ROAD COMMISSION FOR OAKLAND COUNTY

SPECIAL PROVISION
FOR
REINFORCING FIBERS FOR ASPHALT

a. Description

This work consists of furnishing and adding aramid reinforcing fibers to Superpave HMA mixes and shall be done in accordance with section 501 of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, except as herein provided.

b. Mix Design and Product Submittal Requirements.

Furnish an HMA mixture design for the HMA fiber reinforced mixtures as identified on the plans to the Engineer for review.

In addition to the mix design requirements in the HMA Production Manual, submit the following items as part of the mix design submittal:

1. Representative aramid fiber product sample.
2. Aramid fiber product sheet and certification from the Manufacturer that the fiber product meets the requirements of this special provision.
3. Manufacturer's instructions and general recommendations.

c. Materials.

1. Reinforcing Aramid Fibers. Furnish a reinforcing fiber blend of Sasobit® wax or virgin polyolefins with virgin aramids that meet the requirements in Table 1.
2. Treatment. Treat the lightweight aramid fiber with either a Sasobit wax or blended with other polyolefin fibers prior to plant production.
3. Dosage. The standard dosage is 2.1 ounces minimum of pure aramid fibers per ton of asphalt mixture and not to exceed 4.2 ounces per ton. The weight applied is for pure aramid fibers only.

Table 1: Reinforcing Aramid Fiber Material Properties

Property	Measure	Standard
Form	Fibrillated & Monofilament Fibers, non-resin impregnated	Manufacturer Certification
Length	0.75 to 1.50 inches (19 to 38mm) ±10%)	Manufacturer Certification
Filament Diameter	12 ±2 microns	Manufacturer Certification
Specific Gravity	1.44 ±0.01 g/cm3	*ASTM D2256/D2256M*

Tensile Strength	400,000 psi (2.758 GPa) minimum	*ASTM D2256/D2256M*
Elongation at Break	4.4 % maximum	*ASTM D2256/D2256M*
Degradation Temperature	800 °F (426 °C) minimum	*ASTM D2256/D2256M*
Acid and Alkali Resistance	Inert	Manufacturer Certification
Treatment Type	Sasobit® Wax or Blended Polyolefin Fibers	Manufacturer Submittal

d. Delivery, Storage and Handling.

1. Deliver reinforcing aramid fibers and treatment in sealed, undamaged containers with labels intact and legible, indicating material name and lot number.
2. Deliver reinforcing aramid fibers and treatment to the location where it will be added to or loaded into the asphalt plant.
3. Store materials covered and off the ground. Keep sand and dust out of boxes and do not allow boxes to become wet.

e. Mixing and Production.

1. Add aramid fiber at the dosage rate listed in subsection c.3 of this special provision.
2. Have the aramid fiber manufacturer's representative on site during mixing and production. The requirement can be waived if the asphalt producer can provide certification by the manufacturer's representative and completes 2 days of successful production at the asphalt plant being used on the project.
3. **Batch Plant:** When a batch plant is used, add aramid fibers and treatment to the aggregate in the weigh hopper. Ensure that the aramid fiber is uniformly distributed before the injection of asphalt cement into the mixture.
4. **Drum Plant:**
   A. Inject aramid fibers and treatment through the RAP collar using an automatic, metered air blown system to promote rapid and complete fiber dispersion. System must automatically record aramid fiber and treatment addition data by setting the feeding rate of the aramid fibers and treatment with the plant production rate of the asphalt plant. If there is any evidence of a dispersion issue of the aramid fibers at the discharge chute, increase the mixing time and/or temperature and/or change the angle of the aramid fiber feeder line to increase dry mixing time.
   B. Use a control system to control feed rates between the plant and the feeding system which is either; an operators control panel, or, a tethered or wireless control panel in the plants tower.
   C. Manual feeding of the fibers is prohibited.
   D. Add aramid fibers and treatment continuously and in a steady uniform manner. Furnish automated proportioning devices and control delivery within 10 percent of the mass of the aramid fibers required. Perform an equipment calibration to the satisfaction

of the aramid fiber manufacturer's representative to show that the aramid fiber is being accurately metered and uniformly distributed into the mix. Include the following with the automated air blown system:

(1) Low level indicators.
(2) No-flow indicators.
(3) A printout or Subscriber Identity Module card of feed rate status in pounds/minute or ounces per plan ton made.
(4) A section of transparent pipe in the fiber supply line for observing consistency of flow or feed.
(5) Manufacturer's representative's approval of fiber addition system.

f. QC, Sampling for Performance Testing, and Acceptance of Modified HMA Mixtures.

1. QC.

A. Visual Test. Collect a 10 kilogram sample of mix from the discharge chute during the first 50 tons of production. Visually assess the dispersion of the aramid fibers. If fiber bundles are observed and/or fibers are not adequately blended, adjust operations per the manufacturer's recommendation.

B. Shovel Test. In addition to the visual test, use a shovel to inspect the HMA with reinforcing aramid fibers from the first 3 trucks and every 10^{th} truck thereafter to confirm adequate blending and dispersion of the aramid fibers. If aramid fiber bundles are observed and/or fibers are not adequately blended, adjust operations per the manufacturer's recommendation.

C. Remove any observed fiber bundles from placed mixture and adjust operations per the manufacturer's recommendation to eliminate future fiber bundle development.

g. Measurement and Payment

The above items will not be paid for separately and are considered included in the contract unit price for the standard HMA pay items shown on the plans.