

DETAIL SPECIFICATIONS - LIQUID BITUMINOUS MATERIALS

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DETAILED SPECIFICATIONS – HEATER SCARIFICATION

402.99010005 Heater Scarification of Hot Mix Asphalt (HMA) Pavement 402.99010105 Recycling Agent

1 DESCRIPTION

This work shall consist of recycling the existing hot mix asphalt (HMA) pavement surface. The HMA pavement surface is heated using specialized equipment causing the asphalt to soften. In a continuous process, the softened HMA surface is scarified to a specified depth as detailed in the Contract documents. The scarified asphalt pavement is then mixed with a recycling agent that rejuvenates the asphalt. This mix is then placed and compacted back onto the roadway. All work under this item shall be in accordance with the Standard Specifications and as detailed in this specification.

2 MATERIALS

A. Recycling Agent.

Use ASTM D 4552, *Standard Practice for Classifying Hot-Mix Recycling Agents*, grades RA25 and RA75 petroleum-based recycling agents specifically designed as a rejuvenator meeting the requirements in Table 702-9 *Recycling Agent*. Use *Emulsified Recycling Agents*, grades ERA25 (an emulsified RA25) and ERA75 (an emulsified RA75) petroleum-based recycling agents specifically designed as a rejuvenator meeting the requirements in Table 702-10 *Emulsified Recycling Agent*.

TABLE 702-9 RECYCLING AGENT					
MATERIAL DESIGNATION (GRADE)		702-5030 (RA25)		702-5050 (RA75)	
Test Requirements	Test Method	Min	Max	Min	Max
Tests on Residue from Distillation: Viscosity, 140°F (60°C), cSt Flash Point, CSC, °F	T 201 T48	901 426	4500 --	4501 426	12500 --
Test on Residue from RTFO, 325°F (163°C): Viscosity Ratio Weight Change, ± , %	T 240	-- --	3 3	-- --	3 3
Specific Gravity	T 228	Report		Report	

TABLE 702-10 EMULSIFIED RECYCLING AGENT					
MATERIAL DESIGNATION (GRADE)		702-5031 (ERA25)		702-5051 (ERA75)	
Test Requirements	Test Method	Min	Max	Min	Max
Tests on Residue from Distillation:					

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Viscosity, 140°F (60°C), cSt	T 201	901	4500	4501	12500
Flash Point, CSC, °F	T 48	426	--	426	--
Test on Residue from RTFO, 325°F (163°C):					
Viscosity Ratio	T 240	--	3	--	3
Weight Change, ± , %		--	4	--	4
Specific Gravity	T 228	Report		Report	
Saybolt Furol Viscosity @ 77°F (25°C), sec.	T 59	20	100	20	100
Storage Stability, 24 hrs, %		--	1.5	--	1.5
Sieve, %		--	0.1	--	0.1
Residue, by distillation, %		65	--	65	--

At the start of production and during, provide certified test results and documented quantities to the Engineer for each shipment of recycling agent. The use of any other grade of recycling agent requires prior approval from the Director, Materials Bureau. A 2-week notice is needed for this approval.

B. Mixture Design.

Determine the application rate of the recycling agent by taking and analyzing a minimum of three cores per lane mile or a maximum of 20 cores per project from the existing HMA pavement. Take these cores from locations that represent the entire project condition.

Make sure that the designed application rate of the recycling agent provides the average penetration value of the recovered asphalt binder from the loose mix samples, taken during both the HS and HIPR process, to have an increase of at least 30% or more than the average penetration value of the recovered asphalt binder from the existing pavement cores. Do not exceed the final penetration value of 90. Perform all the sample tests for the penetration values in accordance with AASHTO T 49, *Penetration of Bituminous Materials*.

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DETAILED SPECIFICATIONS – HEATER SCARIFICATION (Cont'd)**3 EQUIPMENT****A. Heating Unit**

This unit shall generate sufficient heat to soften the asphalt pavement to the depth required. Care shall be taken not to overheat the existing pavement thereby softening the underlying asphalt pavement not to be scarified. The burner assembly shall be adjustable to heat between 8 and 14 feet in width. The entire heating unit shall be enclosed and vented to contain the heat and prevent damage to adjacent properties and landscape. Additional heating units may be required if the temperature behind the screed does not meet specification requirements.

