Test Devices Inc.
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Engineering Specification TES-005

Engineering Specification Name: **Material Coatings**		Issued By: **Engineering**
Rev: R003	Eff. Date: **1/22/18**	

1.0 Purpose: The purpose of this engineering standard is to define the approved methods for finishing components that will ensure protection of parts.

2.0 Scope: This engineering standard outlines all approved methods for finishing components and assigns classifications to define which specific types of finishing processes can be used. Test Devices documentation, including drawings, will reference this specification and specify the class to be used.

3.0 Definitions: None required

4.0 Responsibility: It is the responsibility of Test Devices' engineering manager to ensure this standard is maintained and updated continuously.

5.0 Engineering Standard: The class below defines the acceptable protective coating methods approved by Test Devices' Engineering department. Any alternate methods must be requested and approved by Test Devices' Engineering department before the alternate coating methods are applied.

APPROVALS		
Engineering	Hiro Endo, Engineering Manager	Date
Quality	David Woodford, VP, Quality & Business Operations	Date

Revision Log				
Revision	Summary of Changes	Approved By Process Owner(s)	Approved By VP Quality / Mgt Rep	Rev. Release Date
Initial Issue		Signature on file	Signature on file	1/23/12
R001	Updated 6.1 new part numbers of primer and paint. Updated 7.1 with new specification for color. Replaced Sherwin Williams product information and application bulletin. All changes highlighted in yellow.	NK 4/915	WEH 4/10/15	9/18/14
R002	Revised Section 6.1: primer was Sherwin Willianms Kem bond HS P/N B50AZ8, paint was Sherwin Williams B73T114 Part A abd B73V100 Part B. Revised Section 7.2 & 7.3: replaced data sheets.	HE 10.18.17	WEH 10/24/17	10/18/17
R003	Revised Section 6.1: primer was Sherwin Williams PRO Industrial Pro-Cryl Primer, paint was Sherwin Williams PRO Industrial Water Based Catalyzed Epoxy – Gloss. Revised Section 7.0 with current data.	HE 2/15/18	WEH Digitally signed by WEH Date: 2018.02.15 08:51:52 -05'00'	2/14/18

6.0 Coatings:

6.1 Paint Coatings: Prime & Painting of components. Paint must be applied by spraying to properly prepared surfaces free of oil, dust, and dirt.

6.1.1 The primer to be used is Sherwin Williams Zinc Clad III HS organic zinc rich epoxy three part primer.

6.1.2 The paint to be used is Sherwin Williams Macropoxy 646 fast cure two part epoxy. Finish: semi-gloss.

6.1.3 Unless otherwise specified, the standard Test Devices color is TDI Blue. See Section 7.0 for custom color match details.

No substitutions allowed without prior written approval by Test Devices Engineering Department.

See Section 7.0 for additional information.

6.2 Electroless Nickel Plating:

6.2.1 Electroless nickel plating should be applied per ASTM-B733-04.

6.2.2 The heat treatment of the plated part is defined by one of the following classes:

Class 1 (As deposited, no heat treatment).

Class 2 (Heat treatment at 260 - 400°C to produce minimum hardness of 850 HK100).

Class 3 (Heat treatment at 180 - 200°C for 2-4 hours to improve adhesion and provide hydrogen embrittlement relief).

6.2.3 The thickness of the plating is specified by one of the following classes:

SC1 (Light Service) .0002 inches minimum
SC2 (Mild Service) .0005 inches minimum
SC3 (Moderate Service) .001 inches minimum
SC4 Severe Service) .003 inches minimum

6.2.3 In situations where electroless nickel plating is called out and no other specification is mentioned, plating should be applied per ASTM-B733-04 Class 1 SC2.

