# ITEM 02595.60 M - ELIMINATOR H.M. WATERPROOFING MEMBRANE SYSTEM FOR RAILROAD DECKS

## DESCRIPTION

This work shall consist of the preparation of the steel railroad deck surface, curb angle vertical leg surfaces, inside surfaces of steel scuppers and top surfaces of shear connector and tie plates as shown on the contract plans and the furnishing and spray application of the Eliminator Waterproofing Membrane system as manufactured by:

Stirling Lloyd Products, Inc.
420 Sackett Point Road, Unit 4A
North Haven, Connecticut 06473
Telephone: (203) 230-9448
FAX: (203) 230-1025

It is desirable to have the membrane waterproofing system installed within a 24 hour period. If weather or scheduling constraints do not permit complete membrane installation within 24 hours, this requirement can be waived so long as the deck surface remains clean and undamaged between coats.

The membrane system shall be applied to the prepared steel strictly in accordance with the Manufacturer's instructions.

The Contractor shall arrange for the membrane manufacturer's representative to be present at all times during this work until final acceptance of the membrane. The manufacturer's representative shall be fully qualified and experienced and shall make recommendations to the Engineer-in-Charge as to the acceptability of every phase of the operation, which includes but is not limited to surface preparation of the steel railroad deck, including type of equipment, mixing of the materials' components, type of application, method of application and finish.

All open flames and spark-producing equipment shall be removed from the work area prior to commencement of application. "No smoking" signs shall be posted at the entrances to the work area.

## MATERIALS

### Primer

The primer resin shall be 100% reactive, acrylic-based, two-component spray applied that will fully cure in under 30 minutes when applied at 20°C. The primer shall be Stirling Lloyd MR6.

### Membrane

The membrane shall be made up of 100% reactive, acrylic-based resin plus pre-blended inert fillers and polymers. This three-component spray applied membrane shall be Stirling Lloyd Eliminator High Modulus.

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A letter of certification shall be issued by the Manufacturer with each delivery of materials on the site. The first shipment shall include a copy of the manufacturer's quality assurance program listing all in-house testing criteria.

In addition, the physical properties shall be verified by an independent laboratory.

A. Physical Properties of Membranes

The waterproofing membrane shall meet or exceed the following properties as related to laboratory-prepared samples tested at 20°C and 24 hour cure where applicable:

| PROPERTY | TEST METHOD | UNITS |
|---|---|---|
| Gel Time | - | 6-11 minutes |
| Cure Time | - | 30 minutes @ 20°C |
| Water Vapor Transmission | ASTM E96 Method A | 6.6 $g/m^2$ day |
| Chloride Transmission | TRRL Research Report 248 | 0.02% by weight of sample |
| Adhesion to Steel | BS3900: E10:1989 | 2MPA minimum |
| Tensile Strength | ASTM D638 | 6481 kPA minimum |
| Elongation at Break | ASTM D638 | 80% minimum |
| Tear Strength | BS903 Pt A3 Method C | 60 N/mm |
| Low Temperature Flexibility | DTp Technical Memo BE27 | Pass @ -25°C |
| Resistance to Penetration | DTp Technical | Pass @ 80°C |

The cured membrane shall be capable of carrying the direct (HS 20 Truck) load of rubber-tired equipment or vehicles without the need for any protective cover after 45 minutes.

All material components of the Eliminator system shall be supplied to the job site in manufacturer's unopened packaging.

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All material components of the Eliminator system shall be stored in accordance with the manufacturer's recommendations, and Health and Safety regulations.

Opened (longer than 24 hours) or damaged containers shall be removed from the site.

Copies of Material Safety Data Sheets (MSDS) for all materials shall be kept on site for review by the Engineer-in-Charge or other personnel.

The contractor shall certify that all properties are met.

## CONSTRUCTION DETAILS

General

Install as per the manufacturer's specifications except as modified herein.