B. Heater Scarification Train

This equipment shall be a self-contained machine designed to reprocess only the upper layers of the existing HMA pavement. The heater scarification train shall be self-propelled and capable of operating at speeds of 8 to 26 feet per minute while uniformly heating and scarifying the existing HMA pavement to the minimum loose mix depth specified in the Contract documents. Listed below are the various units that are part of the heater scarification train.

1. Scarifying Unit – The scarifying unit shall contain at least 2 rows of spring-loaded tines that are adjustable to scarify 8 to 14 feet wide. The tines in row shall be no more than 1.0 inch apart. This unit shall also be able to conform to the pavement contours to insure a uniform penetration from the tines and prevent damage to utility structures.
2. Spray Unit – This unit shall be immediately behind the scarifying unit and capable of applying the recycling agent to the reclaimed asphalt pavement at the approved rate. The size of the nozzles located on the spray bar and pump shall be selected based upon the rate of application and the forward speed of the heater scarification unit. This unit shall be equipped with a measuring system, which shall be capable of maintaining the required application rate of the recycling agent with a tolerance of $\pm 5\%$ for the mix design. The measuring system shall continuously verify and display the application rate of recycling agent and cumulative total with respect to the volume of scarified material for the road surface.

Calibration

Calibrate the measuring system in the presence of the Regional Materials Engineer or designee. A minimum 2-week notice is required when scheduling this calibration. Approved calibrations are required for each project. If the calibration date exceeds 90 days, then the bituminous meters will need to be recalibrated. Work shall not progress until the calibration has been completed and verified. The equipment shall be calibrated in accordance with NYSDOT's Material Procedure (MP) 417-01 – *Calibration of Metering System for Recycling Equipment*. Other calibration methods may be used with the approval of the Engineer.

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3. Mill/Remixer Unit – Immediately following the application of the recycling agent, a dual-drum enclosed milling unit shall mill the asphalt pavement to the loose mix depth specified in the Contract documents, thoroughly mixing the recycling agent with the scarified and milled pavement. The mill/remixer unit shall be an integral part of the scarifying machine and shall be located between the spray unit, which applies the recycling agent, and the screed. This unit shall be operated hydraulically, able to work at variable speeds up to 120 rpm.

4. Screed Unit – The attached heated, augured vibratory screed must be able to uniformly distribute the hot scarified material to the desired longitudinal and transverse section. The screed must be adjustable from 8 to 14 feet wide, equipped with an adjustable crown control and each end of the screed must have hand wheel adjusting screws for providing the desired longitudinal grade and transverse slope.

C. Rollers

Shall meet §402-3.04, Rollers in the Standard Specifications.

4 CONSTRUCTION DETAILS

§402-3, Construction Details applies except as modified below:

A. Weather and Seasonal Limitations

Heater scarification is allowed only when the surface temperature is 50°F or above.

B. Pavement Markings

Remove any epoxy or thermoplastic pavement markings. Other markings shall be removed as ordered by the Engineer. Removal of pavement markings will be paid under a separate pay item in the Contract documents.

C. Cleaning

Clean the existing pavement and shoulder to be scarified by using mechanical sweepers, hand brooms, or other effective means until the surface is free of all material, which might interfere with the scarification process.

D. Heater Scarification

At least two heating units must be used. Operate the heating units in a manner to prevent damage to adjacent property and vegetation. Repair all heat-damaged areas immediately, at no additional cost to the Department.

Control the heater scarification equipment to insure the temperature of the scarified mixture is maintained between 275°F and 325°F. Verify this temperature within 5 feet behind the screed unit.

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Control the speed of the equipment to ensure that the recycled pavement is properly milled, mixed, and uniformly distributed to the proper thickness, slope, and crown shown on the Contract plans. Take extra care in controlling heater scarification equipment to prevent segregation of the recycled mix at the start and end of paving production as well as any points where the heater scarification train needs to stop and restart.

