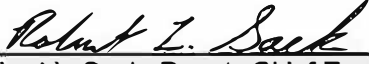


SUPERSEDED BY EB 24-026 EFFECTIVE 6/4/24		New York State Department of Transportation ENGINEERING INSTRUCTION	EI 03-027
Title: ICE-RETARDANT HOT MIX ASPHALT (HMA)			
Distribution: ☐ Manufacturers (18) ☐ Surveyors (33) ☒ Main Office (30) ☒ Consultants (34) ☐ Local Govt. (31) ☐ Contractors (39) ☒ Regions/Agencies (32) ☐ _____ ()		Approved:  Robert L. Sack, Deputy Chief Engineer, Technical Services Division 8 SEP 03 Date	

ADMINISTRATIVE INFORMATION:

- Effective date. This EI is effective with projects submitted for letting of May 6, 2004.
- Superseded Issuances. None.
- Disposition. The special specifications will reside on the Department server.
- The Design Quality Assurance Bureau will insert the shelf note when called for by the Estimate beginning with projects submitted for the letting of May 6, 2004.

PURPOSE. This EI issues the special specifications and design guidance for the use of Ice-Retardant HMA in projects.

TECHNICAL INFORMATION. These specifications provide ice-retardant overlay items for Superpave-designed top course mixes that are used throughout the State. Each specification allows an option to use an ice-retardant additive, at the rate of 5.0%, 5.25%, or 5.5% depending on traffic conditions. These specifications require pavement compaction to be monitored using a nuclear density gauge.

This Hot Mix Asphalt (HMA) top course is made by the addition of encapsulated calcium chloride pellets. Currently only marketed as "Verglimit", these pellets break down under the action of traffic and form a mild brine which blocks the tight adhesion of ice to the pavement surface at temperatures above -8°C (17°F).

DESIGN GUIDANCE. The justification to use this material shall be submitted as part of the design approval process. Design approval must be obtained before any commitment is made to specify this material. The justification should show that this material will be cost-effective based on life-cycle costs. The use of overlays with an ice-retardant additive on shoulder areas cannot be justified due to the high cost of the material and negligible traffic to activate the ice-retardant benefit. Additional controls are required when producing and placing ice-retardant overlays. The Regional Materials Engineer should be notified prior to specifying this material for any project.

When preparing the justification for use, use the following guidelines:

1. A pavement evaluation is recommended for the site in question. Areas with inadequate friction may be corrected more economically by other means. The use of ice-retardant overlays should not be considered as a solution to inadequate sight distance or poor highway geometry. Ice-retardant HMA should not be placed on new or reconstructed pavements with major realignment, since there is no relevant accident history to justify its use.
2. A minimum volume of vehicles per day per lane as shown below must be present in the winter months to activate the ice-retardant additive. If the AADT count at a location with a history of ice-related accidents does not meet the values shown in the chart below, peak-hour volume criteria alone may warrant the use of an ice-retardant additive. Therefore, a justification should indicate the traffic volume and the number of lanes on the facility.

Proportion Verglimit	AADT/ Lane	Peak-Hour Volume/Lane
5.0%	5,000	500
5.25%	3,500	350
5.5%	2,000	200

3. For justification purposes assume that the ice-retardant additive will reduce the number of snow- and ice- related accidents by 50%. The Traffic Engineering and Highway Safety Division recommends the designer obtain the most recent accident cost figures from the Regional Traffic & Safety Group for preparation of the justification. Contact the Regional Materials Engineer to obtain the proper service life for these mixes. Use a discount rate of 4% when computing life-cycle costs and benefits as outlined in Chapter 2 of the Comprehensive Pavement Design Manual. A minimum benefit-cost ratio of 1.0 is required to warrant the product's use.

The ice-retardant top course shall be placed at a minimum nominal compacted thickness of 40 mm. When placed over any Portland Cement Concrete (PCC) pavement, the minimum total overlay thickness must be 60 mm. When placed on a bridge deck constructed with uncoated top reinforcing bars lacking a corrosion-protective overlay system, a waterproof membrane and weeps are required. The designer should follow the most recent specifications for membrane waterproofing systems for structural slabs. The Traffic Engineering and Highway Safety Division is continuing their evaluation of this material. Until further notice, each Region should submit Verglimit placement location and date as early as possible to that Division annually for evaluation.

COST IMPACT. Ice-retardant HMA mixes cost approximately \$175 more per metric ton than standard HMA items, and the ice-retardant additive is a proprietary product. Therefore, current Department policy for justifying the use of a proprietary product must be followed.

TRANSMITTED MATERIALS: This Engineering Instruction issues the following special specifications:

402.09910118M - 9.5 mm F1 Superpave HMA with Ice Retardant
 402.09920118M - 9.5 mm F2 Superpave HMA with Ice Retardant
 402.12910118M - 12.5 mm F1 Superpave HMA with Ice Retardant
 402.12920118M - 12.5 mm F2 Superpave HMA with Ice Retardant

BACKGROUND. Ice-retardant HMA has been in use in New York State since the mid 1980s, and has shown to reduce snow- and ice-related accidents. The ice-retardant additive will last the design life of the HMA. The ice-retardant HMA will help in reducing the early icing that may occur prior to the application of routine snow and ice control measures. This product is not a replacement for routine snow and ice control measures. Since the implementation of the Superpave HMA system, new specifications have not been issued. The limited use of these specialized Items does not warrant general distribution.

