



**SPECIAL PROVISIONS
FOR
STRUCTURAL HYBRID POLYMER ASPHALT CONCRETE (HP-AC)**

**Shelby County
STP-191-3(12)--2C-83**

**Effective Date
March 15, 2022**

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

150840.01 DESCRIPTION.

Flexible pavement mixture strengthening by incorporating a structural hybrid polymer additive during asphalt mixture production. Apply Section 2303 of the Standard Specifications unless otherwise directed in these specifications. Typical intended applications include temporary pavement and shoulder strengthening.

150840.02 MATERIALS.

A. Structural Hybrid Polymer Additive.

1. A quality control plan must be submitted the Iowa DOT before shipment of material to Iowa DOT projects. Minimum requirements for the quality control plan include:
 - a. Manufacturing Location; Street Address, State, Postal Zip Code
 - b. Contact information of person responsible for Quality Control of materials supplied to the Iowa DOT
 - c. Process for monitoring raw material feedstocks used to produce structural hybrid polymers
 - d. Name and location of Quality Control laboratory performing Quality Control testing
 - e. Quality Control Tests Performed
 - 1) Type of Quality Control Tests
 - 2) Testing frequencies
 - 3) Program for maintaining test and shipping records
 - 4) QC plan shall have a procedure to report and handle non-compliant material.
2. Quality control test results must be electronically submitted to the Iowa DOT for structural hybrid polymer additive lots shipped to Iowa DOT projects.
3. The structural hybrid polymer additives are a composition of structural hybrid polymers

meeting the requirements listed in Table 1 and Table 2.

TABLE 1. REQUIREMENTS OF HYBRID POLYMER ADDITIVE

Parameter	Specification	Test method (if applicable)
Shape	Cylindrical bead	
Length	0.25 ± 0.125 inch	
Diameter	0.1875 ± 0.04 inch	
Acid/alkali resistance	Inert	
Color	Black	
Melting range	220°F - 250°F	
Melt-flow index	0.20 ± 0.02 g/10 minutes	ASTM D1238
Specific gravity	0.945 – 0.955	ASTM D1895
Flash point	> 575°F	ASTM D1929
Water absorption	< 0.05%	ASTM D570

TABLE 2. PHYSICAL CHARACTERISTICS OF HYBRID POLYMER ADDITIVE

Parameter	Test Method	Specification
Tensile Strength	ASTM D 638	1800 – 3000 psi
Modulus of Elasticity	ASTM D 638	50,000 – 150,000 psi
Flexural Modulus	ASTM D 790	100,000 – 200,000 psi
Compression	ASTM D 1037	3000 – 5000 psi
Moisture Content	ASTM D 570	0%
Water Absorption	ASTM D 570	0%
Shear Strength	ASTM D 732	1800 – 2500 psi
Ultimate Shear Strength	ASTM D 143	500 – 600 psi
Hardness – Type D	ASTM D 2240	50 – 108
Coefficient of Linear Thermal Expansion	ASTM D 696	1.0 – 2.0 X 10 in/in/°F

B. Mixture Design.

1. HP-AC may be produced at hybrid polymer dosage rates varying from 1% to 5% of total asphalt binder weight (including binder from recycled asphalt material) [equivalent to 0.05% to 0.25% weight of aggregate] per 1 ton of produced mixture in order to achieve desired performance.
2. For HP-AC shoulder strengthening mixture produced at a dosage of hybrid polymer additive of 1% or less, the job mix formula (JMF) will not require any modifications or design alterations. Develop and submit a job mix formula meeting requirements of Materials I.M. 510 when polymer dosage is higher than 1% of total asphalt binder weight.
3. Apply Materials I.M. 510 for mixture design with the following addition to part F step 4: add and mix the structural hybrid polymers with hot aggregate and RAP and dry mix for 15 seconds before adding the asphalt binder to simulate mixing of the structural highbred polymers with the aggregate in the asphalt drum.
4. Each job mix formula must be capable of being produced, placed, and compacted as specified. Apply all HMA volumetric requirements to achieve a JMF capable of being produced, placed, and compacted as specified.

150840.03 CONSTRUCTION.

A. Hybrid Polymer Additive Supply System.

1. Add hybrid polymer additive through calibrated equipment that can accurately proportion

and/or meter, by weight (mass) to $\pm 10\%$ of the mass (weight), the proper amount per batch for batch plants, or continuously and in a steady uniform manner for drum plants. Perform calibration with an Iowa DOT representative before the start of each project.

2. The supply system may produce a treatment data log. The log consists of a series of data sets that capture the measured metering rate at 10 minute intervals production. The data must be a treatment activity register and not a summation. The material represented by a data set is the quantity produced 5 minutes before and 5 minutes after the capture time.
3. Manual System - If approved by the manufacturer's representative and Engineer, pre-weighed dissolvable bags can be used to manually introduce the additive for HMA mixes only at a given time interval based on the production rate of the asphalt plant.

B. Introducing Material into Asphalt Plant.

The additive shall be introduced into the mixture production process when the RAP and/or RAS is typically introduced. The additive can be added with the RAP or RAS on a conveyor belt before the RAP collar, at the RAP collar, or at the fiber port/inlet.

- In a batch plant, introduce the additive at the time that the RAP and/or RAS is introduced.
- For a drum plant, introduce the additive at a location on the drum that the recycle system introduces RAP and/or RAS.

150840.04 METHOD OF MEASUREMENT.

Structural Hybrid Polymer Asphalt Concrete will be measured per pound.

150840.05 BASIS OF PAYMENT.

Payment for Structural Hybrid Polymer Asphalt Concrete will be at the contract unit price. Payment is full compensation for furnishing and applying the HP-AC, including quality control and mix design.