Construct the pavement so that it conforms to the requirements of Sections 402-3.10, *Surface Tolerance* and 402-3.11, *Thickness Tolerance*, of the Standard Specifications. Measure the depth of the loose scarified mix behind the screed unit prior to rolling operation. Adjust the paving equipment if the loose mix depth does not meet the depth specified in the Contract documents.

Control the width of each pass to provide proper placement of longitudinal joints including a 3-inch overlap onto adjacent lane passes.

Add recycling agent uniformly to the scarified HMA pavement at the predetermined application rate to produce a homogenous HMA recycled mix.

In areas such as catch basins or manholes not accessible to scarifying equipment, the Engineer will determine if they require repair. Pavement surfaces that are in good condition do not require repair. Repair all areas with cracks or spalls, as approved by the Engineer, at no additional cost to the State.

E. Compaction

Compact the recycled mixture in accordance with §402-3.07, D., 80 Series Compaction Method.

F. Scarified Mixture Verification:

1. **First day:** The Engineer will select two core locations on the existing pavement. These locations will be within a lane mile or fraction thereof if production is less than one mile. Drill two cores at each location and test one from each location for penetration of the existing PG binder from the surface layer only. Provide the companion core from each location to the Engineer.

During the scarification process, the Engineer will request the Contractor take four loose mix samples prior to compaction at each location where cores were taken. These samples will be representative of the day's production. Take samples either behind the screed or any place after the spraying and mixing units. Identify all samples by their locations at the project site. Test two of the loose mix samples for penetration and provide the other two loose mix samples to the Engineer, which may be evaluated by the Department's Lab to verify test results.

All the required core and loose mix samples must be taken after the first 500 feet of the day's production.

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Submit penetration test results to the Engineer by the end of the next day's production. If test results are not provided, the Engineer may shutdown the paving operation until the results are submitted. The average penetration value of the loose mix samples must be at least 30% more than the penetration of the core sample from the existing pavement.

If the average penetration values of the loose mix samples fail to meet this requirement, adjust the application rate and submit the new adjusted application rate to the Engineer. Repeat the procedure described above of taking and testing samples. Submit the penetration test results to the Engineer by end of the next day's production. Continue taking these samples until average penetration values of the loose mix samples meet the specification requirement of at least 30% more than the penetration value of the core samples.

2. If the specification requirements are met after the first day's production, take samples as described above every three days of production for quality control and quality assurance purposes. When sample results do not meet the specification requirements, make adjustment to the application rate and take samples as described above.

If, at anytime, the average penetration value of the loose mix samples is greater than 90, the Engineer may evaluate the pavement section and request the scarified pavement be removed and replaced at no additional cost to the State. The evaluation may include, but not limited to, testing penetration of the core sample, location of the section, etc. If samples are required, the Contractor will take them at no additional cost to the State and will submit them to the Department for testing. Also, if the recycled pavement is not satisfactory to the Engineer, additional tests may be performed at no cost to the State.

G. Overlay

The heater scarified HMA pavement can be overlaid once work is completed to the satisfaction of the Engineer. The overlay shall be placed prior to the end of the paving season. This work shall be done under a separate pay item in the Contract documents.

5 METHOD OF MEASUREMENT

This work will be measured as the number of square yards of pavement surface recycled as detailed in this specification.

The quantity of recycling agent to be measured for payment will include the number of gallons incorporated in the work, measured at a temperature of 60°F.

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6 BASIS OF PAYMENT

The unit price bid per square yard for this item shall include the cost of all labor, materials and equipment necessary to satisfactorily complete the work including heating, scarifying, mixing, paving, compaction, coring, and testing of the recycled materials. No deduction will be made in areas such as catch basins or manholes where the scarifying equipment cannot be used.

The unit price bid per gallon of recycling agent shall include the cost of all labor, material, and equipment necessary to complete the work satisfactorily. ***The Regional Materials Engineer will evaluate the material represented by any failing sample of recycling agent. If the Engineer elects to leave the material in place, the Contractor shall receive a pay reduction of 75% of the bid price of the recycling agent for the pavement section represented by the failing sample.***

Payment will be made under:

Item No.	Item	Pay Unit
402.99010005	Heater Scarification of Hot Mix Asphalt (HMA) Pavement	Square Yards
402.99010105	Recycling Agent	Gallons