

DULUTH SUPERIOR HARBOR EXISTING IN-PLACE COATING ASSESSMENT

Prepared for Wisconsin Sea Grant Institute, Contract # 034K786



December 12, 2008



1 EAST FIRST STREET, SUITE 403
DULUTH, MN 55802
PH: (218) 727-1206 / FAX (218) 727-3961

Duluth Superior Harbor Existing In-Place Coating Assessment

December 12, 2008

AMI Job #081030

Table of Contents

Cover.....	1
Table of Contents.....	2
Purpose of Inspection.....	3
Procedures Used for Underwater Inspections.....	3
Underwater Engineering Inspection Dates and Locations.....	5
Existing Conditions.....	5
Conclusion.....	13
Appendix A.....	Coating Field Data
Appendix B.....	Coating Technical Data

AMI Contact:

Chad W. Scott, PE
chad.scott@amiengineers.com
Ph: (218) 727-1206
Fax: (218) 727-3961
Cell: (218) 591-0178

UW Sea Grant Project Manager:

Gene R. Clark, PE
gclark1@uwsuper.edu
Ph: (715)-394-8472
Fax: (715)-394-8454

Funded by the University of Wisconsin Sea Grant Program through a grant received from the Wisconsin Coastal Management Program and the National Oceanic and Atmospheric Administration, Office of Ocean and Coastal Resource Management under the Coastal Zone Management Act, Grant # NA06NOS4190183.



Purpose of Inspection

The purpose of the inspections was to provide an underwater coating assessment of in-place coatings at six locations (eight sample coating measurements) within the Duluth-Superior Harbor. This inspection is set up to help determine which coatings have the highest durability and lifespan to resist abrasion from ice impact, vessel impacts and scrapes and wave action in our environment. These six sites were chosen because they are the only known sites within the harbor that have current marine coatings applied to the steel structures. This data will be compiled annually and be made available to dock owners to help them choose the most effective products if coating their steel structures utilizing coating technology.

Procedures Used for Underwater Inspections

The AMI Engineering 3-man dive team consisted of one engineer, one engineer technician and one commercial diver. Surface supplied diving techniques were utilized during all phases of the inspection process to meet OSHA and Coast Guard standard regulations for commercial diving. The inspectors used an underwater helmet mounted video camera to document all structural conditions for future review by project team members. Pertinent photos and tables are used in the report to illustrate the current conditions of the existing structures. Additional photos and video clips are included with the project team master report.

The diver first inspected 100' of coated dock from the waterline to the bottom of the coating to check for adhesion problems and flaws in the coating. Two random locations at each site were then selected to perform coating thickness measurements. This assessment was conducted using a template that can be reused to take thickness measurements underwater of existing coatings in the exact same locations annually. The template used for this assessment is shown below in Figure 1 has 10-1" random holes the size of the measurement probe for the thickness measurement locations. The template is 6" wide x 24" tall.

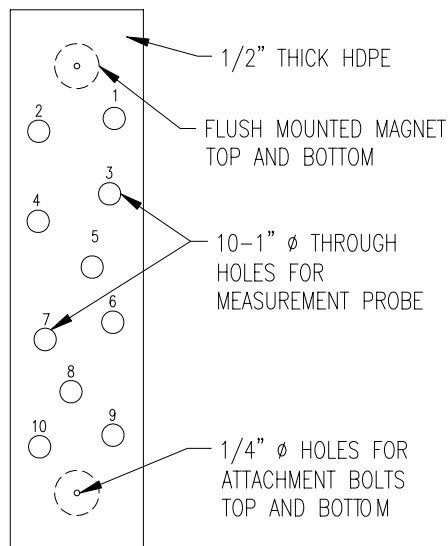
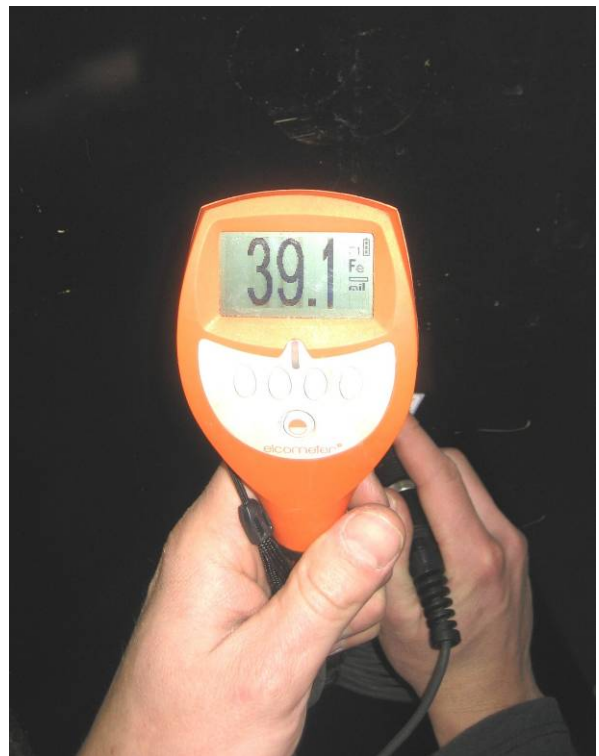


Figure 1: Coating Thickness Template

At each site the current water datum was checked to ensure that the top of the template was mounted at the International Great Lakes Datum (IGLD) which is 601.1 feet above sea level. This area was chosen for measurements because it is the top of the area which sees the highest amount of ice abrasion and is also the zone of highest observed corrosion. The template was mounted to the steel structure by drilling two holes in the coated steel at the top and bottom of the template in the center of the two magnets. A ¼” bolt was then placed in each of the holes to secure the template to the coated steel structure. At each site two random locations were chosen and 10 measurements were recorded at each site. This data is reported in Appendix A. With these holes drilled into the steel sheet piling, the diver will be able to return to the site every year and install the measurement template exactly how it was in years past to measure the exact same spot on the coatings.

An ultrasonic coating thickness measurement instrument was used for the measurement of these coatings. This instrument is an Elcometer 456 Coating Thickness Gauge which utilizes a waterproof probe which takes measurements by sending an electric signal through the coating to the steel and back to the probe. The probe being used by the diver and the thickness gauge can be seen below in Pictures 1 and 2.



Pictures 1 & 2: Diver Using Template & Topside Taking Readings

Underwater Engineering Inspection Dates and Locations

On November 10, 2008 the AMI dive team performed coating thickness evaluations on two sections of sheet pile dock with two different coatings at Hallett 8 dock in Superior, WI and also the Bong Bridge Cell located within the harbor. Then on November 12, 2008 the dive team performed thickness evaluations on two sections of sheet pile dock with two different coated areas at Cenex Harvest States (CHS) and also one evaluation at Elkhorn Industries both in Superior, Wisconsin. Lastly, on December 10, 2008 the dive team performed a thickness evaluation at the Coast Guard facility which is located on Park Point in Duluth, MN.

Existing Conditions

The study investigated 5 coating locations (7 coating measurements) within the Duluth-Superior Harbor (See Figure 1 below for locations). A 6th location (US Army Corps Vessel yard) was also noted but not inspected. A list of these locations can be seen in the Coating Structures Inventory located in Appendix A.

