Colorado Procedure 48-16

Standard Method of Test for

Determination of the Voids in the
Mineral Aggregate (VMA)

1. SCOPE

1.1   Voids in the mineral aggregate (VMA) are the void spaces between the aggregate particles of the compacted mix. This void space includes the air voids and the effective asphalt content.

2. REFERENCED DOCUMENTS

2.1   *Colorado Procedures*:
CP 56   Guidelines for Using Maximum Specific Gravity (Rice) of Project-Produced HMA to Change the Target Specific Gravity for Compaction Compliance

3. CALCULATION

3.1   VMA is computed as follows:

$$VMA = 100 - \frac{G_{mb}\, P_s}{G_{sb}}$$

Where:

VMA = Voids in mineral aggregate, in percent of bulk volume,
G_{sb} = Bulk specific gravity of the aggregate,
G_{mb} = Bulk specific gravity of compacted mix,
P_s = Aggregate, percent by total weight of mix.

3.2   When the total aggregate consists of separate fractions, the bulk specific gravity of the total aggregate is computed as follows:

$$G_{sb} = \frac{P_1 + P_2 + \ldots + P_n}{\dfrac{P_1}{G_1} + \dfrac{P_2}{G_2} + \ldots + \dfrac{P_n}{G_n}}$$

Where:

P_1 = Percent by weight of aggregate 1, etc.,
G_1 = Bulk specific gravity of aggregate 1, etc.

3.3   When the total mix contains 20 percent or less of reclaimed asphalt pavement (RAP), the bulk specific gravity of the aggregate contained in the RAP shall be assumed to be the same as the effective specific gravity of the aggregate contained in the RAP for the purpose of the calculation in Subsection 3.2. The calculation for the effective specific gravity may be found in CP 56.

NOTE 1: For more detailed information on VMA determination and related subjects, refer to the Asphalt Institute publication MS-4.

3.4   When hydrated lime is used in the mix, the G_{sb} value for the lime shall be 2.38.

4. REPORT

4.1   *Report the following information:*

4.1.1   Each VMA to the nearest 0.01%. The average of three VMA to the nearest 0.1%.

NOTE 2: Each VMA shall be considered an intermediate value. Each VMA shall be calculated according to Appendix I.

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