

# Technical Specification – Anti-icing Polymer Surface Overlay

## Tradename: Cargill SafeLane<sup>®</sup> HDX Overlay

### A. Description

Project scope includes providing epoxy, aggregate and application procedures described herein to place an anti-icing polymer overlay system. This specification includes guidelines for appropriate preparation of the surface to which the overlay will be applied as well as guidelines for furnishing and installing the anti-icing overlay system in accordance with the requirements and specifications herein, as well as those of the epoxy manufacturer and the project Owner/Engineer.

Cargill SafeLane<sup>®</sup> HDX overlay is a proprietary product and must be installed by a contractor with an appropriate license from Cargill, Incorporated. Parties interested in obtaining a license should contact Cargill at 866-900-7258 or send an email to safelane@cargill.com.

### B. Materials

The licensed Contractor must purchase all SafeLane<sup>®</sup> overlay materials from or through Cargill, Incorporated.

#### B.1 Epoxy

Provide a Cargill-approved epoxy resin base and hardener that is a modified Type III, two component system which meets requirements given by ASTM-C-881, Grade 1, Classes B & C. The epoxy shall be stored according to the manufacturer's specifications. The epoxy shall have the properties listed below:

**Table 1**

Property	Requirement	Test Method
Pot Life	15 to 45 min at 75° F (24° C)	ASTM C881 (50 ml sample in paper cup)
Tensile Strength	2,000 to 5,000 psi at 7 days	ASTM D638
Tensile Elongation	40% to 80% at 7 days	ASTM D638
Viscosity	7 to 25 poises	ASTM D2393
Minimum Compressive Strength at 3 hours	1,000 psi at 75° F (24° C)	ASTM C579
Minimum Compressive Strength at 24 hours	5,000 psi at 75° F (24° C)	ASTM C579
Minimum Adhesive Strength at 24 hours	250 psi at 75° F (24° C)	ACI 503R

#### B.2 Aggregate

Provide a Cargill-approved aggregate that is free from dirt, clay, asphalt and other foreign or organic materials. The aggregate shall be surface dry and shall be shipped and stored in mini-bulk bags, which shall be packaged to limit moisture intrusion. Once a bag has been opened or the outer protective shroud has been removed, the aggregate must be stored in order to ensure the aggregate remains dry.

Typical SafeLane<sup>®</sup> HDX overlay aggregate size gradation specifications are shown in Table 2.

**Table 2**

Gradation	% Passing
3/8" (9.5 mm)	98-100
#4 (4.75 mm)	50-80
#8 (2.36 mm)	0-15

## C. Construction

Only licensed contractors may install the SafeLane® HDX overlay system. Contractors interested in obtaining a license should contact Cargill at 866-900-7258 or send an email to [safelane@cargill.com](mailto:safelane@cargill.com). Shot blasting, surface preparation, cleaning and crack repair may be subcontracted or provided by the party purchasing the system, but must be directed and approved by the licensed Contractor.

### C.1 Equipment

For mechanical applications, equipment shall consist of not less than an epoxy distribution system, aggregate spreader, application squeegee, moisture- and oil-free compressed air and a lighting source if work will be performed at night. The epoxy distribution system shall accurately blend the epoxy materials according to the manufacturer's specifications and distribute epoxy to the road surface or bridge deck at the specified application rates and in such a manner as to cover 100 percent of the work area. The aggregate spreader shall be propelled in such a manner as to uniformly and accurately apply the aggregate.

For manual applications, equipment shall consist of calibrated containers for measuring epoxy volumes, a paddle-type mixer, squeegees, brooms and shovels which are suitable for mixing the epoxy and applying the epoxy and aggregate at the specified application rates.

### C.2 Surface Preparation

Prior to installing the overlay on any pavement section, the Owner/Engineer must inspect the entire surface. The licensed Contractor should be present at this inspection. The inspection is designed to identify any areas of pavement that are in need of repair before applying the overlay. These areas may include delaminations in the concrete or asphalt, potholes, large cracks or breakouts. These areas should be properly marked and must be repaired before the overlay can be installed. It is the Owner/Engineer's responsibility to decide on the best means for surface repair prior to installation. It is recommended that the Owner/Engineer consult with a Cargill representative prior to performing repairs to ensure the compatibility of products used for patching or repair with the SafeLane® HDX overlay system.