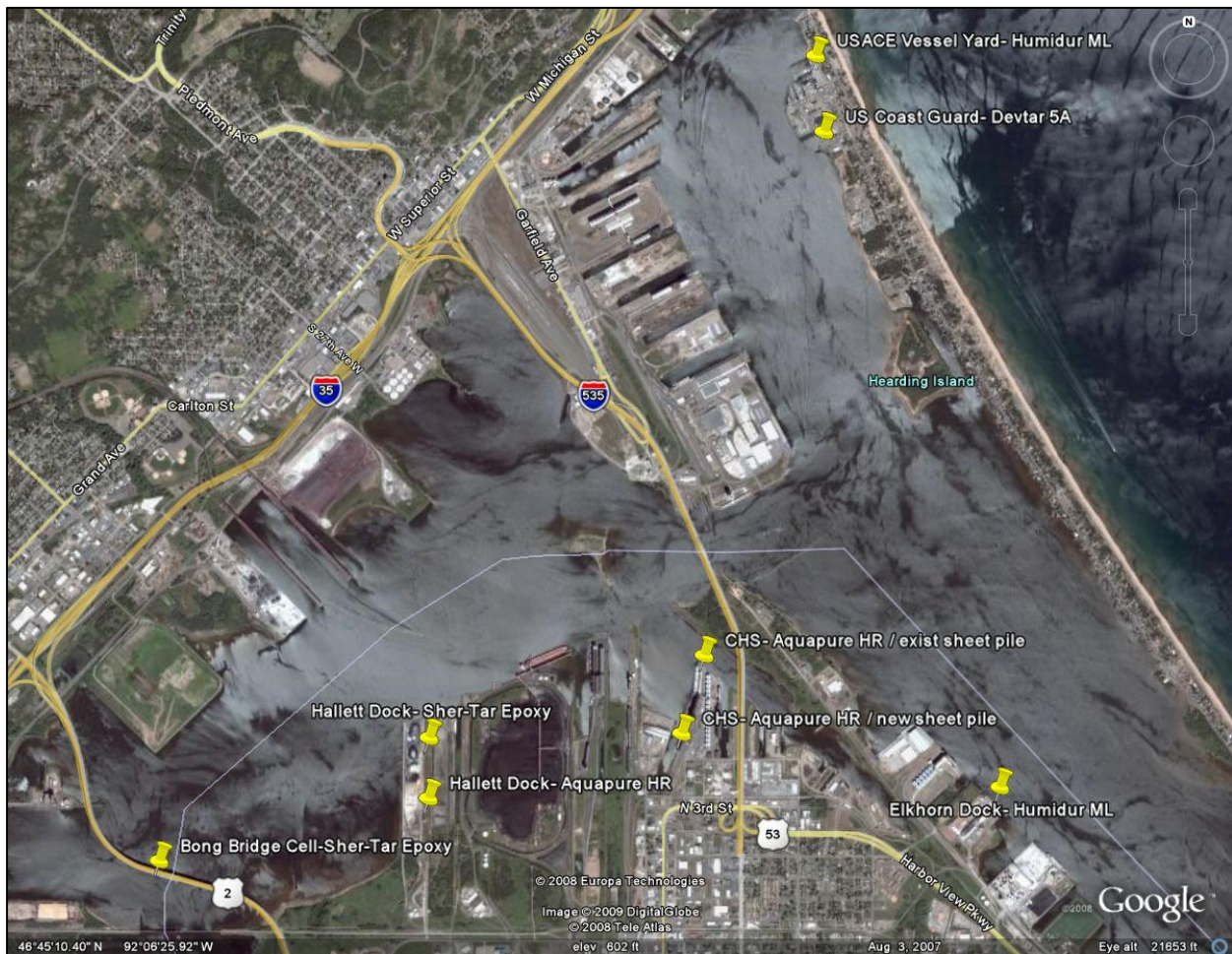


Figure 2: Harbor Map with Inspection Sites

Hallett Dock 8 Outer End

There are two different coatings present at Hallett 8 dock which is located in Superior, WI and is seen below in Picture 3. On the outer end of the dock the coating is a Sherwin Williams® product which is a Hi-Mil Sher-Tar® Epoxy which was applied in October of 2006. Sherwin Williams® specifies a dry film thickness between 16 and 24 mils but was specified to be installed with a minimum film thickness of 40 mils. The diver inspected 100 feet of coated dock from the waterline to the bottom of the coating which was 14' below IGLD. All of the coating that was inspected was intact with no adhesion or abnormal issues present. Two random sites were chosen for thickness measurements. The first site had an average film thickness 25.4 mils. The second site had an average film thickness of 27.4 mils.



Picture 3: Hallett 8 Dock

Hallett Dock 8 Inner End

The inner end of the dock is coated with an AMNOR Viking Armor Epoxy Coating product which is Aquapure HR which was applied in 2007. AMNOR recommends a dry film thickness of 16 mils but was specified to be installed with a minimum film thickness of 40 mils. The diver inspected 100 feet of coated dock from the waterline to the bottom of the coating which was 13' below IGLD. All of the coating that was inspected was intact with no adhesion or abnormal issues present. Two sites were then randomly

chosen for the thickness measurements. The first site had an average film thickness of 46.5 mils. The second site had an average film thickness of 42.2 mils.

Bong Bridge Cell

The NW Bong Cell which is located just north of the Bong Bridge which crosses the Duluth-Superior Harbor and can be seen below in Picture 4. This cell was coated in 1988 with a Sherwin Williams product which is Hi-Mil Sher-Tar® Epoxy. This coating has almost completely worn off the cell at the time of inspection from the water line to -4' below. There was coating present from -4' to -8' below the waterline. The coating was originally specified to be applied with a dry film thickness between 16 and 20 mils with Sherwin Williams's recommendation film thickness between 16 and 24 mils of applied dry coating. AMI did not find a location on the cell near the surface with coatings present where the template could be installed to take measurements due to the coating already being worn off in this area.



Picture 4: Bong Bridge Cell

Elkhorn Industries

Used old pitted steel sheets were coated and then driven at this site for the sole purpose of testing the Humidor® ML coating in the Duluth-Superior Harbor. This product is manufactured by Acotec and was applied in November of 2007 at the end of Elkhorn Industries dock in Superior, WI which can be seen below in Picture 5. This product specifies a dry film thickness between 24 and 40 mils of applied coating. All exposed areas of the test sheet piling was inspected from the waterline to the bottom of the coating. There were no adhesion issues or abnormalities found in the coating. Two random test locations were chosen for thickness measurements. The first site had an average film thickness 38.4 mils. The second site had an average film thickness of 42.7 mils.



Picture 5: Elkhorn Industries Dock

Cenex Harvest States (CHS) – Cofferdam Existing Sheet Piling

There are two sites that have been coated at CHS which is located in Superior, WI, both of which are coated with Aquapure HR which was provided by Marine Coatings, LLC and is a AMNOR Viking Armor Epoxy Coating. AMNOR recommends a dry film thickness between 12 and 16 mils but was specified to be installed with a minimum film thickness of 20 mils. The first site of coating application was existing sheet piling that was severely corroded. This section of dock was coated by use of installing a cofferdam around the section of sheet piling to be coated and then dewatering. Examples of these cofferdams in use can be seen below in Pictures 6 and 7. This section of dock was coated in October of 2008. Once the section was dewatered, the sheet piling was sand blasted and then coated. The coating was allowed to cure for 2 hours before flooding the cofferdam with water.



Pictures 6 & 7: Existing sheet pile at CHS was coated using a cofferdam

The diver inspected 100 feet of dock from the water line to the bottom of the coating which was 12' below IGLD. Two sites were then randomly chosen to perform thickness measurements. This area of dock was very difficult to perform thickness measurements on for two reasons. First, the existing sheet piling was severely pitted so it was difficult to get the probe on a flat surface. Second, the thickness probe has a difficult time reading any coatings thicker than 60 mils and this coating was applied heavily with many readings being close to 60 mils. For these reasons, there were only 4 successful readings at the first site. After the diver measured the top 2' at the first site the top bolt on the template was then put in the bottom hole and hung vertical for an additional set of readings. The first site had an average film thickness 52.4 mils. The diver was able to get 6 readings at the second site which had an average film thickness of 38.7 mils.

