

**ITEM 400HS STANDARD SPECIFICATION FOR
ASPHALT CONCRETE - HIGH STRESS
USING STONE MASTIC ASPHALT
WITH CELLULOSE FIBERS**

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This Specification has been developed by Flexible Pavements, Inc., an Association for the development, improvement and advancement of quality asphalt pavement construction in Ohio. The most current update of this document can be obtained by contacting Flexible Pavements, Inc. at 1-888-4 HOT MIX.

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400HS.01 General. This work shall consist of furnishing, placing and compacting surface or intermediate courses of hot mix asphalt, designed for high stresses, on a prepared surface in accordance with these specifications and in reasonably close conformity with the lines, grades, and typical sections shown on the plans or established by the owner representative.

Where reference is made to ODOT requirements, the requirements of The Ohio Department of Transportation, Construction and Materials Specifications, current edition shall apply.

Hot mix asphalt shall be placed by weight per unit of area as determined by the thickness shown on the plans or in the proposal and weight to volume conversion factors specified under method of measurement, ODOT, 401.17.

The requirements of ODOT, 441 and 446 shall apply; deviations from these are as shown.

Tack coat, when required, shall meet ODOT requirements.

When used in this specification, the term "owner" is to be understood as the entity having ownership of the facility for which the work has been contracted.

400HS.02 Composition. The stone mastic asphalt mixture designed for high stresses shall be composed of aggregate, asphalt binder and cellulose fibers. Aggregate and asphalt binder shall meet ODOT requirements and modifications provided herein. Cellulose fibers shall meet the manufacturers' requirements as detailed in the mixture specifications provided herein.

The contractor shall furnish a JMF (Job Mix Formula) or ODOT Bituminous Concrete Data Sheet suitable for the purpose of pavement construction. The JMF shall be established within the composition limits for the high stress mixture. Prior to producing material for this contract, the contractor shall submit to the owner representative, for approval, a JMF or data sheet. The JMF shall include the mix type being used, aggregate type and gradation, percentage of asphalt binder by weight of mixture, grade of asphalt binder, source of the cellulose fibers and unit weight of the mixture. The JMF, or data sheet, shall have previously been approved for use on ODOT work. Where no previously approved JMF is available, one shall be developed meeting all criteria established herein and shall be reviewed by an independent testing laboratory prior to submission to the owner representative. The person performing the review for the testing laboratory must be of its employ and shall have a current Level II Bituminous Concrete Certification from the Ohio Department of Transportation. The independent testing laboratory shall certify to the owner the mix design is accurate, complete, and meets the requirements of this specification. Costs for performing this review shall be included in the price per unit of mix.

For hot mix asphalt produced under the provisions of this specification, the contractor shall develop a JMF which meets the following limits:

Characteristic	Total Percent Passing
¾ inch sieve	100
½ inch sieve	85 - 98
3/8 inch sieve	55 - 75
No. 4 sieve	20 - 30
No. 8 sieve	15 - 26
No. 16 sieve	12 - 22
No. 30 sieve	11 - 20
No. 50 sieve	10 - 18
No. 100 sieve	9 - 15
No. 200 sieve	9 - 12
Bitumen (1)	5.8 - 9.0
VMA (2)	15.0%
Drainage Test (3)	0.3%

Notes:

- (1) Percent of total mix.
- (2) Based on bulk gravity
- (3) National Center for Asphalt Technology (NCAT) test method, on file at the ODOT laboratory.

The F/A Ratio and F/T Value shall not apply.

The SMA shall be designed using a 50 blow Marshall and meet the properties for medium traffic volumes, except the design air voids shall be 3.5%.

The asphalt binder shall be PG 64-22.

The coarse aggregate, retained on the No. 4 sieve, shall have a maximum LA Abrasion of 35, a maximum of 20% 3 to 1 flat and elongated pieces in accordance with ASTM D 4791, and a minimum of 90% mechanically crushed particles. A mechanically crushed particle is defined as a particle having rough, angular edges resulting from mechanical crushing.

All of the virgin fine aggregate shall be sand manufactured from stone, gravel or air-cooled slag. If the sand is manufactured from gravel it shall be crushed from gravel material retained on the 3/8-inch sieve.