6.3 Zinc Coating

6.3.1 Zinc coating should be applied per ASTM-B633-98

6.3.2 The thickness of the coating should be specified by one of the following classes:

SC 1 (mild environmental conditions) .0002 inches thick
SC 2 (moderate environmental conditions) .0003 inches thick
SC 3 (severe environmental conditions) .0005 inches thick
SC 4 (very severe environments) .001 inches thick

6.4.3 On parts where specification and class are not specified parts are to be plated to ASTM-B633-98 Class SC2.

6.4 Black Oxide

6.4.1 Black oxide coating should be applied in accordance to MIL-DTL-13924 CLASS 1

7.0 Referenced Documents:

7.1 Custom Manual Color Match for Paint

(Information from tinted paint can label)

Int/Ext Ind Maint
Macropoxy 646 Fast Cure Epoxy
Semi-Gloss IFC 7012NP

Test Devices TDI Blue

844 Colorant	OZ	32	64	128
TW-White	2	32	-	-
PB-Phth Blue	8	32	-	-
LB-Lamp Black	-	8	-	-

One Gallon Ultradeep
B58T00604 640310298

7.2 Primer Data Sheet

Protective & Marine Coatings

ZINC CLAD® III HS
ORGANIC ZINC-RICH EPOXY PRIMER

PART A	B69A100	GRAY-GREEN, BASE
PART A	B69LW100	OAP BLUE, BASE
PART B	B69V100	HARDENER
PART F	B69D11	ZINC DUST

Revised: August 04, 2016 — **PRODUCT INFORMATION** — 6.07

PRODUCT DESCRIPTION

ZINC CLAD III HS is a three-component, polyamide epoxy, zinc-rich coating. It has a low VOC level and contains 90.5% by weight of zinc dust pigment in its dried film.

- Meets Class B requirements for Slip Coefficient and Creep Resistance
- Provides cathodic protection
- Damaged film exhibits "self-healing" properties
- Fast Recoat Time
- Outstanding application properties

PRODUCT CHARACTERISTICS

Finish:	Flat
Color:	Gray-Green, OAP Blue
Volume Solids:	70% ± 2%, ASTM D2697
Weight Solids:	90% ± 2%, mixed
VOC (EPA Method 24):	Unreduced: <340 g/L; 2.80 lb/gal mixed Reduced 5%: <380 g/L; 3.00 lb/gal
Zinc Dust Pigment Content in Dry Film:	ASTM D 521 90% Min ASTM D 6580 85% Min
Mix Ratio:	3 components, premeasured 3.25 gallons (12.3L) total

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	**4.5** (113)	**7.0** (175)
Dry mils (microns)	**3.0** (75)	**5.0** (125)
~Coverage sq ft/gal (m^2/L)	**224** (5.5)	**370** (9.1)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	**1120** (27.5)	

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

Drying Schedule @ 5.0 mils wet (125 microns):

	@ 35°F/1.7°C	@ 77°F/25°C 50% RH	@ 120°F/49°C
To touch:	45 minutes	30 minutes	10 minutes
To handle:	2 hours	1 hour	30 minutes
To recoat*:			
minimum:	4 hours	30 minutes	30 minutes
****maximum:**	none	none	none
To cure:	10 days	7 days	7 days

Drying time is temperature, humidity, and film thickness dependent.

*NOTE: Film must be free of solvent, hard and firm. When rubbed with the face of a coin or knife the film should polish but not flake or chip.

**Maximum Recoat: Unlimited. Must have a clean, dry surface for top-coating. "Loose" chalk or salts must be removed in accordance with good painting practice.

Paint temperature must be at least 40°F (4.5°C) minimum.

Pot Life:	6 hours	4 hours	2 hours
Sweat-in-Time:	1 hour	30 minutes	15 minutes

Shelf Life:	Part A*: 18 months, unopened Part B: 18 months, unopened Part F: 24 months, unopened Store indoors at 40°F (4.5°C) to 100°F (38°C)

*B69LW100 (Part A) has a 12 month shelf life

PRODUCT CHARACTERISTICS (CONT'D)

Flash Point:	67°F (19°C), Closed Cup, mixed
Reducer/Clean Up: Below 80°F (27°C):	Reducer #58 or MEK, R6K10
Above 80°F (27°C):	Reducer #58 or R7K104

RECOMMENDED USES

For use over properly prepared blasted steel.