Cenex Harvest States (CHS) – New Sheet Piling

The other section of dock at Cenex Harvest States consisted of new sheet piling which was also coated with Aquapure HR. This section of dock was coated on dry land and is located on the south inner end of the dock and was also installed in the fall of 2008. AMNOR recommends a dry film thickness between 12 and 16 mils but was specified to be installed with a minimum film thickness of 20 mils. All the sheet piling was inspected from the waterline to the bottom of the coating which was located 12' below the water line. There were no adhesion issues or abnormalities found in the coatings. Two random test locations were chosen for thickness measurements. The first site had an average film thickness 24.6 mils. The second site had an average film thickness of 33.0 mils.



Picture 8: Newly installed sheet pile at Cenex Harvest States

Army Corps Vessel Yard

A 4'-0" section of beam was coated with Humidur® ML which is manufactured by Acotec. This is a solvent free epoxy which was first coated and installed August of 2001 at the Midwest Energy Wharf in Superior, WI then was removed for inspection in September of 2006. At this time the coating was still in tack with no loss of adhesion present. The test beam was then reinstalled at the Army Corps of Engineers Vessel Yard located on Park Point in Minnesota in October of 2007 which can be seen below in Picture 8. Due to unforeseen circumstances, this site was unavailable for assessment at the time of inspection. It will be inspected and analyzed in spring of 2009.



Picture 9: Army Corp of Engineers Vessel Yard

United States Coast Guard Dock

The USCG dock is located on Park Point in Duluth, MN and can be seen in Picture 9 below. This section of dock was coated and installed in 2004 with Devtar® 5A which is an epoxy high build coating. Devco® High Performance Coatings manufactures this coating and recommends a dry film thickness between 6 and 8 mils. The coating was applied from the top of the sheets to 22' below the water. The sheet piling was inspected from the waterline to the bottom of the coating. There were no adhesion issues or abnormalities found in the coatings. Two random test locations were chosen for thickness measurements. The first site had an average film thickness 16.6 mils. The second site had an average film thickness of 14.1 mils.



Picture 10: USCG Dock

Conclusion

The inspection and data collection process was accomplished successfully with the use of the measurement template and the thickness gauge. All of the coatings which were inspected were intact and in good condition with the exception of the Bong Bridge Cell which was applied approximately 20 years ago. The other coatings are relatively new so no coating issues should be expected at this time. However, the inspection records provide a baseline for use in the future study of coating durability.

It is expected that future inspections will be a yearly process where the AMI dive team will perform measurements on the same coated structures in the exact same locations. The same template and measure device will be used in the exact same location and manner in the future that was used during this initial phase of the study so that the data can be accurately compared. This compiled data will be analyzed annually to determine the yearly rate of loss of each of the coatings. The final outcome of the study will provide a better understanding of how these coatings will perform in time within the Duluth-Superior Harbor.

Respectfully Submitted,

Michael K. Weber, EIT
Structural Engineer/Commercial Diver

Reviewed By,

Chad W. Scott, P.E.
Principal

APPENDIX A

DULUTH SUPERIOR HARBOR IN-PLACE COATING ASSESSMENT FIELD DATA

FIELD DATA:

TABLE 1: Coating Sites Thickness Measurement Data

DULUTH SUPERIOR HARBOR IN-PLACE COATING FIELD DATA

Site Information	Facility	Hallett Dock 8	Hallett Dock 8	Bong Bridge	Cenex Harvest States	Cenex Harvest States	Elkhorn	Army Corps Vessel Yard	USCG DOCK
	City	Superior	Superior	Duluth	Superior	Superior	Superior	Duluth	Duluth
	Location	850 ft on W side of N side	E Inland Side	Cells	1st 300' N side of dock	At corner on S side of dock	Test Beam	Test Beam	Sheet Pile
	Facility Information	Dock 8 Bulkhead	Dock 8 Bulkhead	Cell	Existing Sheetpiling	New Sheetpiling	Dock	Vessel Yard	Dock
	Owner	Hallett Dock Co.	Hallett Dock Co.	Mn/DOT	CHS	CHS	Jeff Foster Trucking	Army Corps of Engineers	USCG
Coating Information	Coating Name	Hi-Mil Sher-Tar Epoxy	Aquapure HR	Hi-Mil Sher-Tar Epoxy	Aquapure HR	Aquapure HR	Humidur ML	Humidur ML	Devtar 5A
	Coating Manufacturer	Sherwin Williams	AMNOR Viking Armor Epoxy Coatings	Sherwin Williams	AMNOR Viking Armor Epoxy Coatings	AMNOR Viking Armor Epoxy Coatings	Acotec	Acotec	Devoe
	Coating Type	Coal Tar Epoxy	Rapid Cure Epoxy	Coal Tar Epoxy	Rapid Cure Epoxy	Rapid Cure Epoxy	Solvent Free Epoxy	Solvent Free Epoxy	Epoxy High Build Coating
	Date Coated	October-06	2007	1986 for NE, SE, SW Cells, 1988 for NW Cell	October-08	October-08	November-07	Installed Aug 2001, then removed in Sept. 2006 and put back on Nov. 13, 2007	2005
	Coating Location	top to 14' below w/l	top to 13' below w/l	4 to 8 feet below IGLD	top to 12' below w/l	top to 12' below w/l	top to 12' below w/l	Test Beam	top to 20' below w/l
	Dry Thickness	20 mils	40 mils	16-20 mils	20 mils	20 mils	24-40 mils	20 mils	9 mils
Test Location #1	1	21.5	43.4	0	38.3/55.3	24.2	37.8	-	17.8
	2	16.3	19.6	0	43.4/**	28.6	26.6	-	25.8
	3	27.3	26.7	0	49.3/58.6	24.1	38.2	-	16.5
	4	29.4	51.7	0	**/**	25.4	34.5	-	15.1
	5	45.9	60.4	0	**/**	29.8	54.4	-	15.3
	6	15.5	62.0	0	**/**	20.1	34.8	-	13.8
	7	21.5	**	0	**/58.3	22.5	33.4	-	15.4
	8	19.2	37.3	0	**/**	27.2	43.3	-	15.0
	9	34.0	61.1	0	46.1/59.6	18.5	51.3	-	15.9
	10	22.9	56.2	0	**/62.6	25.9	29.2	-	15.1
	Average	25.4	46.5	0	52.4	24.6	38.4	-	16.6
Test Location #2	1	22.0	44.1	0	**	33.7	44.6	-	10.0
	2	16.5	31.6	0	44.0	30.7	34.2	-	12.1
	3	20.8	42.5	0	28.5	34.8	44.5	-	22.2
	4	36.7	47.3	0	34.9	29.1	61.4	-	18.3
	5	30.8	48.6	0	50.6	37.8	55.8	-	12.7
	6	28.2	46.6	0	23.3	31.4	46.4	-	19.7
	7	33.9	42.6	0	**	30.0	27.7	-	11.6
	8	32.4	49.6	0	**	28.7	39.4	-	11.4
	9	24.5	39.6	0	**	29.6	41.1	-	10.7
	10	28.1	29.5	0	50.7	44.2	32.0	-	12.3
	Average	27.4	42.2	0	38.7	33.0	42.7	-	14.1