#### ***Preparation of Concrete Surfaces***

Before placing the overlay, the entire concrete bridge deck or road surface shall be thoroughly cleaned by steel shot blasting to ensure proper bonding between the epoxy and the concrete substrate. A final surface texture meeting the International Concrete Repair Institute's (ICRI) concrete surface profile numbers 5 through 7 shall be achieved as defined in ICRI Guideline No. 03732 and as shown by Surface Profile Samples available from ICRI (<http://www.icri.org>). Shot blasting is meant to expose the coarse aggregate and the surface shall be free of asphalt material, oil, dirt, rubber, curing compounds, paint carbonation, laitance, weak surface mortar and other potentially detrimental materials, which may interfere with the bonding or curing of the overlay. Loosely bonded patches shall be removed and repaired. Traffic marking lines shall also be removed or protected as directed by the Owner/Engineer. Moisture- and oil-free compressed air or high volume leaf blowers shall be used to remove all dust and other loose material. Mechanical brooms, without water, may be used after a rain event to remove any residual dust that adheres to the prepared surface after it has been blown off with compressed air. The surface must then be blown again with moisture- and oil-free compressed air or high volume leaf blowers.

Adhesion bond strength testing may be required by the Owner/Engineer before surface preparation is considered acceptable. See ACI 503R, Appendix A of the ACI Manual of Concrete Practice or Virginia Test Method 92 for guidelines.

SafeLane® HDX overlay shall not be placed on Portland Cement Concrete that is less than 28 days old unless otherwise approved

by the Owner/Engineer. The overlay may be placed on fast curing and quick set patching materials using the manufacturer's recommended curing times and with approval from the Owner/Engineer.

### Preparation of Asphalt Surfaces

Asphalt surfaces may be sandblasted or planed and textured to a depth approved by both the Owner/Engineer and the licensed Contractor. Surfaces should be free of oil, dirt, rubber, curing compounds, paint carbonation, weak surface mortar and other potentially detrimental materials, which may interfere with the bonding or curing of the overlay. Moisture- and oil-free compressed air or high volume leaf blowers shall be used to remove all dust and other loose material. Mechanical brooms, without water, may be used after a rain event to remove any residual dust that adheres to the prepared surface after it has been blown off with compressed air. The surface must then be blown again with moisture- and oil-free compressed air or high volume leaf blowers.

SafeLane® HDX overlay shall not be placed on asphalt that is less than six months old.

The overlay should be placed as soon as possible after surface preparation is completed. It is recommended to keep traffic closed on a fully prepared surface until the overlay has been placed and allowed to fully cure.

Application of SafeLane® HDX overlay on any pavement surface or structure that is not elevated may be subject to premature delamination due to moisture or pore pressure caused by moisture that may be present at the pavement surface in those environments.

## C.3 Overlay Application

### Application Conditions

Handling and mixing of the epoxy resin and hardening agent shall be performed in a safe manner to achieve the desired results in accordance with these specifications and with the manufacturer's recommendations as approved or directed by the Owner/Engineer. SafeLane® HDX overlay materials shall not be applied when weather or surface conditions are such that the material cannot be properly handled, placed and cured within the specified requirements for project sequencing or traffic control, or when rain is imminent within the manufacturer's recommended cure times. The prepared surface must be completely dry at the time of epoxy application. Moisture-and oil-free heat sources or torches may be used to dry the surface. The temperature of the deck surface and all epoxy and aggregate components shall be a minimum of 55°F (13°C) at the time of application. Epoxy shall not be applied if the gel time is less than five minutes or if pavement temperatures exceed 115°F (46°C). In situations where road closures are not under strict time constraints, epoxy may be applied at lower temperatures with the Owner/Engineer's approval.

### Double Pass Method

SafeLane® HDX overlay is applied using a double pass method. The double pass method calls for applying the epoxy and aggregate in two separate layers at the corresponding application rates shown in Table 3 below. Total epoxy application rates should be no less than 10 gallons per 100 square feet and typically range from 10 – 11 gallons per 100 square feet.

**Table 3**

Double Pass Method	Epoxy Rate Gal/100 sq. ft.* (liters/sq meter)	Aggregate lbs/sq ft.** (kg/sq. meter)
1st course	2.0 to 4.0 (0.8 to 1.6)	1-2 (4.9 - 9.75)
2nd course	6.0 to 8.5 (2.4 to 3.4)	3-4 (14.6 - 19.5)
* Total epoxy applied must equal no less than 10 gal/100 sq ft. (4.1 liters/sq meter)		
**Application of aggregate shall be of sufficient quantity to completely cover the epoxy.		

### Protecting people, bridges and roads™

The epoxy must be mixed at a volume ratio of 1 Part A: 1 Part B and mechanically stirred by a paddle type mixer for three minutes or according to the epoxy manufacturer's recommendations. After the epoxy has been properly mixed, it shall be immediately and uniformly applied to the pavement surface with a 3/16 to 1/4 inch (4.8-6.4mm) V-notched squeegee. The aggregate shall be applied in such a manner as to cover the epoxy mixture while the epoxy is still fluid. First course applications that do not receive enough aggregate prior to gelling shall be removed and replaced.