- Fabrication Shops
- Bridge and Highway Structures
- Stadiums and Sports Complexes
- Drilling Rigs
- Piping
- Refineries
- Barges and Ships
- Wind Towers - onshore and offshore
- Shop or Field Applications
- Not recommended for immersion service
- Approved with FIRETEX hydrocarbon coatings

PERFORMANCE CHARACTERISTICS

Substrate*: Steel

Surface Preparation*: SSPC-SP10/NACE 2

System Tested*:

1 ct. Zinc Clad III HS @ 5.0 mils (125 microns) dft
1 ct. Macropoxy 646 @ 5.0-10.0 mils (125-250 microns) dft
1 ct. Acrolon 218 HS @ 5.0 mils (125 microns) dft

*unless otherwise noted below

Test Name	Test Method	Results
Adhesion	ASTM D4541	1976 psi
Corrosion Weathering	ASTM D5894, 27 cycles, 9072 hours	Rating 10 per ASTM D610 for rusting; Rating 10 per ASTM D714 for blistering
Dry Heat Resistance (zinc only)	ASTM D2485	400°F (204°C)
Moisture Condensation Resistance	ASTM D4585, 100°F (38°C), 4000 hours	Rating 10 per ASTM D610 for rusting; Rating 10 per ASTM D714 for blistering
Pencil Hardness (zinc only)	ASTM D3363	2H
Salt Fog Resistance	ASTM B117, 15,000 hours	Rating 10 per ASTM D610 for rusting; Rating 10 per ASTM D714 for blistering
Slip Coefficient* (zinc only)	AISC Specifications for Structural Joints using ASTM A325 or ASTM A490 Bolts	Class B, 0.52
Slip Coefficient*¹	AISC Specification for Structural Joints using ASTM A325 or ASTM A490 Bolts	Passes Class B, 0.58

Meets SSPC Paint Spec 20 - 1ct. Zinc @ 5 mils (125 microns) dft

Complies with ISO 12944-5 C5I and C5M requirements.

Footnotes:
¹1 ct. Zinc Clad III HS @ 3.0-5.0 mils (75-125 microns) dft
1 ct. Steel Spec Epoxy Primer @ 4.0-6.0 mils (100-150 microns) dft
*Refer to Slip Certification document

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Protective & Marine Coatings

ZINC CLAD® III HS
ORGANIC ZINC-RICH EPOXY PRIMER

PART A	B69A100	GRAY-GREEN, BASE
PART A	B69LW100	OAP BLUE, BASE
PART B	B69V100	HARDENER
PART F	B69D11	ZINC DUST

PRODUCT INFORMATION

Revised: August 04, 2016 6.07

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	(Microns)
Steel, polyurethane topcoat:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
1-2 cts.	Acrolon 218 HS	3.0-6.0	(75-150)
Steel, catalyzed epoxy topcoat:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
1-2 cts.	Macropoxy 646	5.0-10.0	(125-250)
Steel, catalyzed epoxy topcoat:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
1-2 cts.	Tile-Clad HS	2.5-4.0	(63-100)
Steel, catalyzed epoxy siloxane topcoat:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
1-2 cts.	Polysiloxane XLE-80	3.0-7.0	(75-175)
or			
1-2 cts.	Polysiloxane XLE-80 HAPS Free	3.0-7.0	(75-175)
Steel, acrylic topcoat:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
2 cts.	Pro Industrial DTM Acrylic Coating	2.5-4.0	(63-100)
or			
1 ct.	Fast Clad HB Acrylic	5.0-8.0	(125-200)
Steel, water based epoxy topcoat:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
2 cts.	Waterbased Tile-Clad Epoxy	2.0-4.0	(50-100)
Steel, water-based urethane topcoat:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
1 ct.	Waterbased Tile-Clad Epoxy	2.0-4.0	(50-100)
1-2 cts.	Hydrogloss	2.0-4.0	(50-100)
Steel, Class B Compliant System:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
1 ct.	Steel Spec Epoxy Primer (red)	4.0-6.0	(100-150)
ISO 12944 C5M System:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
1 ct.	Fast Clad Urethane	6.0-9.0	(150-225)
or			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
1 ct.	Tower Guard Epoxy	5.0-11.5	(125-287.5)
1 ct.	Acrolon 218 HS	3.0-6.0	(75-150)
FIRETEX ONLY			
Steel Substrate being primed for FIRETEX M90 and M90/2			
1 ct.	Zinc Clad III HS	3.0-6.0	(75-150)