** Indicates diver could not get reading, due to thickness probe not accurate above 60.0 mils.

Test Location #1 Information	Outpan north of 2nd ladder from end	Directly under 2nd yellow bollard from north.		1+00 @ 2nd Bollard from end	From corner connector 3 sheets north	1st set from left & first sheet on left.		1 sheet west of bollard #2
Test Location #2 Information	At bollard #8	Sheet right of safety ladder.		22'-6" past bollard #3 from end	From corner connector 5 sheets east	3rd set from left & 1st sheet on left.		3 sheets west of bollard #2

APPENDIX B

DULUTH SUPERIOR HARBOR IN-PLACE COATING ASSESSMENT COATING DATA

COATING TECHNICAL DATA SHEETS:

ACOTEC, INC. - HUMIDUR®

AMNOR - AQUAPURE

DEVOE® - DEVTAR® 5A

SHERWIN WILLIAMS® – HI-MIL SHER-TAR® EPOXY



Technical Data Sheet

HUMIDUR[®]ML Solvent Free Epoxy Coating

Description

Humidur[®]ML is a two-pack, solvent free polyamine cured epoxy system with outstanding rust resisting capacities. Binding agents contain modifying components, thus ensuring excellent adhesion of the coating to the substrate. Pigmentation consists of specially developed abrasion resistant extenders and colouring pigments. High molecular weight elastifiers are added to provide for sufficient flexibility. The resulting composition combines excellent adhesion, abrasion and impact resistance, and is at the same time hydrophobic. Thus enabling the product to cure at low temperatures, even while immersed. It can be exposed to water immediately after application.

Composition

Humidur[®]ML is a two-component system. Both the A and B component are delivered predosed in separate packaging. The base or A component contains non-cristallizable epoxy resins, high-tech modifying agents, elastifiers, lamellar abrasion and impact resistant fillers, and colouring pigments. The B component contains the polyamine hardener complex.

Application

Humidur[®]ML is an efficient and proven solvent free anti-corrosion coating designed to protect steel as well as concrete structures from corrosion. **Humidur[®]ML** can be applied in one single layer up to thicknesses of 1 mm, depending on ambient temperature, using high-pressure airless spraying equipment. Overcoating if necessary can be done immediately on top of the previous clean **Humidur[®]** coat and does not need to be preceded by whipblasting. Adhesion onto the substrate as well as interadhesion between layers is excellent, even when cured at low temperature and high humidity. **Humidur[®]ML** is highly resistant to mechanical wear and immersion in mild chemicals and polluted waters. Since **Humidur[®]ML** can be 100% decontaminated, it is also suited for use in nuclear power plants.

Humidur[®]ML is also used for the protection against bottom plate corrosion in storage tanks for gasoline, kerosine, ...

Specific Data

- Density @ 23°C
 - base..... $\pm 1,46 \text{ g/cm}^3$
 - hardener..... $\pm 1,14 \text{ g/cm}^3$
 - mixture..... $\pm 1,40 \text{ g/cm}^3$
- Solid content..... 100%
- Dry Film Thickness
 - should be considered per application area*
 - max. in 1 layer..... 1000 microns
- Flash Point
 - should be considered per application area.*
 - mixture..... over 100°C
- Pot life
 - @ 23 °C..... 45 mins
 - @ 30 °C..... 35 mins
- Covering capacity
 - theoretical @ 300 μ* $\pm 0,42 \text{ kg/m}^2$
 - theoretical @ 400 μ* $\pm 0,56 \text{ kg/m}^2$
- Viscosity @ 23°C @ CSS750Pa
 - mixture..... $5 \pm 1 \text{ Pas}$
- Mixing ratio A:B
 - by weight.....* 5 : 1
 - by volume.....* 3,9 : 1
- Min. overcoating time wet-in-wet
- Colours..... 25 different shades
- Shelf life..... 6 months in unopened pails stored at max. 25°C in a dry place.
- Thinning..... Adding thinner and/or diluants is under any circumstances **strictly forbidden.**

Important

This coating system should not be thinned

The present edition of this technical data sheet replaces all previous ones. Specific data have been drawn up as accurately as possible and are based on our knowledge regarding the above mentioned product on 25/11/2008. For more information, please contact : Acotec NV, Industrielaan 8, Zuid III, 9320 Aalst (Erembodegem), Belgium Tel. +32/53 83 86 60 Fax +32/53 83 69 88



AMNOR Marine Construction, Inc.
AMNOR Viking Armor Epoxy Coatings
1810 Wilson Lane, #102
McLean, Va. 22102

Tel: (703) 556-0818
Fax: (703) 556-0471
info@amnormarine.com
www.amnormarine.com

Technical Data Sheet

Aquapure HR (Heat Resistant) Rapid Cure Epoxy Coating™ **For Potable Water Systems**

Warning: Do NOT mix chemical thinners with Aquapure HR Rapid Cure Epoxy Coating™ in any amount under any circumstances. Consistency of the epoxy is controlled by changing the temperature of the product. To achieve a lower viscosity, the epoxy should be heated by placing it in hot water, or a paint heater, or in direct sunlight, until the desired consistency is achieved. Pumps with heating elements may also be used. **ADDING THINNER TO AQUAPURE HR RAPID CURE EPOXY COATING™ MAY CAUSE PINHOLES, LOSS OF ADHESION, BLISTERING AND FAILURE OF THE PRODUCT.**

Summary Description and Uses

Viking Armor's Aquapure HR (heat resistant) Rapid Cure Epoxy Coating™ is a two-part, solvent-free, 100% solids, polyamine-cured single coat epoxy coating system designed to protect ferrous and non-ferrous pipes, tanks and other structures used in potable water systems from corrosion, particularly in high temperature operating conditions.

Aquapure HR Rapid Cure Epoxy Coating™ is extremely tolerant of ambient and surface temperatures during application, and will cure at extremely low temperatures (tested to 23° F [-5° C]). Binding agents with modifying components ensure excellent adhesion of the coating to steel, non-ferrous metal, concrete, and other surfaces. It is a highly impact and abrasion resistant. It does not shrink when it cures, and actual wet film thickness and dry film thickness will be identical.

Aquapure HR Rapid Cure Epoxy Coating™ comes in standard white and a variety of other colors, and can also be color coated with UV resistant urethane coatings when used on structures exposed to sunlight and weathering to maintain selected color. Contact AMNOR Marine Construction, Inc. for further information.

APPLICATION

Surface preparation. Steel and other metal surfaces should be free of oil, grease and other contaminants, and must be grit blasted to SSPC-SP10 (NACE No. 2), near white. If hydroblasting is used to clean the surface and surface cleanliness or roughness is inadequate, hydroblasting should be followed by sweep grit blasting to reach the SSPC-SP10 standard.

For preparation of concrete and masonry surfaces, refer to AMNOR Marine Construction, Inc.

Application: Aquapure HR Rapid Cure Epoxy Coating™ is a two-part, solvent-free, 100% solids epoxy coating system. Thinners should never be used under any circumstances. The mixing ratio is 1:1 by volume. Pot life is approximately 10 minutes at 70° F (21° C). Curing time to light-traffic condition is approximately 3 – 4 hours at 70° F (21° C). Aquapure HR Rapid Cure Epoxy Coating™ cures under water and can be immersed in water immediately after application. AMNOR Marine recommends that it be applied to dry metal surfaces, but it may be applied to damp metal surfaces when necessary. It may also be used on concrete, masonry, and other materials, and it is a very effective coating for protecting concrete structures in harsh environments.

AMNOR Marine recommends the use of airless dual component spray pump systems for the application of Aquapure HR Rapid Cure Epoxy Coating™. Aquapure HR Rapid Cure Epoxy Coating™ is a single coat product designed to be applied at a film thickness of approximately 20 mils (500 microns)¹ and can be applied up to 40 mils thickness (1,000 microns). If additional film thickness is desired, a second coat may be applied (see below). Spray coating should be preceded by stripe coating of all difficult-to-reach areas, or areas where extra protection is warranted. Theoretical coverage is approximately 80 square feet per gallon at 20 mils.