A. The Eliminator system shall be applied in three distinct steps as follows:

1. Substrate preparation
2. Priming
3. Application of the waterproofing membrane

B. Immediately prior to the application of any component of the Eliminator system, the receiving surface shall be cleaned to remove dust and debris. Oil and moisture-free compressed air or an alternate method of cleaning may be used, as approved by the engineer.

C. When the area to be treated is bounded by a vertical surface (i.e., curb angle, scupper, or joint edge bar), the waterproofing layer shall be continued up the vertical.

D. The handling, mixing and addition of initiators, accelerators, and fillers shall be performed to achieve the desired results in accordance with the manufacturer's recommendations as approved or directed by the Engineer-in-Charge. The Eliminator waterproofing membrane system shall not be placed when weather or surface conditions (as determined by the manufacturer and the engineer) are such that the material cannot be properly handled, sprayed, and cured within the specified time.

Substrate Preparation

A. Prior to the application of the primer, the manufacturer's representative shall certify to the Engineer that the required degree of cleanliness of the steel surface area to which the membrane is to be applied has been achieved.

B. The deck and all steel surfaces to be coated shall be cleaned to remove all oil, dirt, rubber, and other potentially detrimental material which, in the Engineer-in-Charge's opinion, would prevent

proper bonding to, and curing of, the primer resin material.

C. The deck and all accessible steel surfaces to be coated shall be prepared by shot blasting wheelabrators. Areas not accessible to a shot blast wheelabrator can be cleaned by alternate methods (i.e. abrasive blasting) as approved by the Engineer-in-Charge. The final surface condition is important. All steel surfaces should be equal to SSPC-SP10 (near white) prior to application of the membrane system. Water blasting shall not be permitted.

D. The Contractor shall collect all shot blast residue and all other material residue and dispose of these materials in an approved waste site.

E. Construction traffic shall not be allowed on any portion of the deck which has been shot blasted. The deck surface shall be primed within four (4) hours of the surface preparation operation. If, in the opinion of the Engineer-in-Charge, the cleared surface has become soiled, rusted or contaminated prior to the application of the primer, it shall be recleaned to the satisfaction of the Engineer-in-Charge at no additional cost to the State.

F. Immediately before applying the primer resin material, all prepared surfaces shall be cleaned to remove dust and debris. Oil-free and moisture-free compressed air or an alternate method of cleaning can be used as approved by the Engineer. All surfaces to be coated shall be dry at the time of application. If rain occurs, adhesion tests will be performed prior to membrane placement and any damaged areas will be cleaned and reprimed.

G. There shall be no visible moisture present on the surface of the steel at the time of application of the primer. Compressed oil-free air, light passing of a propane torch may be used to dry the surface of the deck.

H. Prior to the application of the primer, random testing for adequate tensile bond strength shall be conducted on the deck by the Manufacturer's representative at the job site using an Elcometer Adhesion Tester Model 106 or similar at a minimum frequency of three tests per 500 $m^2$.

I. Adequate surface preparation will be indicated by tensile bond strength of primer to the deck greater than or equal to 2 MPA.

J. Should the tensile bond strengths be lower than the minimum specified, the Engineer-in-Charge may require additional substrate preparation, at no additional cost to the State.

Priming

A. The primer shall be applied in accordance with the manufacturer's recommendations. Primed surfaces which the engineer determines have become contaminated by dust or dirt shall be reprimed. All such priming work shall be at no additional cost to the State.

B. The primer shall consist of a one coat single component system, applied by spraying or by brush and roller. The approximate coverage rate shall be 3-4 $m^2$/L. The primer shall be applied at a

temperature greater than 0°C.

C. The primer shall cure, tack free before application of the waterproofing membrane. The Engineer-in-Charge and the Stirling Lloyd representative at the job site shall determine when the cure is adequate to continue.

D. After the primer has dried and prior to the application of the Eliminator membrane, the Engineer-in-Charge may call for pull-off tests to determine the adequacy of surface preparation and patching materials. These tests shall be carried out using an Elcometer Adhesion Tester Model 106 or similar at a frequency of a minimum of three tests per 500 $m^2$.