CONTACT PERSON. Questions regarding justification of the ice-retardant HMA items may be directed to David Clements of the Traffic Engineering and Highway Safety Division's Safety Program Management Bureau at (518) 457-3537. Questions regarding this instruction and technical questions regarding the ice-retardant HMA items may be directed to Chris Euler of the Main Office Materials Bureau at (518) 457-4582.

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The provisions of Section 401 - Plant Production and Section 402 - Hot Mix Asphalt (HMA) Pavements shall apply except as modified and/or revised below.

DESCRIPTION. This work shall consist of developing Hot Mix Asphalt pavement courses using the SUPERPAVE Mix Design procedure detailed in Materials Method 5.16, "SUPERPAVE Hot Mix Asphalt Mixture Design and Mixture Verification Procedures," in accordance with these specifications and in reasonable close conformity with the required lines, grades, thicknesses, and typical sections shown on the plans or established by the Engineer. Written instructions for determining pavement density are available from the Regional Materials Engineer.

MATERIALS. The materials and composition for these mixtures shall meet the requirements specified in §401-2 Materials, except as noted herein. The specific Performance-Graded Binder and the Design-Estimated Traffic in 80 kN ESALs will be specified by a Special Note in the Contract Documents.

Blotting Aggregate. Aggregate for blotting shall be clean and dry, meeting the requirements of Screenings outlined in §703-02, Coarse Aggregate.

Ice-Retardant Additive. The Ice-Retardant additive shall be selected from the Department's current Approved List. The percentage of additive is based on the total weight of the mix and shall be either 5.0%, 5.25%, or 5.5% as specified by Special Note in the contract documents.

The provisions of §401-2.05, Reclaimed Asphalt Pavement, shall not apply.

CONSTRUCTION DETAILS. The provisions of §401-3 and §402-3, Construction Details, shall apply except as modified below:

"Quality Control (QC) sampling and testing will be performed on any portion of the lot as determined by the Regional Materials Engineer (RME). The sampling point(s) will be determined by the Regional Materials Engineer. Exclusion of the first and last 150 metric ton portion of the lot for testing shall not apply. A Quality Control Technician (QCT) must be present during all production, regardless of the lot size.

The Ice-Retardant additive may be batched and recorded manually. Proportioning of the additive shall be accurate to 0.1% of the total mixture batch weight. The additive shall be sieved through a 19.0 mm sieve to eliminate lumps prior to its addition to the mixer.

The aggregate dry mix time shall be at least 15 seconds. The aggregate and asphalt wet-mix time shall be at least 30 seconds. The Ice-Retardant additive shall then be added to the mixture and mixed for an additional 15 seconds or until all the additive particles are thoroughly coated."

§401-3.09, Hot Mix Asphalt Holding Bins, shall not apply, unless approved by the Regional Materials Engineer.

Add the following to the end of §402-3, Construction Details:

"Prior to paving operations for this item, determine the Project Target Density (PTD) for this item by using the method outlined in the MP96-08, "Pavement Density Monitoring of Hot Mix Asphalt with Ice-Retardant

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Additive." Begin routine paving operations immediately following the determination of the PTD, to the satisfaction of the Engineer.

Only gauge(s) calibrated for this project will be allowed to be used during routine paving operations. If another nuclear gauge is to be used, a new PTD must be established using the procedures outlined earlier."

The provisions of §402-3.07, Compaction, shall be deleted and replaced with the following:

"Routine paving operations will not begin unless both a project calibrated nuclear density gauge and an operator are present.

Immediately after the HMA mixture has been spread, struck off, and surface irregularities adjusted to uniformity, compact it using rollers meeting the requirements of §402-3.04, Rollers. Roll the surface when the mixture is in the proper condition and when the rolling does not cause displacement, cracking or shoving as determined by the Engineer. Initially roll all courses with the roller traveling parallel to the centerline of the pavement beginning at each edge and working toward the center. Roll the banked curves starting at the low-side edge and working toward the superelevated edge.

Use a nuclear density gauge to monitor and record the pavement and longitudinal joint density in accordance with this section and Materials Procedure 96-08. The nuclear density gauge should consist of a radioactive source, scaler and other basic components housed in a single backscatter unit. The gauge must be operated by personnel trained in the principles of nuclear testing and safety practices.

Compact the pavement and the longitudinal joints sufficiently to achieve a minimum density of 98% of the PTD at single test locations as determined by a nuclear density gauge. The nuclear gauge density testing frequency will be performed as indicated in Table 1 below.

