT-311 (92)

Where:

weight of effective asphalt =

weight of mix - weight of dry aggregate - weight of absorbed asphalt

Where:

$$\text{weight of dry aggregate} = \frac{\text{weight of mix}}{1 + \% \text{ asphalt}}$$

$$\text{weight of absorbed asphalt} = \text{weight of dry aggregate} \times \frac{\text{asphalt absorption}}{100}$$

4.2 Calculate the surface area as follows:

Surface area (m<sup>2</sup>/kg) =

$$0.41 + .0038a + .0078b + .0155c + .029d + .054e + .1218f + .290g$$

Where:

a = percent passing 5 000

b = percent passing 2 500

c = percent passing 1 250

d = percent passing 630

e = percent passing 315

f = percent passing 160

g = percent passing 80

Correct for aggregate bulk specific gravity by multiplying:

$$\text{Surface area (m}^2\text{/kg)} \times \frac{2.650}{\text{aggregate bulk specific gravity}}$$

4.3 Calculate the asphalt film thickness as follows:

$$\text{Asphalt film thickness (}\mu\text{m)} = \frac{\text{volume of effective asphalt}}{\text{calculated surface area of aggregate}} \times 10^6$$

Where:

surface area of aggregate = surface area x weight of aggregate

## 5.0 REPORT

5.1 The Asphalt Film Thickness results are presented within the mix design summary report.