E. Minimum pull-off test values shall be greater than or equal to 2 MPa for steel. Should the tensile bond strength of primer to the steel plate be lower than the minimum specified, the Engineer may request additional surface preparation.

Eliminator Membrane

A. The waterproofing membrane shall consist of two coats with a film thickness of 1.5mm (60 mils) per coat and a total of 3.0mm (120 mils) to achieve an overall coverage rate of 0.3 $m^2$/L. The minimum coverage on peaks, shall be 2.5mm (100 mils.).

B. The membrane shall be three-component spray-applied product.

C. The three-components spray-applied membrane shall be comprised of two liquid components A and B and a hardener powder (50% benzoyl peroxide) which is to be added to Component B in accordance with the manufacturer's recommendations.

D. The Engineer shall take a quart sample of each liquid component of the membrane system including each component of the primer and membrane. Samples shall be taken prior to the addition of the hardener powder. An 18 mL sample of the hardener powder shall also be taken. All samples shall be sent to the Materials Bureau for informational testing.

E. The mixed Part A and Part B shall be sprayed using a multi-component airless spray unit supplied by the Manufacturer. The spray unit shall automatically meter the components on a 1:1 ratio and mix in-line. Spraying pressure and tip size shall be as recommended by the Manufacturer.

Reversible tips shall be used to facilitate rapid clearance of blockages.

F. Membrane application can proceed if the air and substrate temperature is greater than 0°C, provided that the substrate is above the dewpoint. Applications below 4°C require an adhesion test to be performed prior to the membrane application. Test values must exceed 2 MPa to be in compliance.

G. The substrate shall be coated. Checks for wet film thickness shall be carried out by the applicators at least once every 9$m^2$ as required by "On-Site: Part B - Membrane Thickness",

below.

**QUALITY CONTROL**

On-Site

A. Adhesion Tests

Adhesion tests on random pull off specimens of the cured system to the steel deck shall be checked similar to "Priming: Part D". The minimum tensile bond strength shall be greater than or equal to 2MPa.

B. Membrane Thickness

Wet film thickness shall be checked at least once every $9m^2$ using a gauge pin standard comb type thickness gauge. Coverage rate shall also be monitored checking the quantity of material used against the area covered.

C. Samples

When deemed necessary by the Engineer-in-Charge, membrane samples of minimum size 203mm x 203mm shall be provided for each day's production or every $500m^2$ whichever is greater.

Specifications provided by the manufacturers shall be verified during the course of project via comparison with the sample properties.

a. Patching

If an area is left untreated or the membrane becomes damaged, a patch repair shall be carried out to restore the integrity of the system. The damaged area shall be cut back to sound material and wiped with solvent (e.g. acetone) up to a width of at least 52mm on the periphery, removing tack coat and any contaminants. The substrate shall be primed if necessary, followed by the application of membrane. A continuous layer shall be obtained over the substrate with 152mm overlap onto the existing membrane.

b. Overlapping

Where the membrane is to be joined to existing cured material and at day joints the new application shall overlap the existing one by at least 152mm. No preparation shall be necessary unless the existing materials are contaminated with tack coat or dirt in which case the repair/overlap area shall first be wiped with solvent (e.g. acetone).

All work shall proceed in a workmanlike manner and shall be subject to the inspection of the Engineer-in-Charge, who shall be given all facilities required for a thorough inspection, at no additional cost to the

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State. Work completed while the Engineer-in-Charge has been refused access will automatically be rejected.

The manufacturers shall warrant the materials used as evidenced by the Certificate of Conformity.

The applicator, "The Contractor", shall be responsible for the workmanship and performance of the installed material.

### METHOD OF MEASUREMENT

Measurement for the Eliminator Waterproofing Membrane shall be per each square meter of Eliminator Waterproofing Membrane system placed as required.

### BASIS OF PAYMENT

The unit price bid shall include the cost of all labor, materials and equipment necessary to complete the work.