

# Special Specification 4130

## Cold Liquid-Applied Elastomeric Waterproofing Membrane



### 1. DESCRIPTION

Furnish and install a cold liquid-applied waterproofing membrane system for use on ballasted-trough railroad underpass structures. Include all surface preparation and quality control testing of substrates and the applied membrane. Furnish and install a secondary placement of 1/2 in. asphalt plank or asphalt mat, or an additional spray-applied protection board layer.

### 2. MATERIALS

Use a spray-applied, waterproofing membrane system meeting the requirements of AREMA 8.29.9.10 indicated in Table 1.

**Table 1: Performance Requirements for Membrane**

Property	Requirements	Test Method
Thickness	≥ 0.080 in. dry film thickness	
Water Vapor Transmission	≤ 0.2 perms (0.1 grains/ft./hr.)	ASTM E 96, procedure B or BW
Elongation at Break	≥ 80%	ASTM D 638
Minimum Tensile Strength	930 psi	ASTM D 638
Adhesion to Steel	290 psi	ASTM D 4541
Adhesion to Concrete	100 psi	ASTM D 4541
Crack Bridging	Meet low temperature flexibility and crack bridge requirements of 10 cycles of 1/8 in. at -15°F	ASTM C 836

Provide a secondary placement of 1/2 in. asphalt plank or asphalt mat meeting the requirements of Item 458. Alternately, provide an additional spray-applied protection board layer compatible with the manufacturer's membrane system. Provide an integrated expansion joint coating that provides a continuous waterproofing system compatible with the expansion joint details and cover plates shown in the plans.

Provide the following submittals for approval, a minimum of six weeks in advance of the work:

- Product data sheets and installation specification,
- Material Safety Data Sheets (MSDS) for materials used in the work,
- Substrate preparation details,
- Expansion joint and cover plate application details,
- Qualifications of applicator, including previous railroad underpass structures and authorized applicator certificate for the chosen manufacturer. The presence and installation approval of a manufacturer's representative is required on site during installation, and
- A 4 sq. in. sample of the membrane having the color, texture, and thickness of proposed membrane system.

Submittals will be approved by the Department and the railroad company that will own the structure at project completion.

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### 3. CONSTRUCTION

- 3.1. **General.** Meet the submittal requirements and coordinate with manufacturer representatives as indicated in Section 2 "Materials" before proceeding with construction of waterproofing membrane.
- 3.2. **System Application**
- Install the waterproofing system to the requirements indicated below. Follow manufacturer recommendations when they are more stringent.
- 3.2.1. **Substrate Preparation.** For concrete surfaces, remove residual matter using blast cleaning, brooms and oil/moisture-free compressed air, and ensure the surface profile does not exceed 1/4 in. peak to valley. For steel surfaces (except galvanized elements), clean and sand blast to a near white SSPC SP-10 specification. Handle welds, bolts, and rivets in steel deck surfaces per manufacturer recommendations. Provide surfaces that are clean, smooth, dry, and free of oil, grease, and loose or foreign material. Apply any primers recommended by the manufacturer within the allowable time frame of cleaning recommended by the manufacturer. Protect surfaces and areas outside the bridge from overspray with masking and/or curtains. Immediately before application of any component of the system, ensure the surface is clean and dry. Remove any remaining dust or loose particles using a vacuum or clean, dry, oil-free compressed air.
- 3.2.2. **Substrate Moisture Content and Temperature.** Measure the surface moisture content, dew point, and temperature before applying the primer and membrane. Ensure the surface moisture content, temperature, and dew point are within the allowable limits established by the manufacturer.
- 3.2.3. **Substrate Cohesion/Primer Adhesion.** After the substrate has been prepared to the satisfaction of the Engineer, test the cohesion of the substrate and the adhesion of the primer to the substrate in accordance with ASTM D 4541. Conduct tests after the primer has sufficiently cured as determined by the technical representative. Perform a minimum of three tests, including one test for every 250 sq. yd. of prepared substrate area and at locations where deficient adhesion is suspected by the Engineer. Verify that substrates meet the adhesion/pull off values indicated in Table 1 before applying primer to the remaining surface area.
- 3.2.4. **Primer Application.** Apply primer to the remaining substrate surface area using equipment, application rates, and techniques recommended by the manufacturer.
- 3.2.5. **Membrane Application.** Apply each course of the elastomeric membrane using equipment, application rates, and techniques recommended by the manufacturer. Where membrane joins existing cured material, clean the overlap area and overlap by at least 4 in.
- 3.2.6. **Membrane Thickness.** Measure the wet-film thickness of each course of membrane using a standard comb-type thickness gauge and measure the dry-film thickness of each course of membrane using a dry-film thickness gauge for nonferrous substrates. Check wet film thickness and dry film thickness every 100 sq. ft. Submit alternative methods for measuring thickness to the Engineer for approval.
- 3.2.7. **Membrane Adhesion.** Test the adhesion of the membrane system to the substrate in accordance with ASTM D 4541. Conduct tests after the membrane system has sufficiently cured as determined by the technical representative. Perform a minimum of three tests, including one test for every 250 sq. yd. of membrane applied and at locations where deficient adhesion is suspected by the Engineer. Verify that membrane meets the adhesion/pull off values indicated in Table 1.
- 3.2.8. **Membrane Corrections.** If required by site conditions, small areas, or touch-up, local membrane may be applied by brush, trowel, or localized spray in accordance with manufacturer recommendations. Repair and correct any deficiencies in the membrane system and substrate noted during quality control testing as recommended by the technical representative to the satisfaction of the Engineer at no additional cost.
- 3.2.9. **Protective Cover.** Provide a secondary placement of 1/2 in. asphalt plank or asphalt mat meeting the requirements of Item 458. Alternately, provide an additional spray-applied protection board layer compatible

with the manufacturer's membrane system. Apply protective cover only when the membrane has cured sufficiently per manufacturer recommendations and the membrane installation has been installed to the satisfaction of the Engineer and the railroad company designated technical representative. Ensure the waterproofing membrane is protected from dirt and other foreign material between membrane placement and protective cover placement. Remove any dirt and other foreign material before placing protective cover. Ideally, place protective cover within 24 to 48 hr. of membrane placement. No construction traffic is allowed on the waterproofing until a minimum thickness of 6 in. of ballast is placed.

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**4. MEASUREMENT**

Measurement will be by the square yard of spray-applied, waterproofing membrane system satisfactorily furnished and installed.

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**5. PAYMENT**

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Cold Liquid-Applied Elastomeric Waterproofing Membrane". The price is full compensation for materials furnished (including the secondary protective surface), equipment, labor, tools, and incidentals.