Each course of epoxy overlay shall be cured before removing the excess unbonded aggregate to prevent tearing or damaging of the surface. Oil- and moisture-free compressed air or high volume leaf blowers, vacuum or mechanical broom can be used to remove excess aggregate. After all loose aggregate is removed any remaining dust must also be removed using the methods described above. The first course shall not be opened to traffic without the Owner/Engineer's approval. Application of the second course may begin after all dust is removed. Under no circumstances shall traffic be permitted on the overlay until it has been cured sufficiently to prevent damage from wheel loads. Typical curing times are specified below in Table 4.

**Table 4**

Course	Average Temperature of Deck, Epoxy, and Aggregate Components in °F (°C)					
	60-64 (16-18)	65-69 (18-21)	70-74 (21-23)	75-79 (24-26)	80-84 (27-29)	*85+ (29+)
1	4 hr	3 hr	2.5 hr	2 hr	1.5 hr	1 hr
2	6.5 hr	5 hr	4 hr	3 hr	3 hr	≤ 3 hrs

\*Refer to manufacturer's recommendation

The second course shall be applied at the rates specified in Table 3. Epoxy will be applied using a flat-bladed squeegee. The aggregate shall be applied in such a manner as to cover the epoxy mixture before polymerization. Special care must be taken to ensure that the wet epoxy does not coat the wear surface (top) of the aggregate. Once the epoxy is cured, all loose aggregate shall be removed from the surface by oil- and moisture-free compressed air or high volume leaf blowers, vacuum or mechanical broom. After all loose aggregate is removed, and if there are any areas where the top surface of the stone has been coated with epoxy, the excess epoxy must be removed using a light shot or sand blast.

Prior to installing SafeLane® HDX overlay, the licensed Contractor may be required to submit an overlay construction work plan for approval. The work plan should include, but not be limited to, materials, equipment, anticipated schedule for traffic control, patching, crack repair, surface preparation, sequencing of the overlay placement, as well as test reports, documentation, explanation and justification to support the proposed work plan. The work plan shall also be in accordance with the epoxy manufacturer's specifications. Any deviations from the guidelines prescribed by this specification shall be explained and are subject to approval by the Owner/Engineer.

The licensed Contractor shall plan and execute the work to allow for the minimum curing periods specified herein, or longer curing periods as prescribed by the manufacturer, prior to opening the surface to public or construction traffic.

Unless otherwise specified by the Owner/Engineer, the overlay shall not be applied over the expansion joints of a bridge deck. The expansion joints shall be coated with a bond breaker (e.g., duct tape) that can adequately seal the joints from the epoxy. Duct tape may also be used to delineate application areas. It is recommended that all taped areas or bond breakers be removed before epoxy starts to harden. Epoxy may also be removed by scoring the overlay prior to gelling or by saw cutting after cure.

Should the licensed Contractor's operations or actions damage or mar the overlay, the Contractor shall remove the damaged areas and reapply the overlay to the Owner/Engineer's satisfaction. In the event that part of the epoxy mixture does not cure, all portions of the overlay shall be completely removed from the affected area and discarded. Any residual epoxy remaining on the pavement must be completely removed by mechanical means such as steel shot or abrasive blasting or scarifying before the overlay can be reapplied.

For each batch applied, the licensed Contractor may be asked to maintain, and provide to the Owner/Engineer, records including but not limited to the following:

- Number of batches mixed and volume per batch
- Location of batches as placed on deck, referenced by stations
- Batch time
- Gel time (50 ml sample)
- Temperature of the air, deck surface and epoxy components
- Loose aggregate removal time
- Time open to traffic

## D. MEASUREMENT

Project area shall be measured by square feet of installed overlay. Project area shall be identified and marked by the Owner/Engineer and agreed to by the licensed Contractor and the material supplier (Cargill, Incorporated).

## E. PAYMENT

The Owner will pay for the project at the agreed upon quantities and at the contract unit price under the following bid item:

Item Number	Description	Unit
xxxxx	SafeLane® HDX Overlay	Square feet

Payment is full compensation for furnishing and hauling all materials, including epoxy and pre-bagged aggregate; preparing the pavement surface and applying SafeLane® HDX overlay as described in the above specifications; providing traffic control during surface preparation and overlay installation and curing; removing and disposing of all excess materials; and for furnishing all equipment, labor, tools, and incidentals necessary to complete the contract work.

### **For additional information contact:**

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 York, PA 17402                          Web: www.cargillsafelane.com

Note: To request a version of this document that can be modified or used for developing project specifications, call 866-900-7258 or send an email to safelane@cargill.com.

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