Pot Life, Cure and Recoat time. Aquapure HR Rapid Cure Epoxy Coating™ has a minimum shelf life of one year when stored in sealed unmixed containers at room temperature (70° F [21° C]). Pot life is approximately 10 minutes at 70° F (21° C), but will vary according to the amount of epoxy mixed, ambient temperature, temperature of the epoxy, etc. Aquapure HR Rapid Cure Epoxy Coating™ will begin to set up approximately 10 minutes after application, and surfaces will be ready for light traffic or use within 4 hours, at 70° F (21° C). Complete curing will require approximately 24 hours, the precise time depending on temperature and other conditions. If a second coat is desired, it should be applied within ?? hours of the previous coat. No surface preparation is necessary to ensure a strong bond if a second coat is applied within 24 hours. Applicators should avoid applying a second coat over areas where water has condensed, and should ensure that any such condensation is removed prior to applying the second coat.

Cleanup. To clean paint guns, pump parts, and tools, methyl ethyl ketone (MEK), acetone may be used. Users are cautioned to follow the manufacturers' MSDS health and safety recommendations for these products. None of these products should ever be used to thin Aquapure HR Rapid Cure Epoxy Coating™ or allowed to mix with epoxy that is to be applied in pump lines, on brushes, rollers, or other tools.

Safety. See the Material Safety Data Sheet for safety, health and environmental information.

¹ Minimum recommended film thickness is 16 mils [400 microns]).

Warranty and Disclaimer: AMNOR Marine Construction, Inc. will replace Aquapure HR Rapid Cure Epoxy Coating™ found to be defective because of manufacture within one year from date of purchase, provided that all written directions on the storage and use of the product have been followed. This warranty is made in lieu of any and all other warranties, either expressed or implied. Under no circumstances will AMNOR Marine Construction, Inc. be responsible for any damage to surfaces, personal injuries, or other damage if Aquapure HR Rapid Cure Epoxy Coating™ is used contrary to the manufacturer's written directions.

All information presented in this technical data sheet is believed to be true and accurate. Nevertheless, AMNOR Marine Construction, Inc. makes no warranty expressed or implied, and further disclaims any liability, as to the suitability of such information to particular end use applications of Aquapure HR Rapid Cure Epoxy Coating™, and in no event will AMNOR Marine Construction, Inc. be liable for any incidental or consequential damages.

For further information, contact:

AMNOR Marine Construction, Inc.
1810 Wilson Lane, Suite 102
McLean, Va. 22102
Tel: (703) 556-0818
Fax: (703) 556-0471
info@amnormarine.com
www.amnormarine.com

PRODUCT DESCRIPTION

Generic: Hydrocarbon Resin Modified Epoxy Polyamide

General Description: Contains No Coal Tar. A high performance, two-component, chemically-cured high-build epoxy coating for use in areas where coal tar epoxy is normally used. Uniquely formulated to provide corrosion protection for steel and masonry surfaces exposed to water immersion or chemical splash, spillage and fumes. Self-priming on most surfaces. Outperforms Coal Tar Epoxies in all respects, including improved recoatability, toxicity, film embrittlement and application properties.

Typical Uses: Ideal for use on underground steel storage tanks, underground steel piping, in sewage and waste water treatment plants, petroleum refineries, chemical plants, pulp and paper mills, fertilizer plants, hydro and fossil fuel power plants, and underground coal & salt mines. Excellent for fresh and salt water immersion in steel and concrete structures on bridges, pilings, basins, and pits. Can be used on concrete block and poured concrete surfaces in commercial and industrial facilities.

Special Qualifications: Meets or exceeds the performance requirements of Corps of Engineers C-200; Steel Structures Painting Council Paint 16; Federal Specification MIL-P- 23236B, (SH) Type I and IV Class 2.

FEATURES

Advantages:

- Does not contain Coal Tar – no coal tar “burns”
- Ease of application
- Excellent chemical resistance – alkalis, dilute acids, sewage, salt brine, liquid fertilizers, crude oil, etc.
- Excellent water immersion resistance – fresh & salt water
- Abrasion resistant
- Good aged flexibility
- Exceeds performance of Coal Tar Epoxies
- Formulated without lead or mercury containing materials
- May be topcoated with urethane for good appearance

Limitations of Use: Not recommended for prolonged contact with strongly oxidizing chemicals, diluted alkalis, ketones, esters, alcohols or for lining tanks used to store “white” petroleum products. Exterior exposure will cause early loss of sheen and chalking, as is normal for epoxy coatings but this does not affect protective properties.

SPECIFICATION DATA

Color: Black

Finish: Semi-Gloss

Reduction Solvent: T-10 Thinner

Clean-up Solvent: T-10 Thinner

Weight/Gallon: 10.7 lbs./gal.(1.28 kg/L)

VOC (EPA 24): 2.38 lbs./gal.(285 g/L)

Thinned 10% with T-10 thinner 2.78 lbs./gal. (334 g/L)

Solids By Volume (ASTM D 2697-7 days): 69% ±2%

Theoretical Coverage at 1.0 Mil (25 microns) Dry: 1107 sq. ft./gal.(27.2 m²/L)

Recommended Film Thickness: 6.0-8.0 mils (150-200 microns) dry – 8.7-11.6 mils (218-290 microns) wet.

Systems: Please consult the appropriate system guide, the particular job specification or your ICI Paints Representative for proper systems using this product. Systems must be selected considering the particular environment involved.

Minimum Dry Time (ASTM D 1640): At 8 mils (200 microns) DFT

Substrate Temperature	40°F (4°C)	60°F (16°C)	80°F (27°C)
Minimum Recoat	22 Hours	11 Hours	4 Hours
Dry Hard	48 Hours	18 Hours	8 Hours
Maximum Recoat			
Self	30 Days	30 Days	30 Days

Ventilation, film thickness, humidity, thinning, and other factors can influence the rate of dry.

Warning: The above table provides general guidelines only. Always consult your ICI Paints Representative for appropriate recoat windows since the maximum aged recoat time of this product may be significantly shortened or lengthened by a variety of conditions, including, but not limited to humidity, surface temperature, and the use of additives or thinners. The use of accelerators or force curing may shorten the aged recoat of individual coatings. The above recoat windows may not apply if recoating with a product other than those listed above. If the maximum aged recoat window is exceeded, please consult your ICI Paints Representative for appropriate recommendations to enhance adhesion. Failure to observe these precautions may result in intercoat delamination.

Shelf Life: Over 24 months at 77°F (25°C) – unopened

Mix Ratio By Volume: 1 (base): 1 (converter) – see mixing instructions.

Induction: 15 minutes @ 60-80°F (16-27°C) – see mixing instructions

Pot Life: 5 hours @ 77°F (25°C) & 50% R.H.

PERFORMANCE DATA

Adhesion: (ASTM D 4541) – Excellent

Humidity Resistance: (ASTM D 4585) – Excellent

Abrasion Resistance: (ASTM D 4060) – Very Good

Elongation: (ASTM D 522 Method B) – Very Good

Service Temperature Limits: 250°F (121°C) dry, 120°F (49°C) wet.*

Hardness: (ASTM D 3363), 7 day cure @ 77°F (25°C) – 3H

Chemical Resistance: (ASTM D 1308 – 24 hr. contact) – Excellent. Resists splash and spillage of alkalis, dilute acids, sewage, salt brine, liquid fertilizers, crude oil.