Fines from the baghouse shall be limited to 3.0% of the total weight of aggregate in the mix design unless metered from a silo through a system having been previously approved by the ODOT laboratory. The remainder of the filler in the JMF shall have a plasticity index not greater than 4. Remaining filler shall be incorporated to achieve consistent mix properties but shall not be premixed with another aggregate or be from another aggregate used in the mixture. Cement, hydrated lime or flyash shall not be used as a filler material.

No reclaimed pavement shall be permitted.

The cellulose fiber shall be VIATOP Bitumen Granulate 66/34, manufactured by Interfibe Corporation. The fiber shall be added to the plant at the dosage recommended by the manufacturer to achieve a fiber content of 0.3% of total weight of the mix. The fibers shall meet the following requirements:

Gradation - Alpine Sieve -	maximum length of 0.2 inches 60% to 80% passing No. 100
Ash Content -	maximum of 20% nonvolatile
pH -	7.5 ± 1.0
Oil Absorption -	6.0 ± 1.0
Moisture Content -	less than 5%
Bulk Density -	34 pounds per cubic foot

The manufacturer of the fibers shall furnish certified test data showing the fibers meet the above requirements, to the owner representative.

The contractor shall protect the cellulose from moisture and contamination prior to incorporating it into the SMA.

Mixing time in batch plants shall be increased a minimum of 5 seconds.

The fiber feed system and the filler feed system shall be approved by the owner's representative, by a trial load and inspection of the baghouse collected material, prior to the start of production.

The SMA shall not be stored at the plant for more than 2 hours and shall be a minimum of 300°F when it arrives at the paver, unless otherwise approved by the owner's representative. If drain-down occurs, storage time shall be shortened.

Quality Control tests shall be performed every 2 hours of production. Tests shall determine: binder content, gradation, moisture content, air voids, voids in mineral aggregate, and maximum specific gravity.

In addition to the quality control requirements of ODOT, 441.10, a drainage test (on file at the ODOT laboratory) shall be performed once each day of production.

Table C of 441.10 shall be modified as follows:

The 4.75 mm (No. 4) and 75 µm (No. 200) sieve design bands shall not be exceeded by the moving average of three tests.

Mix Characteristic	Specification Limits	Warning Band Limits
Bitumen	-0.4 to 0.4	-0.3 to 0.3
12.5 mm (0.5 inch) sieve	-6.0 to 6.0	-5.5 to 5.5
4.75 mm (No. 4) sieve	-5.0 to 5.0	-4.5 to 4.5
75 µm (No. 200) sieve	-2.0 to 2.0	-1.8 to 1.8
Air Voids	2.5 to 4.5	2.7 to 4.3

During the production of the SMA until such time as the owner's representative determines the manufacturing process is adequately controlled, the contractor shall have at the plant or construction site a representative having a current ODOT Level II Bituminous Concrete Certification.

Compaction shall start immediately after the SMA has been placed by the paver. Compaction equipment shall be limited to steel wheel rollers. Vibratory rollers, if used in vibratory mode, shall be set at high frequency and low amplitude, and shall only be used in the breakdown position. Isolated fat spots shall be sanded as soon as practicable during compaction. Placement shall cease if continuous fat spots develop.

400HS.03 Acceptance. Acceptance of the mixture shall be in accordance with ODOT, 446.05, except that an independent testing laboratory shall test the cores in accordance with ODOT Supplement 1036 and report the data to the owner's representative for the purpose of calculating the pay factor. The person testing the cores shall have a current Level I Bituminous Concrete Certification from the Ohio Department of Transportation. Costs for the acceptance testing shall be included in the price per unit of mix.

Table A of ODOT, 446.05 shall be modified as follows:

Mean of 10 cores as percent of daily MSG

93.0% or greater	1.00
92.0% to 92.9%	0.97
91.0% to 91.9%	0.94
90.0% to 90.9%	0.88
Less than 90.0%	*

*The owner will determine whether the material will remain in place. The pay factor for such material allowed to remain in place will be 0.70.

400HS.04 Basis of Payment. Payment for accepted quantities of mix, complete in place, will be made at the contract price for:

Item	Unit	Description
400HS	Cubic Yard	Asphalt Concrete - High Stress