The systems listed above are representative of the product's use, other systems may be appropriate.

DISCLAIMER

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.

SURFACE PREPARATION

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.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Iron & Steel: SSPC-SP6/NACE 3, 2 mil (50 micron) profile
Galvanizing: SSPC-SP7
Weathered Zinc Rich Primer: Clean, dry, sound

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 B87078:A1	SSPC	NACE
White Metal		Sa 3	SP 5	1
Near White Metal		Sa 2.5	SP 10	2
Commercial Blast		Sa 2	SP 6	3
Brush-Off Blast		Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	SP 2	-
	Pitted & Rusted	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	SP 3	-
	Pitted & Rusted	D St 3	SP 3	-

TINTING

Do not tint.

APPLICATION CONDITIONS

Temperature:	35°F (1.7°C) minimum, 120°F (49°C) maximum (air and surface) 40°F (4.5°C) minimum, 120°F (49°C) maximum (material) At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:

3.25 gallons (12.3L) mixed:

Part A	1 gallon (3.78L)
Part B	1 gallon (3.78L)
Part F	73 lb (33 Kg) Zinc Dust

1 gallon (3.78L) mixed:

Part A	0.30 gallon (1.14L)
Part B	0.30 gallon (1.14L)
Part F	22 lb (10 Kg) Zinc Dust

Weight: 27.63 ± 0.2 lb/gal ; 3.31 Kg/L, mixed

SAFETY PRECAUTIONS

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.

WARRANTY

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.

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Protective & Marine Coatings

ZINC CLAD® III HS

ORGANIC ZINC-RICH EPOXY PRIMER

Part A	B69A100	Gray-Green, Base
Part A	B69LW100	OAP Blue, Base
Part B	B69V100	Hardener
Part F	B69D11	Zinc Dust

Revised: August 04, 2016

Application Bulletin

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Surface Preparations

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.

Zinc rich coatings require direct contact between the zinc pigment in the coating and the metal substrate for optimum performance.

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 / 50 microns). Coat any bare steel the same day as it is cleaned or before flash rusting occurs.

When used on Ductile Iron Pipe, surface preparation shall be in accordance with NAPF 500-03-04 Abrasive Blast Cleaning of Ductile Iron Pipe with a minimum 1.0 mil surface profile.

Galvanized Steel
Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1 (recommended solvent is VM&P Naphtha). When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned or before flash rusting occurs.

Weathered Zinc-Rich Primer
Remove zinc salts by either high pressure water washing and scrubbing with stiff bristle brush or sweep blast followed by water flush. Allow to dry.

Note: If blast cleaning with steel media is used, an appropriate amount of steel grit blast media may be incorporated into the work mix to render a dense, angular 1.5-3.0 mil (38-75 micron) surface profile, per Keane-Tator Surface Profile Comparator. A profile up to 4 mils (100 microns) is acceptable, however, coating must be applied to achieve a minimum of 3 mils (75 microns) dft. This method may result in improved adhesion and performance.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

Application Conditions

Temperature:	35°F (1.7°C) minimum, 120°F (49°C) maximum (air and surface) 40°F (4.5°C) minimum, 120°F (49°C) maximum (material) At least 5°F (2.8°C) above dew point
Relative humidity:	85% maximum

Application Equipment

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.