DANGER! FLAMMABLE. HARMFUL OR FATAL IF SWALLOWED. Read label and Material Safety Data Sheet Prior to Use. See other cautions on last page. DSF3-0696

GENERAL SURFACE PREPARATION

Surfaces must be dry, clean, free of oil, grease, dust, dirt, wax, soaps, powdery residue, form release agents, curing compounds, laitance, other foreign matter and be structurally sound. Remove all loose paint, mortar spatter, mill scale, and rust.

New Surfaces: Steel – Blast to near-white metal surface cleanliness in accordance with SSPC-SP10 or ISO-Sa2 1/2 for immersion service, or commercial blast cleanliness in accordance with SSPC-SP6 or ISO-Sa2 for non-immersion service. Blast profile on steel should be 1.5 - 2.5 mils (38-62 microns) in depth and be of a sharp, jagged, nature as apposed to a "peen" pattern (from shot blasting). Surfaces must be free of grit dust. Prime with this coating. For immersion or under-ground service use two coats of this product at 8 mils (200 microns) dry per coat. For maximum performance, apply over CATHACOAT® 302H primer.

Concrete Block – Remove loose aggregate and repair major voids. Prime with this coating. **Concrete Floors, Poured Concrete** – Cure at least 30 days, abrasive blast or acid etch.

Previously Painted Surfaces: A test patch should be applied to old coatings to check for lifting. If lifting occurs or if old applied coatings are not sound and tightly adherent, they should be removed. Aged epoxy coatings must be cleaned and scuff sanded, or cleaned with DEVPREP® 88 or other suitable cleaner followed by a thorough water rinsing.

DIRECTIONS FOR USE

Tinting: Do not tint

Thinning: Thinning is not normally required or desired. However, at lower temperatures, small amounts (not to exceed 10%) T-10 thinner ONLY can be added subject to local VOC and air quality regulations.

Mixing: DEVTAR® 5A coating is a two component product supplied in 2 gallon and 10 gallon kits which contain the proper ratio of ingredients. The entire contents of each container must be mixed together. Power mix both portions first to obtain a smooth, homogeneous condition. Then add the converter slowly with continued agitation. After the converter add is complete, continue to mix slowly. Allow the mixed material to stand 15 minutes at 60-80°F (16-27°C) before use. Always restir before use. Mixed material is usable for 5 hours; if it thickens, do not add thinner, but discard and mix fresh material. Higher temperatures will reduce working life of the coating; lower temperatures will increase it. Avoid storing or placing containers in direct sunlight. Surfaces coated with this product may become slippery when wet. For additional slip resistance in areas of pedestrian traffic, add one pound per gallon of coarse pumice or other texturing material.

Application: Can be easily applied by airless or conventional (air) spray equipment. An airless spray pump capable of 3,000 psi (207 bars) should be used with a .021"

to .031" tip size to provide a good spray pattern. Fluid hoses should not be less than 3/8" ID and not longer than 50 feet (15.2 meters) to obtain optimum results. Longer hose length may require an increase in pump capacity or pressure. For air spray application, use a professional grade gun with a .070" or larger fluid tip, and an air cap that will provide good break-up for heavy materials. The fluid pressure should be kept low (about 15 psi) with just enough air pressure to get good break-up of the coating. Excessive air pressure can cause overspray problems. For touch-up work, DEVTAR 5A coating can be applied by brush or roller. Care should be taken that proper and uniform film thicknesses are obtained. Brushing and rolling may require multiple coats to achieve correct film thickness and/or hiding. Second coat of this material should be applied to first coat within 30 days (@ 80°F (27°C)).

Spreading Rate: Apply at 130-170 sq. ft. per gallon (3.2-4.1 m²/L) depending on surface texture and porosity. Allow for loss due to over-spray and surface textures or irregularities.

Dry Time (ASTM D 1640): DEVTAR 5A coating dries in 5 hours to recoat and achieves full cure in 7 days at 77°F (25°C) and 50% R.H. High humidity and/or low temperature will retard dry.

Clean-up: Use T-10 thinner.

PRECAUTIONS

DANGER! FLAMMABLE LIQUID AND VAPOR. HARMFUL OR FATAL IF SWALLOWED. ASPIRATION HAZARD-CAN ENTER LUNGS AND CAUSE DAMAGE. HARMFUL IF INHALED. MAY CAUSE CENTRAL NERVOUS SYSTEM EFFECTS, INCLUDING DIZZINESS, HEADACHE OR NAUSEA. CAUSES EYE, SKIN AND RESPIRATORY TRACT IRRITATION. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE ALLERGIC SKIN AND RESPIRATORY REACTION. OVEREXPOSURE MAY CAUSE BLOOD, LIVER, KIDNEY DAMAGE. CONTAINS MICA WHICH MAY CAUSE PNEUMOCONIOSIS. USE ONLY WITH ADEQUATE VENTILATION. KEEP OUT OF THE REACH OF CHILDREN. NOTICE: Products in this series contain solvents. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal. For emergency information call (800) 545-2643. **Note: These warnings encompass the product series. Prior to use, read and follow product-specific MSDS and label information.** Keep away from heat, sparks and flame. **Do not** smoke. Vapors may ignite. Extinguish all flames, burners, stoves, heaters and pilot lights and disconnect all electrical motors and appliances before use and until all vapors are gone. Prevent build-up of vapors by opening all windows and doors to achieve cross-ventilation. If sanding is done, wear a dust mask to avoid breathing of sanding dust. Do not breathe vapors or spray mist. Ensure fresh air entry during application and drying. Avoid contact with eyes and skin. If you experience eye watering, headaches, or dizziness, leave the area. If properly used, a respirator may offer additional protection. Obtain professional advice before using. Close container after each use. **FIRST AID:** In case of skin contact, wash thoroughly with soap and water. If any product remains, gently rub petroleum jelly, vegetable or mineral/baby oil onto skin, then wash again with soap and water. Repeated applications may be needed. Remove contaminated clothing. For eye contact, flush immediately with large amounts of water, for at least 15 minutes. **Obtain emergency medical treatment.** If swallowed, **obtain medical treatment immediately.** If inhalation causes physical discomfort, remove to fresh air. If discomfort persists or any breathing difficulty occurs, get medical help. **KEEP FROM FREEZING.**

DS170-1003

SHIPPING

Flash point: 80°F (27°C)
Packaging: 2 gallon kit (7.57L) 10 gallon kit (37.85L)
 1.00 gallon base 5.00 gallon base
 1.00 gallon converter 5.00 gallon converter

Shipping Weight: 2 gallon kits - 26 lbs. (11.8 kg)
 10 gallon kit - 115 lbs. (52.2 kg)

5A (05/07)
 Ad Stock #68633D



Strongsville, Ohio U.S.A.
 800-654-2616
 www.devoecoatings.com

LIMITATION OF LIABILITY: To the best of our knowledge, the technical data contained herein are true and accurate at the date of issuance but are subject to change without prior notice. We guarantee our product to conform to the specifications contained therein. WE MAKE NO OTHER WARRANTY OR GUARANTEE OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE. Liability, if any, is limited to replacement of the product or refund of the purchase price. LABOR OR COST OF LABOR AND OTHER CONSEQUENTIAL DAMAGES ARE HEREBY EXCLUDED.



