

SECTION 717

ASPHALT- RUBBER

717.1 DESCRIPTION:

The work under this section shall consist of furnishing, proportioning and mixing all the ingredients necessary to produce asphalt-rubber material.

717.2 MATERIALS:

717.2.1 Asphalt-Rubber:

Asphalt Cement: Asphalt cement shall conform to the requirements of Section 711.

Rubber: Rubber shall meet the following gradation requirements when tested in accordance with Arizona Test Method 714.

Sieve Size	Percent Passing <u>MCDOT</u>	Percent Passing <u>Phoenix</u>
#10 (2.00 mm)	100	<u>100</u>
#16 (1.18 mm)	65 - 100	<u>75 - 100</u>
#30 (600 μm)	20 - 100	<u>25 - 60</u>
#50 (300 μm)	0 - 45	<u>0 - 20</u>
#200 (75 μm)	0 - 5	<u>0 - 5</u>

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 Comment [rth1]: What is the impact on cost if City of Phoenix stricter gradation limits are used?

The rubber shall have a specific gravity of 1.15 ± 0.05 , shall contain not more than 0.5 percent fabric and shall be free of wire or other contaminating materials. Calcium carbonate, up to four percent by weight of the granulated rubber, may be added to prevent the particles from sticking together.

Certificates of Compliance conforming to Arizona State Department of Transportation Standard Specifications for Road and Bridge Construction Section 106.05 shall be submitted. In addition, the Certificates shall confirm that the rubber is a crumb rubber, derived from processing whole scrap tires or shredded tire materials; and the tires from which the crumb rubber is produced is taken from automobiles, trucks, or other equipment owned and operated in the United States. The Certificates shall also verify that the processing does not produce, as a waste product, casings or other round tire material that can hold water when stored or disposed of above the ground.

717.2.2 Asphalt-Rubber Proportions and Properties: Ground rubber in asphalt-rubber shall be a minimum of 20 percent and a maximum of 22 percent by weight of the asphalt cement.

Comment [rth2]: Mesa has questioned why the maximum ground rubber is limited to 22% and not 25%. MCDOT believes that the high rubber content can contribute to raveling.

Asphalt shall be Type 1 unless otherwise specified and conform to the following:

Property	Requirement		
	Type 1	Type 2	Type 3
Grade of base asphalt cement	PG 64-16	PG 58-22	PG 52-28
Rotational Viscosity*; 354-350 °F (177°C); cps (Pascal seconds) (cps)	1.5-4.0 (1500-4000) (1.5-4.0)	1.5-4.0 (1500-4000) (1.5-4.0)	1.5-4.0 (1500-4000) (1.5-4.0)
Penetration; 39.2°F (4°C), 200g, 60 sec. (ASTM D 5); in (dmm) (in), min	10 (0.04) (10)	15 (0.06) (15)	25 (0.10) (25)
Ductility; 39.2°F (4°C), 1cpm (ASTM D 113); cm (in), min.	5 (2)	5 (2)	5 (2)
Softening Point; (ASTM D 36); °F (°C), min.	135 (57)	129 (54)	126 (52)
Resilience; 77°F (25°C) (ASTM D 3407); %min	25	20	15
* The Viscometer used must be a hand held rotational viscometer, such as a Rion (formerly Haake Viscometer,) Model VT – 04, or an equivalent, using Rotor No. 1, or viscometer correlated. The rotor, while in the off position, shall be completely immersed in the binder at a temperature from 350°F to 355°F for a minimum heat equilibrium period of 60 seconds, and an average viscosity determined from three separate constant readings (± 0.5 pascal seconds) taken within a 30 second time frame with the viscotester level during testing and turned off between readings. Continuous rotation of the rotor may cause thinning of the material immediately in contact with the rotor, resulting in erroneous results.			

717.2.3 Asphalt-Rubber Design: At least two weeks prior to the use of asphalt-rubber, the Contractor shall submit an asphalt-rubber design prepared by an ADOT approved laboratory. Such design shall meet the requirements specified herein. The design shall show the values obtained from the required tests, along with the following information: percent, grade and source of the asphalt cement used; and percent, gradation and source(s) of rubber used.

717.3 CONSTRUCTION REQUIREMENTS:

717.3.1 Mixing of Asphalt-Rubber: The temperature of the asphalt-cement shall be between 375°F (191°C) and 425°F (218°C) prior to the addition of rubber. No agglomerations of rubber particles in excess of 2" in the least dimension shall be allowed in the mixing chamber. The ground rubber and asphalt-cement shall be accurately proportioned in accordance with the design and thoroughly mixed prior to the beginning of the one-hour reaction period. Reaction time may be decreased to 45-minutes if documentation is provided that the physical properties of the mix design requirements are consistently met using a 45-minute reaction period. The Contractor shall document that the proportions are accurate and that the rubber has been uniformly

incorporated into the mixture. Additionally, the Contractor shall demonstrate that the rubber particles have been thoroughly mixed such that they have been "wetted." The occurrence of rubber floating on the surface or agglomerations of rubber particles shall be evidence of insufficient mixing. The temperature of the asphalt-rubber immediately after mixing shall be between 350°F (177°C) and 400°F (204°C). Reaction time shall start after all of the material for the batch has been mixed and the minimum reaction temperature of 350°F (177°C) has been achieved.

Prior to use, the viscosity of the asphalt-rubber shall be tested by the use of a rotational viscometer, which is to be furnished by the Contractor or supplier. The Contractor shall provide a qualified person to perform the testing.

717.3.2 Handling of Asphalt-Rubber: Once the asphalt-rubber has been mixed, it shall be kept thoroughly agitated during periods of use to prevent settling of the rubber particles. During the production of asphaltic concrete the temperature of the asphalt-rubber shall be maintained between 325°F (163°C) and 400°F (204°C). However, in no case shall the asphalt-rubber be held for more than 10 hours at these temperatures. It shall be allowed to cool to a temperature of 250°F (121°C) or less and held at that temperature for not more than four days. The process of cooling and reheating shall not be allowed more than one time for a batch of asphalt rubber binder.

For each load or batch of asphalt-rubber, the Contractor shall provide the Engineer with the following documentation:

- (A) The source, grade, amount and temperature of the asphalt cement prior to the addition of rubber.
- (B) The source and amount of rubber and the rubber content expressed as percent by the weight of the asphalt cement.
- (C) Times and dates of the rubber additions and resultant viscosity test.
- (D) A record of the temperature, with time and date reference for each load or batch. The record shall begin at the time of the addition of rubber and continue until the load or batch is completely used. Readings and recordings shall be made at every temperature change in excess of 52°F (11°C), and as needed to document other events which are significant to batch use and quality.

– End of Section –