

**INDIANA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS MANAGEMENT**

**TOTAL AGGREGATE BULK SPECIFIC GRAVITY DETERMINATION
FROM EXTRACTED HMA OR SMA MIXTURE**

ITM No. 590-16T

1.0 SCOPE.

- 1.1** This test method covers the procedure to determine the total aggregate bulk specific gravity value from extracted HMA mixture.
- 1.2** This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

2.0 REFERENCED DOCUMENTS.

2.1 AASHTO Standards.

- T 30 Mechanical Analysis of Extracted Aggregate
T 84 Specific Gravity and Absorption of Fine Aggregate
T 85 Specific Gravity and Absorption of Coarse Aggregate
T 164 Quantative Extraction of Bitumen from Bituminous Paving Mixtures

2.2 ITM Standards.

- 571 Quantitative Extraction of Asphalt and Gradation of Extracted Aggregate from HMA Mixtures
580 Sampling HMA
587 Reducing HMA Samples to Testing Size

2.3 Other References.

Design Mix Formula Cover Sheet

- 3.0 TERMINOLOGY.** Definitions for terms and abbreviations shall be in accordance with the Department's Standard Specifications, Section 101.

4.0 SIGNIFICANCE AND USE. This test method covers the procedure to determine the total aggregate bulk specific gravity value from extracted HMA mixture.

5.0 APPARATUS. The apparatus shall be as stated in the referenced test methods.

6.0 SAMPLING. Sampling shall be as stated in the referenced test methods.

7.0 PROCEDURE.

7.1 Determine the minimum mass of coarse aggregate required based on the mixture designation as follows:

Mixture Designation, mm	Minimum mass of coarse aggregate, g
12.5 or less	2400
19.0	3600
25.0	4800

7.2 Calculate the minimum mass of HMA needed to produce the minimum mass of coarse aggregate after extraction as follows:

$$(\text{HMA})_{\text{MIN}} = \frac{A}{\left[1 - \left(\frac{\text{Pb}}{100}\right)\right]_{\text{DMF}} \times \left[1 - \left(\frac{\text{B}}{100}\right)\right]_{\text{DMF}}}$$

Where:

A = minimum mass of coarse aggregate as determined in 7.1.

B = % passing 4.75 mm sieve determined from the DMF or mixture test results.

Pb = binder content determined from the DMF or mixture test results.

7.3 Reduce the HMA sample in accordance with ITM 587, section 5.0, to the minimum mass of HMA needed as determined in 7.2.

7.4 Extract the HMA sample in accordance with ITM 571, Method A.

7.5 Perform a gradation in accordance with AASHTO T 30.

7.5.1 Combine all coarse aggregate material retained on the 4.75 mm sieve.

7.5.2 Combine all fine aggregate material passing the 4.75 mm sieve

- 7.6** Determine the bulk specific gravity, $(Gsb)_{CA}$, of the coarse aggregate sample in accordance with AASHTO T 85 except as follows:
- 7.6.1 The in-water mass shall be determined following the 15 h soaking period prior to determining the SSD mass.
- 7.7** Reduce the fine aggregate material in accordance with AASHTO T 248, Method A, to the minimum AASHTO T 84 sample size. Prepare two fine aggregate samples for testing. Determine the bulk specific gravity, $(Gsb)_{FA}$, of the two fine aggregate samples in accordance with AASHTO T 84 except as follows:
- 7.7.1 Excess water shall be poured over a No. 200 sieve and fines retained on the sieve should be washed back into the sample.
- 7.8** Determine the $(Gsb)_{FA}$ by averaging the two fine aggregate sample results.
- 7.9** Combine the $(Gsb)_{CA}$ determined in 7.6 and the $(Gsb)_{FA}$ determined in 7.8 to achieve the $(Gsb)_{TOTAL}$ of the aggregate blend as follows:

$$7.9.1 \quad (Gsb)_{TOTAL} = \frac{100}{\left[\frac{(100 - A)}{(Gsb)_{CA}} \right] + \left[\frac{(A)}{(Gsb)_{FA}} \right]}$$

Where:

A = % passing the 4.75 mm sieve as determined in 7.5.

- 8.0 REPORT.** The $(Gsb)_{TOTAL}$ is reported to the nearest 0.001.