Reducer/Clean Up
Below 80°F ....Reducer #58 or MEK, R6K10
Above 80°F ....Reducer #58 or R7K104

Airless Spray
(use Teflon packings and continuous agitation)
Pressure........................2000 - 2300 psi
Hose..............................3/8" ID
Tip ....019"
Filter ....none
Reduction.......................As needed up to 5% by volume

Conventional Spray
(continuous agitation required)
Gun ....Binks 95
Fluid Nozzle 68
Air Nozzle.......................68P
Atomization Pressure.....50 psi
Fluid Pressure................10 - 20 psi
Reduction.......................As needed up to 5% by volume

Keep pressure pot at level of applicator to avoid blocking of fluid line due to weight of material. Blow back coating in fluid line at intermittent shutdowns, but continue agitation at pressure pot.

Brush
Brush..............................Small areas only; natural bristle
Reduction.......................Not recommended

If specific application equipment is not listed above, equivalent equipment may be substituted.

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Protective & Marine Coatings

ZINC CLAD® III HS
ORGANIC ZINC-RICH EPOXY PRIMER

PART A	B69A100	GRAY-GREEN, BASE
PART A	B69LW100	OAP BLUE, BASE
PART B	B69V100	HARDENER
PART F	B69D11	ZINC DUST

Revised: August 04, 2016 — **APPLICATION BULLETIN** — 6.07

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Zinc Clad III HS comes in 3 premeasured containers which when mixed provides 3.25 gallons (12.3L) of ready-to-apply material.

Mixing Instructions:
Mix contents of component A and B thoroughly with low speed power agitator. Make certain no pigment remains on the bottom of the can. Then combine 1 part by volume of Part A with 1 part by volume of Part B, then add Part F (73 lb zinc dust). Thoroughly agitate the mixture with power agitation. After mixing, pour through a 30-60 mesh screen. Allow the material to sweat-in as indicated. Re-stir before using.
If reducer solvent is used, add only after components have been thoroughly mixed, after sweat-in.
Continuous agitation of mixture during application is required, otherwise zinc dust will quickly settle out.

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

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	4.5 (113)	7.0 (175)
Dry mils (microns)	3.0 (75)	5.0 (125)
~Coverage sq ft/gal (m^2/L)	224 (5.5)	370 (9.1)
Theoretical coverage **sq ft/gal** (m^2/L) @ 1 mil / 25 microns dft	1120 (27.5)	

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

Drying Schedule @ 5.0 mils wet (125 microns):

	@ 35°F/1.7°C	@ 77°F/25°C 50% RH	@ 120°F/49°C
To touch:	45 minutes	30 minutes	10 minutes
To handle:	2 hours	1 hour	30 minutes
To recoat*:			
minimum:	4 hours	30 minutes	30 minutes
****maximum:**	none	none	none
To cure:	10 days	7 days	7 days

Drying time is temperature, humidity, and film thickness dependent.

*NOTE: Film must be free of solvent, hard and firm. When rubbed with the face of a coin or knife the film should polish but not flake or chip.

**Maximum Recoat: Unlimited. Must have a clean, dry surface for top-coating. "Loose" chalk or salts must be removed in accordance with good painting practice.

Paint temperature must be at least 40°F (4.5°C) minimum.

Pot Life:	6 hours	4 hours	2 hours
Sweat-in-Time:	1 hour	30 minutes	15 minutes

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with MEK, R6K10. Clean tools immediately after use with MEK, R6K10. Follow manufacturer's safety recommendations when using any solvent.

DISCLAIMER

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PERFORMANCE TIPS

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 performance.

Do not mix previously catalyzed material with new.

Do not apply the material beyond recommended pot life.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with MEK, R6K10.