Industrial & Marine Coatings

HI-MIL SHER-TAR® EPOXY

PART A
PART B

B69B40
B60V40

BLACK
HARDENER

PRODUCT INFORMATION

Revised 1/09

PRODUCT DESCRIPTION		RECOMMENDED USES																												
<p>HI-MIL SHER-TAR EPOXY is a high build, polyamide cured, epoxy coal tar coating, which can be applied at high film thickness in one coat.</p>		<p>For use over prepared substrates such as steel and concrete in industrial environments.</p> <ul style="list-style-type: none"> • Penstocks • Dam gates • Petroleum storage tanks • Heavy duty structural coating • Non-potable water tank and pipe coating • Acceptable for use with cathodic protection systems <ul style="list-style-type: none"> • Liner for clarifiers • Marine applications • Offshore drilling rigs 																												
PRODUCT CHARACTERISTICS		PERFORMANCE CHARACTERISTICS																												
<p>Finish: Semi-Gloss</p> <p>Color: Black</p> <p>Volume Solids: 68% ± 2%, mixed</p> <p>Weight Solids: 77% ± 2%, mixed</p> <p>VOC (calculated): Unreduced: <340 g/L; 2.8 lb/gal mixed Reduced 25%: <430 g/L; 3.59 lb/gal</p> <p>Mix Ratio: 2 components, premeasured 3:1 4 gallons mixed</p> <p>Recommended Spreading Rate per coat: Wet mils: 24.0 - 35.0 Dry mils: 16.0 - 24.0 Coverage: 45 - 68 sq ft/gal approximate</p> <p>NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.</p> <p>Drying Schedule @ 29.0 mils wet @ 50% RH:</p> <table border="1"> <thead> <tr> <th></th> <th>@ 50°F</th> <th>@ 77°F</th> <th>@ 100°F</th> </tr> </thead> <tbody> <tr> <td>To touch:</td> <td>10 hours</td> <td>8-10 hours</td> <td>2 hours</td> </tr> <tr> <td>To handle:</td> <td>48 hours</td> <td>48 hours</td> <td>6 hours</td> </tr> <tr> <td>To recoat:</td> <td></td> <td></td> <td></td> </tr> <tr> <td> minimum:</td> <td>24 hours</td> <td>16 hours</td> <td>8 hours</td> </tr> <tr> <td> maximum:</td> <td>72 hours</td> <td>48 hours</td> <td>16 hours</td> </tr> <tr> <td>To cure:</td> <td>7 days</td> <td>7 days</td> <td>7 days</td> </tr> </tbody> </table> <p>Pot Life: 6 hours 4 hours 1 hour</p> <p>Sweat-in-Time: 1 hour 30 minutes 15 minutes If maximum recoat time is exceeded, abrade surface before re-coating. Drying time is temperature, humidity, and film thickness dependent.</p> <p>Shelf Life: 12 months, unopened Store indoors at 40°F to 100°F.</p>		@ 50°F	@ 77°F	@ 100°F	To touch:	10 hours	8-10 hours	2 hours	To handle:	48 hours	48 hours	6 hours	To recoat:				minimum:	24 hours	16 hours	8 hours	maximum:	72 hours	48 hours	16 hours	To cure:	7 days	7 days	7 days	<p>System Tested: (unless otherwise indicated) Substrate: Steel Surface Preparation: SSPC-SP6 1 ct. Hi-Mil Sher-Tar @ 20.0 mils dft</p> <p>Abrasion Resistance: Method: ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load Result: 101 mg loss</p> <p>Adhesion: Method: ASTM D4541 Result: 600 psi</p> <p>Direct Impact Resistance: Method: ASTM D2794 Result: >80 in. lbs.</p> <p>Dry Heat Resistance: (quench test only) Method: ASTM D2485 Result: 350°F</p> <p>Flexibility: Method: ASTM D522, 180° bend, 1" mandrel Result: Passes</p> <p>Moisture Condensation Resistance: Method: ASTM D4585, 100°F, 1000 hours Result: No failure</p> <p>Pencil Hardness: Method: ASTM D3363 Result: 4H</p> <p>Salt Fog Resistance: Method: ASTM B117, 1000 hours Result: Excellent</p> <p>Sea Water Immersion: Method: ASTM D870 2 years Result: No blistering, cracking, or rusting</p> <p>Water Vapor Permeability: Method: ASTM D1653 Result: 0.021 perm-in.</p> <p>Wet Heat Resistance: Method: Non-immersion Result: 120°F</p> <p>Provides performance comparable to products formulated to federal specifications: DOD-P-23236A (SH) Class 2. (Replaces</p>	
	@ 50°F	@ 77°F	@ 100°F																											
To touch:	10 hours	8-10 hours	2 hours																											
To handle:	48 hours	48 hours	6 hours																											
To recoat:																														
minimum:	24 hours	16 hours	8 hours																											
maximum:	72 hours	48 hours	16 hours																											
To cure:	7 days	7 days	7 days																											



**Industrial
&
Marine
Coatings**

4.71

HI-MIL SHER-TAR® EPOXY

**PART A B69B40
PART B B60V40**

**BLACK
HARDENER**

PRODUCT INFORMATION

RECOMMENDED SYSTEMS	SURFACE PREPARATION																				
<p>Concrete or Steel, atmospheric or immersion: 1 ct. Hi-Mil Sher-Tar Epoxy @ 16.0 - 24.0 mils dft</p> <p>Concrete or Steel, atmospheric or immersion: 2 cts. Hi-Mil Sher-Tar Epoxy @ 8.0 - 12.0 mils dft/ct</p> <p>Steel, zinc rich primer, atmospheric only: 1 ct. Zinc Clad II Plus @ 3.0 - 5.0 mils dft 1 ct. Hi-Mil Sher-Tar Epoxy @ 16.0 - 24.0 mils dft</p> <p>Steel, atmospheric only (Optional Epoxy Primer): 1 ct. Recoatable Epoxy Primer @ 4.0 - 6.0 mils dft 1 ct. Hi-Mil Sher-Tar Epoxy @ 16.0 - 24.0 mils dft</p> <p>Aluminum, atmospheric only: 1 ct. Hi-Mil Sher-Tar Epoxy @ 16.0 - 24.0 mils dft</p> <p>Galvanized Metal, atmospheric only: 1 ct. Hi-Mil Sher-Tar Epoxy @ 16.0 - 24.0 mils dft</p> <p>The systems listed above are representative of the product's use. Other systems may be appropriate.</p>	<p>Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.</p> <p>Refer to product Application Bulletin for detailed surface preparation information.</p> <p>Minimum recommended surface preparation:</p> <p>Iron & Steel: Atmospheric: SSPC-SP6/NACE 3, 2 mil profile Immersion: SSPC-SP10/NACE 2, 4 mil profile Aluminum: Brush Blast, 2 mil profile Galvanizing: Brush Blast, 2 mil profile</p> <p>Concrete Masonry: Atmospheric: SSPC-SP 13/NACE 6, or ICRI 03732, CSP 1-3 Immersion: SSPC-SP 13/NACE 6-4.3.1 or 4.3.2., or ICRI 03732, CSP 1-3</p> <tr> <th colspan="2">TINTING</th> </tr> <tr> <td colspan="2">Do not tint.</td> </tr> <tr> <th colspan="2">APPLICATION CONDITIONS</th> </tr> <tr> <td colspan="2"> <p>Temperature: 50°F minimum, 120°F maximum (air, surface, and material) At least 5°F above dew point</p> <p>Relative humidity: 90% maximum</p> <p>Refer to product Application Bulletin for detailed application information.</p> </td> </tr> <tr> <th colspan="2">ORDERING INFORMATION</th> </tr> <tr> <td colspan="2"> <p>Packaging: 4 gallons mixed Part A: 3 gallons in a 5 gallon container Part B: 1 gallon</p> <p>Weight per gallon: 10.3 ± 0.2 lb, mixed</p> </td> </tr> <tr> <th colspan="2">SAFETY PRECAUTIONS</th> </tr> <tr> <td colspan="2"> <p>Refer to the MSDS sheet before use.</p> <p>Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.</p> </td> </tr> <tr> <th>DISCLAIMER</th> <th>WARRANTY</th> </tr> <tr> <td> <p>The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.</p> </td> <td> <p>The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.</p> </td> </tr>	TINTING		Do not tint.		APPLICATION CONDITIONS		<p>Temperature: 50°F minimum, 120°F maximum (air, surface, and material) At least 5°F above dew point</p> <p>Relative humidity: 90% maximum</p> <p>Refer to product Application Bulletin for detailed application information.</p>		ORDERING INFORMATION		<p>Packaging: 4 gallons mixed Part A: 3 gallons in a 5 gallon container Part B: 1 gallon</p> <p>Weight per gallon: 10.3 ± 0.2 lb, mixed</p>		SAFETY PRECAUTIONS		<p>Refer to the MSDS sheet before use.</p> <p>Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.</p>		DISCLAIMER	WARRANTY	<p>The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.</p>	<p>The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.</p>
TINTING																					
Do not tint.																					
APPLICATION CONDITIONS																					
<p>Temperature: 50°F minimum, 120°F maximum (air, surface, and material) At least 5°F above dew point</p> <p>Relative humidity: 90% maximum</p> <p>Refer to product Application Bulletin for detailed application information.</p>																					
ORDERING INFORMATION																					
<p>Packaging: 4 gallons mixed Part A: 3 gallons in a 5 gallon container Part B: 1 gallon</p> <p>Weight per gallon: 10.3 ± 0.2 lb, mixed</p>																					
SAFETY PRECAUTIONS																					
<p>Refer to the MSDS sheet before use.</p> <p>Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.</p>																					
DISCLAIMER	WARRANTY																				
<p>The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.</p>	<p>The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.</p>																				



