

**ITEM 11595.9820 M - SPRAY-APPLIED WATERPROOFING SYSTEM**

**Description:**

The work shall consist of furnishing and installing a spray-applied seamless liquid membrane waterproofing system as shown on the Contract Plans. The work shall include the preparation of concrete surfaces as specified herein. The Contractor shall furnish and apply the membrane waterproofing system as required by these specifications as indicated in the plans and in accordance with the manufacturer's recommendations.

**Materials:**

The membrane waterproofing system shall be as manufactured by:

DISAPPROVED BY  
EI 05 016

Eliminator Membrane  
Stirling Lloyd Products  
420 Sackett Point Rd.  
North Haven, CT 06473  
Tel. (203) 230-9448  
Fax (203) 363-2184

PmB Membrane  
c/o R. J. Watson, Inc.  
P. O. Box 85  
East Amherst, NY 14051  
Tel. (716) 741-2166  
Fax (716) 741-2580

or approved equal.

The membrane waterproofing system shall consist of the following:

Primer - shall be an acrylic or polyurethane based, spray-applied primer that will fully cure in less than 30 minutes when applied at 20° C. The concrete surfaces shall be primed with the primer.

Membrane - shall be 100% solvent free, acrylic or polyurethane based, two component, spray-applied material. The membrane shall be capable of being applied to both horizontal and vertical surfaces leaving a uniform coating of the recommended thickness. The membrane shall meet or exceed the following properties as related to laboratory prepared samples tested at 20° C and 24 hour cure where applicable.

<u>PROPERTIES</u>	<u>TEST METHOD</u>	<u>UNITS</u>
Gel Time	----	5 minutes
Cure Time	----	20 minutes at 20° C
Tensile Strength	ASTM D638	3 N/mm <sup>2</sup>
Elongation at Break	ASTM D638	100%

All materials shall be supplied to the job site in the manufacturer's unopened packaging and shall be clearly identified with the product name, date of manufacture and batch number. Opened or damaged containers shall be removed from the site. All components of the membrane system shall

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be stored in cool (<32° C), dry conditions out of direct sunlight. Storage shall be according to the manufacturer's recommendations and relevant health and safety regulations. Prior to placement of the membrane the Contractor shall supply the Engineer with copies of the Material Safety Data Sheets (MSDS) for all components of the membrane system.

**Construction Details:**

**General.** A representative of the manufacturer shall be present during the installation of the membrane system. Work shall not begin until all concrete repairs have cured properly.

Work shall not be done during wet weather conditions, nor when unfavorable atmospheric conditions are such that unsatisfactory results may be produced. The Engineer shall be the sole determinant of what constitutes unfavorable atmospheric conditions. No work shall be done when the ambient and concrete temperature falls below 5° C. The concrete shall be surface dry at the time of the application of the waterproofing system.

**Structural Slab Cleaning.** All structural slab surfaces against which the membrane system is to be placed shall be cleaned of all loose material and contaminants including, but not limited to dirt, gravel, concrete laitance, oil and concrete curing compounds. Cleaning shall be done as follows:

Concrete surfaces and repaired areas shall be abrasive blast cleaned or shot blasted. All blasting equipment shall be equipped with vacuum recovery to eliminate dust. At no time during the blasting operation shall there be visible dust.

Immediately prior to application of the membrane system, surfaces shall be recleaned of dust or other loose material by vacuuming.

Prior to the application of the primer, random tests for adequate tensile bond strength shall be conducted on the concrete surface by the manufacturer's representative using an Elcometer Adhesion Tester Model 106. The testing frequency shall be three tests per 500 m<sup>2</sup> or three tests per structure, whichever is greater. Adequate surface preparation will be indicated by tensile bond strengths of primer to the deck, greater than or equal to 0.7 N/mm<sup>2</sup> or by failure in the concrete.

**Primer Application.** After cleaning, all surfaces to be waterproofed shall be primed with the manufacturer's appropriate primer. The primer shall consist of one coat with an overall coverage rate applied as follows, as recommended by the manufacturer:

Acrylic membrane	3.0-4.3 M <sup>2</sup> /l
Polyurethane membrane	45 grams/M <sup>2</sup>

The primer shall be thoroughly mixed prior to the application and shall be spray-applied. If required by site conditions, brush or roller application shall be allowed. On vertical curbs, concrete barrier and header surfaces, the primer shall be applied and finished off in a neat line to a height that will

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be 25 mm higher than the height of the completed asphalt overlay. Subdrainage holes shall be coated with primer to a depth of at least 25 mm.

The primer shall be applied in accordance with the manufacturer's instructions. The primer shall cure to a tack free condition before application of the waterproofing membrane. The Engineer and the manufacturer's representative shall determine when the cure is adequate to continue.

After the primer has cured and prior to placing the membrane, the Engineer may require additional tensile bond tests to determine the adequacy of the surface preparation.