Keep pressure pot at level of applicator to avoid blocking of fluid line due to weight of material. Blow back coating in fluid line at intermittent shutdowns, but continue agitation at pressure pot.

SSPC-SP11 surface preparation is acceptable for small areas.

Higher dry film thickness may be acceptable under certain conditions. Contact your Sherwin-Williams representative.

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

SAFETY PRECAUTIONS

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.

WARRANTY

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7.3 Paint Data Sheet

Protective & Marine Coatings
PRODUCT DATA SHEET

MACROPOXY® 646
FAST CURE EPOXY

Revised: January, 2018

PRODUCT DESCRIPTION

MACROPOXY 646 FAST CURE EPOXY a high solids, high build, fast drying, polyamide epoxy designed to protect steel and concrete in industrial exposures. Ideal for maintenance painting and fabrication shop applications. The high solids content ensures adequate protection of sharp edges, corners, and welds. This product can be applied directly to marginally prepared steel surfaces.

INTENDED USES

- Recommended for marine applications, refineries, offshore platforms, fabrication shops, chemical plants, tank exteriors, power plants, water treatment plants, and mining and minerals industry
- Mill White and Black are acceptable for immersion use for salt water and fresh water, not acceptable for potable water

PRODUCT DATA

Volume Solids: 72% ± 2%, mixed, Mill White

VOC (mixed): Unreduced: <250 g/L; 2.08 lb/gal
Reduced 10%: <300 g/L; 2.50 lb/gal

Finish: Semi-Gloss

Colors: Mill White, Black and a wide range of colors available through tinting

Typical Thickness:

Recommended Spreading Rate Per Coat

	Minimum	Maximum
Wet mils (microns)	7.0 (175)	13.5 (338)
Dry mils (microns)	5.0* (125)	10.0 (250)
~Coverage sq ft/gal (m2/L)	115 (2.9)	230 (5.8)
Theoretical coverage sq ft/gal (m2/L) @ 1 mil (25 microns) dft	1152 (28.2)	

*May be applied at 3.0-10.0 mils (75-250 microns) dft in a multicoat system.
NOTE: *Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.*

Mix Ratio: 1:1 by volume

Reducer/Clean Up: Reducer R7K15 or R7K58
(California) Reducer R7K111 or Oxsol 100

Flash Point: 91°F (33°C), TCC, mixed

Packaging:
Part A: 1 gallon (3.78L) and 5 gallon (18.9L) containers
Part B: 1 gallon (3.78L) and 5 gallon (18.9L) containers

Average Drying Times @ 7.0 mils wet (175 microns):

	35°F (1.7°C)	77°F (25°C) 50% RH	100°F (38°C)
Touch	4-5 hours	2 hours	1.5 hours
Handle	48 hours	8 hours	4.5 hours
Recoat			
- Minimum	48 hours	8 hours	4.5 hours
- Maximum	1 year	1 year	1 year
Cure to Service			
- Atmospheric	10 days	7 days	4.5 hours
- Immersion	14 days	7 days	4 days
Pot Life	10 hours	4 hours	2 hours
Sweat-in-time	30 minutes	30 minutes	15 minutes

If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature humidity, and film thickness dependent. Paint temperature must be at least 40°F (4.5°C) minimum.

Weight: 12.9 ± 0.2 lb/gal ; 1.55 Kg/L mixed, may vary by color

Shelf Life: 36 months, unopened Store indoors at 40°F 4.5°C) to 110°F (43°C)

SURFACE PREPARATION

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.