Table 1 - Testing Frequency

Lane meters, L	Frequency of Readings
$L < 30 \text{ m}$	every 5 m
$30 \text{ m} < L < 450 \text{ m}$	every 15 m
$451 \text{ m} < L < 1500 \text{ m}$	every 30 m
$L > 1500 \text{ m}$	every 60 m

Record density readings on a BR 334 "Ice-Retardant Asphalt Concrete Pavement Density Data." At the end of each production day provide the Engineer with copies of all BR 334 forms relating to that days work.

If the average of 4 nuclear density gauge measurements taken at 90° angles over two consecutive readings falls below 98% of the PTD, stop routine paving operations and determine a new PTD using the method described earlier. Normal production will only resume after establishing a new PTD.

When the rolling operation is complete there should be no visible shallow ruts, ridges, roller marks, or irregularities in the pavement. If these imperfections are present, correct the imperfections or replace the pavement to the satisfaction of the Engineer. All corrective work will be performed at no additional cost to the Department.

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Correct at once any displacement occurring as a result of reversing the direction of the roller, or from other causes, by the use of rakes and addition of fresh mixture as required. Care shall be exercised in rolling not to displace the line and grade of the edges of the HMA mixture. Use a minimum amount of water, water mixed with small quantities of detergent or other approved material to prevent adhesion of the mixture to the rollers. Petroleum products or solvents having an adverse effect upon the HMA pavement will not be permitted for use on Department projects.

Unless otherwise directed by the Engineer, construct and compact the longitudinal joint by using the tapered wedge-joint method specified in § 402-3.09 B. 2. Option B - Tapered Wedge Joint. Prior to placing the adjacent lane, apply tack coat to the joint at a rate specified by the Engineer.

Along forms, curbs, headers, walls and other areas not accessible to rollers, thoroughly compact the mixture with mechanical tampers. On depressed areas, use a trench roller or a small vibratory roller with the approval by the Engineer. Cleated compression strips also may be used under the roller to transmit compression to the depressed area.

Remove and replace with fresh HMA mixture any mixture that becomes loose and broken, mixed with dirt, or is in any way defective. Compact the mixture to conform with the surrounding area. Correct any area showing an excess or deficiency of HMA material.

Vibratory compaction is not permitted when compacting HMA mixtures on structural bridge decks, or other structures with less than 0.6 meter cover. When using vibratory compaction, repair all damages which may occur to the highway components and adjacent property, including buried utility and service facilities, at no cost to the State.

Immediately after compaction, while the surface is still warm, cover the ice-retardant overlay with a layer of the blotting aggregate. Apply the blotting aggregate at approximately 1.1 kg/m^2 . Spreading of the blotting aggregate may be done by hand brooming or other methods approved by the Engineer. Roll the blotting aggregate with a self-propelled, steel-wheel tandem roller weighing a minimum of 8 metric tons in a separate operation from the compaction train. The temperature of the surface shall not be lower than 90°C . Just prior to opening to traffic sweep the blotting aggregate from the pavement surface, using a method approved by the Engineer. Sweeping shall remove all loose aggregate particles.

Before opening the pavement to traffic, erect warning signs W8-28 "Fresh Oil" as prescribed by the MUTCD. Flush the pavement surface with water using a pressure distributor. The pressure distributor shall be equipped and operated so that the water can be applied, at a uniform pressure with a rate of 9.0 L/m^2 and a minimum width of 3.6 m. Flushing shall be done in two passes. Make the first pass using a minimum rate of 2.3 L/m^2 . Before the pavement dries, approximately 10 to 30 minutes after the first pass, make the second pass using a minimum rate of 9.0 L/m^2 . Flush the pavement as many times as necessary to remove any sheen, or as directed by the Engineer. Water flushing will also include all locations where traffic has tracked the brine. Remove the "Fresh Oil" warning signs when directed by the Engineer.

Use traffic paint conforming to Item 640 - ReflectORIZED Pavement Marking Paint for short-term pavement markings. Maintain these markings until permanent markings can be placed.

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Apply permanent pavement markings either before any sheen develops on the surface of the ice-retardant asphalt concrete or after all evidence of it has vanished."

METHOD OF MEASUREMENT

The provisions of §401-4 and §402-4, Method of Measurement, shall apply including the following:

"The final Quality Adjustment Factor for plant production shall be 1.00."

BASIS OF PAYMENT

The provisions of §402-5, Basis of Payment, shall apply including the following:

"The unit bid price will also include the material and labor costs associated with the placement of Ice-Retardant HMA such as blotting and flushing of the pavement, additional signage, etc."

Payment will be made under:

Item No.	Item	Pay Unit
402.09910118M	9.5 mm F1 SUPERPAVE HMA with Ice Retardant	Metric Ton
402.09920118M	9.5 mm F2 SUPERPAVE HMA with Ice Retardant	Metric Ton
402.12910118M	12.5 mm F1 SUPERPAVE HMA with Ice Retardant	Metric Ton
402.12920118M	12.5 mm F2 SUPERPAVE HMA with Ice Retardant	Metric Ton