**Industrial
&
Marine
Coatings**

4.71A

HI-MIL SHER-TAR® EPOXY

**PART A B69B40
PART B B60V40**

**BLACK
HARDENER**

APPLICATION BULLETIN

Revised 1/09

SURFACE PREPARATION	APPLICATION CONDITIONS		
<p>Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.</p> <p>Iron & Steel (atmospheric service) Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Commercial Blast Cleaning per SSPC-SP6/NACE 3. For better performance, use Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils). Prime any bare steel the same day as it is cleaned or before flash rusting occurs.</p> <p>Iron & Steel (immersion service) Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (4 mils). Remove all weld spatter and round all sharp edges by grinding. Prime any bare steel the same day as it is cleaned or before flash rusting occurs.</p> <p>Galvanized Steel/Aluminum Allow to weather a minimum of six months prior to coating. Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1 (recommended solvent is VM&P Naphtha). Lightly brush blast per SSPC-SP 7 to provide a 2 mil profile.</p> <p>Concrete/Masonry, Atmospheric Service: New For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI 03732, CSP 1-3. Surface must be clean, dry, sound, and offer sufficient profile to achieve adequate adhesion. Minimum substrate cure is 28 days at 75°F. Remove all form release agents, curing compounds, salts, efflorescence, laitance, and other foreign matter by sandblasting, shotblasting, mechanical scarification, or suitable chemical means. Refer to ASTM D4260. Rinse thoroughly to achieve a final pH between 8.0 and 10.0. Allow to dry thoroughly prior to coating. Old Surface preparation is done in much the same manner as new concrete; however, if the concrete is contaminated with oils, grease, chemicals, etc., they must be removed by cleaning with a strong detergent. Refer to ASTM D4258. Form release agents, hardeners, etc. must be removed by sandblasting, shotblasting, mechanical scarification, or suitable chemical means. If surface deterioration presents an unacceptably rough surface, Kem Cati-Coat HS Epoxy Filler/Sealer is recommended to patch and resurface damaged concrete. Concrete/Masonry, Immersion Service: For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 4.3.2, or ICRI 03732, CSP 1-3 Always follow the industry standards listed below: ASTM D4258 Standard Practice for Cleaning Concrete. ASTM D4259 Standard Practice for Abrading Concrete. ASTM D4260 Standard Practice for Etching Concrete. ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.</p>	<p>Temperature: 50°F minimum, 120°F maximum (air, surface, and material) At least 5°F above dew point</p> <p>Relative humidity: 90% maximum</p> <tr> <th colspan="2">APPLICATION EQUIPMENT</th> </tr> <p>The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.</p> <p>Reducer/Clean Up Reducer #54, R7K54</p> <p>Airless Spray Pressure.....2500 - 3000 psi Hose.....3/8" - 1/2" ID Tip0.031" Filternone Reduction.....As needed up to 25% by volume</p> <p>Conventional Spray (bottom feed tank recommended) GunBinks 95 Fluid Nozzle66 Air Nozzle.....63PB Atomization Pressure.....60 psi Fluid Pressure.....40 psi Reduction.....As needed up to 25% by volume</p> <p>Brush Brush.....Natural Bristle Reduction.....Not recommended</p> <p>Roller Cover3/8" - 1/2" woven with phenolic core Reduction.....Not recommended</p> <p>If specific application equipment is not listed above, equivalent equipment may be substituted.</p>	APPLICATION EQUIPMENT	
APPLICATION EQUIPMENT			



**Industrial
&
Marine
Coatings**

4.71A

HI-MIL SHER-TAR® EPOXY

**PART A B69B40
PART B B60V40**

**BLACK
HARDENER**

APPLICATION BULLETIN

APPLICATION PROCEDURES	PERFORMANCE TIPS
------------------------	------------------

Surface preparation must be completed as indicated.

Mix contents of each component thoroughly with power agitation. Make certain no pigment remains on the bottom of the can. Then combine three parts by volume of Part A with one part by volume of Part B. Thoroughly agitate the mixture with power agitation. Allow the material to sweat-in as indicated. Re-stir before using.

If reducer solvent is used, add only after both components have been thoroughly mixed, after sweat-in.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:
 Wet mils: 24.0 - 35.0
 Dry mils: 16.0 - 24.0
 Coverage: 45 - 68 sq ft/gal approximate

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 29.0 mils wet @ 50% RH:

	@ 50°F	@ 77°F	@ 100°F
To touch:	10 hours	8-10 hours	2 hours
To handle:	48 hours	48 hours	6 hours
To recoat:			
minimum:	24 hours	16 hours	8 hours
maximum:	72 hours	48 hours	16 hours
To cure:	7 days	7 days	7 days

Pot Life: 6 hours 4 hours 1 hour

Sweat-in-Time: 1 hour 30 minutes 15 minutes
 If maximum recoat time is exceeded, abrade surface before re-coating.
 Drying time is temperature, humidity, and film thickness dependent.

Application of coating above maximum or below minimum

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Do not apply the material beyond recommended pot life.

Do not mix previously catalyzed material with new.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Reducer #54, R7K54.

Coating must be fully cured before placing into immersion service.

Holiday Detection: For systems <20 mils, use a wet sponge-type detector such as KD Bird Dog or equivalent equipment per manufacturer's recommendation. For systems >20 mils, use high voltage holiday detectors. Test only cured coating, as solvent entrapment in fresh films may provide false readings.

Refer to Product Information sheet for additional performance characteristics and properties.

CLEAN UP INSTRUCTIONS

SAFETY PRECAUTIONS

Clean spills and spatters immediately with Reducer #54, R7K54. Clean tools immediately after use with Reducer #54, R7K54. Follow manufacturer's safety recommendations when using any solvent.

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

DISCLAIMER

WARRANTY

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.