Minimum recommended surface preparation:

Iron & Steel: Atmospheric: SSPC-SP2/3/ ISO8501-1:2007 St 2 or SSPC-SP WJ-3 / NACE WJ-3L
Immersion: SSPC-SP10 / NACE 2/ ISO8501-1:2007 Sa 2.5, 2-3 mil (50-75 micron) profile or SSPC-SP WJ-2/NACE WJ-2L

Aluminum & Galvanizing: SSPC-SP1

Concrete & Masonry: Atmospheric: SSPC-SP13 / NACE 6, or ICRI No. 310.2R, CSP 1-3
Immersion: SSPC-SP13 / NACE 6-4.3.1

Protective & Marine Coatings
PRODUCT DATA SHEET

MACROPOXY® 646
FAST CURE EPOXY

APPLICATION

Airless Spray*
- Pump: 30:1
- Pressure: 2800 - 3000 psi (193 – 206 bar)
- Hose: 1/4" ID (6.3 mm)
- Tip: .017" - .023" (0.43 – 0.58 mm)
- Filter: 60 mesh
- Reduction: As needed up to 10% by volume

Conventional Spray*
- Gun: DeVilbiss MBC-510
- Fluid Tip: E
- Air Nozzle: 704
- Atomization Pressure: 60 - 65 psi (4.1 – 4.5 bar)
- Fluid Pressure: 10 - 20 psi (0.7 – 1.4 bar)

Brush*
- Brush: Nylon/Polyester or Natural Bristle

Roller*
- Cover: 3/8" woven with solvent resistant core

Plural Component Spray: Acceptable

**Reduction:* *As needed up to 10% by volume*

RECOMMENDED SYSTEMS

Dry Film Thickness / ct.		Mils	(Microns)
Steel, Immersion & Atmospheric			
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)
Steel, Organic Zinc Primer, Atmospheric			
1 Ct.	Zinc Clad IV (85)	3.0-5.0	(75-125)
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)
Steel, Inorganic Zinc Primer, Atmospheric:			
1 Ct.	Zinc Clad II (85)	2.0-4.0	(50-100)
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)
Steel, Organic Zinc/Epoxy/Urethane Topcoat			
1 Ct.	Zinc Clad IV (85)	3.0-5.0	(75-125)
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)
1 Ct.	Acrolon 7300	2.0-4.0	(50-100)
Steel, Inorganic Zinc/Epoxy/Urethane Topcoat			
1 Ct.	Zinc Clad II (85)	2.0-4.0	(50-100)
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)
1 Ct.	Acrolon 7300	2.0-4.0	(50-100)
Steel, Organic Zinc/Epoxy/Polysiloxane Topcoat, Atmospheric			
1 Ct.	Zinc Clad IV (85)	3.0-5.0	(75-125)
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)
1-2 Cts.	Sher-Loxane 800	2.0-4.0	(50-100)
Concrete/Masonry, Smooth, Immersion & Atmospheric			
1 Ct.	Macropoxy 646	5.0-10.0	(125-250)

WARRANTY

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.

APPLICATION CONDITIONS

Temperature:
- Air: 35°F (1.7°C) minimum, 120°F (49°C) maximum
- Surface: 35°F (1.7°C) minimum, 250°F (120°C) maximum
- Material: 40°F (4.5°C) minimum

At least 5°F (2.8°C) above dew point
Relative humidity: 85% maximum

APPROVALS

- Suitable for use in USDA inspected facilities
- Acceptable for use in Canadian Food Processing facilities, categories: D1, D2, D3 (Confirm acceptance of specific part numbers/rexes with your SW Sales Representative)
- Conforms to AWWA D102 OCS #5
- Conforms to MPI # 108
- This product meets specific design requirements for non-safety related nuclear plant applications in Level II, III and Balance of Plant, and DOE nuclear facilities*

* Nuclear qualifications are NRC license specific to the facility

ADDITIONAL NOTES

Tint Part A with Maxitoners at 150% strength. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

Tinting is not recommended for immersion service.

Quik-Kick Epoxy Accelerator is acceptable for use. See data page 4.99 for details.

Acceptable for Concrete Floors.

When spraying above 120°F, reduce material 10% with R7K100. Spray apply only. Product will produce an orange peel appearance when applied at elevated temperatures.

HEALTH AND SAFETY

Refer to the SDS 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

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 Sheet.