Primed surfaces that the Engineer determines have become contaminated by dust or dirt shall be reprimed. Primed areas that have not been covered with membrane within 24 hours after primer application shall be reprimed if they have been damaged or contaminated or if it is recommended by the manufacturer. All such re-priming shall be done at no cost to the State.

**Membrane Application.** The waterproofing membrane shall consist of either one coat of polyurethane membrane or two coats of the acrylic membrane with a minimum normal wet film total thickness of 3.0 mm. The two coats shall be different in color to assure proper coverage. The membrane shall be a two-component spray-applied system comprised of two liquid components, A and B, and, if applicable, a hardener, all of which are to be combined and thoroughly dispersed in accordance with the manufacturer's recommendations. If required, the hardener powder (50% benzoyl peroxide) shall be added to component B and thoroughly dispersed by mechanical means recommended by the manufacturer. A 10-15 minute mixing time shall be required.

Part A and mixed part B shall be sprayed using a multi-component airless spray unit supplied by the membrane manufacturer. The spray unit shall automatically meter the components at the specified ratio within the permissible temperature range and mix in line. Spraying pressure and tip type and size shall be as recommended by the membrane manufacturer. Reversible tips shall be used to facilitate rapid clearance of blockages.

The concrete shall be coated in a methodical manner to assure bond with the primed surface, uniform coverage and elimination of holidays. The Contractor shall protect adjacent areas from overspray. If overspraying does occur, the Contractor shall clean the areas to the satisfaction of the Engineer at no cost to the State. The wet film thickness shall be verified by the Contractor at least once every 5 m<sup>2</sup>. The Engineer, at his discretion, shall randomly verify the Contractor's wet film thickness measurements.

During application of the membrane, elcometer dollies shall be bonded to the membrane in random locations to test for adequate bond strength of the finished product. After the membrane has cured for one hour, the bond strength shall be measured using an Elcometer. Test areas shall be repaired as detailed below.

The entire surface of the completed membrane shall be tested for holidays and pinholes by the

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manufacturer's representative in accordance with ASTM G62 - Test Methods for Holiday Detection in Pipeline Coatings. The surface shall be tested after the membrane has cured a minimum of one hour but prior to application of the tack coat. The holidays and pinholes shall be located, marked for repair, be repaired and the number of pinholes found recorded. Blisters shall be cut out and repaired as damaged membrane.

Untreated or damaged areas of the membrane, including holidays, adhesion test locations and thickness test locations shall be patched or repaired in accordance with the manufacturer's recommendations. The damaged area shall be cut back to sound material and the periphery prepared as detailed in the specification. Repaired areas shall meet the total thickness requirements. Where the membrane is to be joined to existing cured material, the new application shall overlap the existing one by at least 150 mm. No surface preparation shall be necessary unless the existing materials are contaminated with tack coat or dirt, in which case, the repair/overlap shall be first wiped with a solvent approved by the manufacturer. Oil, diesel fuel, gasoline, hydraulic fluid, grease and other deleterious substances, shall also be removed with a solvent approved by the membrane manufacturer. Any material damaged by contaminants or during cleaning shall be cut out and repaired. Cured polyurethane membrane greater than four hours old shall be lightly wire brushed and re-primed to a margin of at least 25 mm greater than the lap. The primer shall be allowed to cure prior to application of the membrane.

### **Quality Control.**

The Contractor shall supply the Engineer with a complete record of the following:

Temperature - ambient temperature, substrate temperature and dew point shall be recorded at the time of the primer and membrane application. Concrete moisture readings shall also be recorded. Dew point shall be calculated from temperature and humidity using standard tables.

Adhesion test results.

Membrane Thickness - wet film thickness measurements taken every 5 m<sup>2</sup> using a gauge pin or standard comb type thickness gauge or samples removed after membrane installation.

Coverage Rates - coverage rates for primer and membrane shall be calculated by dividing the area covered, in square meters, by the quantity of materials used, in liters.

Membrane Integrity - the completed membrane shall be tested for pinholes using ASTM G62 - Test Methods for Holiday Detection in Pipeline Coatings. The pinholes shall be repaired and the number of pinholes found reported.

Above quality control activities shall be conducted in the presence of the Engineer's representative. The Engineer shall be given at least five (5) days advance notice prior to such

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activities.

**Method of Measurement:**

The work shall be measured by the number of square meters of surface areas of the slab or wall, as shown on the plans, covered with all components of the membrane waterproofing system. No separate payment will be made for vertical faces of curbs, joints, concrete barriers, headers, scuppers or sub-drainage outlets shall be made. No deductions will be made for holes less than 0.1 m<sup>2</sup> in area. Measurements will be taken as the plane projection of the completed membrane waterproofing system.

**Basis of Payment:**

The unit price bid per square meter for this item shall include the cost of furnishing all labor, materials and equipment necessary to complete the work.

Payment will not be made for repairs to damaged areas caused by the Contractor's operations. No payment will be made for re-priming or reapplying a membrane where the surfaces have become contaminated by dust or dirt, areas damaged by the testing and quality control procedures or where primed surfaces have not been covered with membrane within 24 hours of primer placement.