 <p>Manitoba Infrastructure</p> <p>MATERIALS ENGINEERING BRANCH PAVEMENT SECTION</p>	Standard No.: MEB- P038
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1.0 SCOPE

This specification covers the required gyrations and properties for hot mixed bituminous design using the Superpave method.

2.0 REFERENCE STANDARDS

ASTM Standards


- D5821 Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
- D4791 Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

AASHTO Standards

- T304 Standard Method of Test for Uncompacted Void Content of Fine Aggregate
- T176 Standard Method of Test for Plastic Fines in Graded Aggregates and Soils by use of the Sand Equivalent Test
- M323 Standard Specification for Superpave Volumetric Mix Design
- R35 Standard Practice for Superpave Volumetric Design for Asphalt Mixtures
- T312 Standard Method of Test for Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor
- T166 Bulk Specific Gravity (Gmb) of Compacted Asphalt Mixture Specimens by means of the Superpave Gyratory Compactor
- T168 Sampling Bituminous Paving Mixtures
- R30 Standard Practice for Mixture Conditioning of Hot Mix Asphalt (HMA)
- M231 Weighing Devices Used in the Testing of Materials
- T319 Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures

MEB Standard

- P039 Standard Practice for Sampling and Testing of Hot Mix Bituminous

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3.0 MIX DESIGN

The Superpave mix design shall produce a job mix formula for hot mixed bituminous using the gyrations as specified in Table 1. The mix design shall also meet the mix properties as specified in Table 2.

The aggregates used in the mix design shall meet the aggregates specification in the Special Provisions.

The return of fines to the mixture and the aggregate breakdown from plant production may require appropriate changes to the job mix formula to meet requirements as specified in Table 2.

Table 1: Superpave Gyrotory Compaction Requirements

Design ESALs (million)	Compaction Parameters		
	N _{initial}	N _{design}	N _{Max}
<0.3	6	50	75
0.3 to <10	7	75	115
10 to <30	8	100	160

Table 2: Superpave Mix Requirements

Design ESALs (million)	Required Relative Density, Percent of Theoretical Maximum Specific Gravity			Minimum VMA (%)				Voids Filled with Asphalt (%)	Dust to Binder Ratio ⁴
	N _{initial}	N _{design}	N _{Max}	SP19	SP12.5	SP9.5	SP4.75		
<0.3	≤91.5	96.0	≤98.0	13	14	15	16	70-80 ¹	0.6-1.2 ⁴
0.3 to <3	≤90.5	96.0	≤98.0	13	14	15	16	65-78 ²	0.6-1.2 ⁴
3 to <30	≤89.0	96.0	≤98.0	13	14	15	16	65-75 ^{1,2,3}	0.6-1.2 ⁵

¹ SP4.75 shall have VFA of 67 to 79 percent

² SP4.75 shall have VFA of 66 to 77 percent


³ SP9.5 shall have VFA of 73 to 76 percent

⁴ SP4.75 shall have dust to binder ratio of 1.0 to 2.0 percent

⁵ SP4.75 shall have dust to binder ratio of 1.5 to 2.0 percent

3.1 Changes to the Job Mix Formula

The Department will monitor the mix properties using a quality assurance laboratory as per *MEB P039 Standard Practice for Sampling and Testing Hot Mix Bituminous*. Changes to the job mix formula shall be made when the mix requirements are outside the acceptable limits.

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4.0 RECYCLED ASPHALT PAVEMENT

The Recycled Asphalt Pavement (RAP) shall be tested once processed to verify the gradation, recovered binder grade and asphalt cement content.

The blended aggregates shall meet the gradation requirements as specified in the Special Provisions.

The binder content of the RAP shall be determined to adjust the virgin binder requirements.

The blended binder shall meet the design asphalt binder grade as per *AASHTO M323 Standard Specification for Superpave Volumetric Mix Design*.