Base Load Power Hub (BLPH)

SURFACE PREPARATION AND PAINTING PROCEDURES - CONTROL VALVES (AST)

25-FV-031, 25-FV-032, 25-FV-033, 25-FV-034, 25-FV-036, 25-FV-038
25-PV-035, 25-PV-037, 25-PV-040, 25-PV-043, 25-PV-046, 25-PV-049
25-PV-055A, 25-PV-055B, 64-PV-031A, 64-PV-031B

Document Number: 1724000740-MAT-PRO-00008

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		00	01	02	03	04	05		
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3	Revision / Change Log	X	X	X	X	X	X		
4	References	X	X	X	X	X	X		
5	Surface Preparation and Painting Procedures	X	X	X	X	X	X		

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Revision / Change Log

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Rev	Date	Description	Issued	Checked	Approved
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1. PURPOSE

This document details AST Standard Specification for surfaces' treatment by painting of: Carbon Steel, Stainless Steel and HDG Valves.

The painting systems selected for Carbon steel and HDG, shall be in accordance with ISO 12944-2 and ISO 12944-5, for service temperature up to 120°C.

For operative temperature between 120°- 200°C epoxy phenolic system and for HT Inorganic zinc and Acryl Silicone or Silicone and Silicate resin shall be used.

For HT service, un-insulated or insulated surfaces, ISO 12944 standard does not provide guidelines for coating systems with operative temperatures over 120°C.

This documents also refers to intermediate requirements needed for each single working step such as preparation, paint application, procedures and inspections.

The indications and instructions written by the manufacturer on the product technical data sheets have to be followed.
Any discrepancies and/or disagreements between the data sheets and this specification will be submitted to the Company for approval.

2. REFERENCE DOCUMENTS

Company documents:

- Customer's Purchase Order 1724000740 123A90A
- Customer's Painting Specification 123A90-DDL-MAT-SP-60006
- Norsok M501 for controlling surface preparation and coating standard.
- AST Painting system:
    - TEC015_L1 (Valves in CS material &Actuators) Final color : RAL 9002
    - TEC015_6C (Valves in SS material) Final color : RAL 9002

3. STANDARDS

ASTM D 4285 ED. 2018 Standards Test Method for indicating Oil or Water in compressed Air
ASTM D 4228 ED.2023 Standard practice for Qualification of Coating Applicators for Application of Coating to steel surface
ASTM D 3359 ED.2023 Standard Test Method for measuring adhesion by tape test
ASTM D 4752 ED.2020 Standard Test Method for measuring MEK resistance of inorganic zinc rich primer by solvent rub
ASTM D 4414 ED.2020 Standard practice for measurement of WFT by WF gauge
ASTM D 4417 ED.2021 Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel Method CD
ASTM D 4541 ED.2022 Standard Test Method for measuring adhesion by pull off test
ISO 8501-1 ED.2007 Preparation of steel substrates before application of paint and related products- Visual assessment of surface cleanliness- Part 1: Rust grades and preparation grades of uncoated steel substrates after overall removal of previous coatings
ISO 8501-3 ED.2006 Preparation of steel substrates before application of paint and related products- Visual assessment of surface cleanliness- Part 3: Preparation grades of welds, edges and other areas with surface imperfections
ISO 8502-3 ED.2017 Preparation of steel substrates before application of paint and related products- Test for the assessment of surface cleanliness- Part 3: Assessment of dust on steel surfaces prepared for painting (pressure sensitive

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tape method)

ISO 8502-4 ED.2017 Preparation of steel substrates before application of paint and related products- Test for the assessment of surface cleanliness- Part 4: Guidance on the estimation of the probability of condensation prior to paint application
ISO 8502-6 ED.2017 Preparation of steel substrates before application of paint and related products- Test for the assessment of surface cleanliness- Part 6: Extraction of soluble contaminants for analysis- Test Bresle Method
ISO 8502-9 ED.2017 Preparation of steel substrates before application of paint and related products- Test for the assessment of surface cleanliness- Part 9: Field method for the conductometric determination of water-soluble salts

ISO 8503-5 ED.2017 Preparation of steel substrates before application of paints and related products-Surface roughness characteristics of blast cleaned steel substrates- Part 5: Replica tape method for the determination of the surface profile (as ASTM D 4417)
ISO 8504-2 ED.2020 Preparation of steel substrates before application of paint and related products- Surface preparation method- Part 2: Abrasive blast-cleaning
ISO 8502-3 ED.2017 Preparation of steel substrates before application of paints and related products- Surface preparation method- Part 3: Hand-and power-tool cleaning
ISO 11126-7 ED.2018 Preparation of steel substrates before application of paints and related products- Specifications for non-metallic blast-cleaning abrasives- Part 7: Fused Aluminum Oxide
ISO 12944-5 ED.2019 Paints and varnishes- Corrosion protection of steel structures by protective paint system- Part 4: Types of surface and surface preparation
ISO 12944-5 ED.2019 Paints and Varnishes-Corrosion protection of steel structures by protective paint system- Part 5: protective paint system
ISO 17024 ED.2012 Conformity assessment- General requirements for bodies operating certification of persons
ISO 19840 ED.2012 Measurement of and acceptance criteria for, the thickness of dry films on rough surface
SSPC-SP 1 ED.2016 Solvent cleaning
SSPC-PA2 ED.2022 Procedure for determining conformance to dry coating thickness requirements
SSPC-SP 16 ED.2020 Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steel, and Non-ferrous Metals

4. ABBREVIATIONS

PDS: Product data sheet

HDG: Hot dip galvanized

HT: High temperature

5. SAFETY

Any blast-cleaning or coating phase shall be carried out in accordance with all applicable local, national and international safety regulations.

Moreover, any paint, thinner, abrasive, material or equipment shall be used according to all applicable local, national and international safety regulations.

Product Data Sheets (PDS) shall be available in the facility where coating is applied for review.

All operators shall be provided with suitable safety personal equipment.

The use of solvents, paint, waste materials and cleaning materials shall be handled in strict accordance with PDS requirements and applicable local and national disposal procedures.

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6. AMBIENT CONDITIONS

Blast cleaning, coating application and paint curing shall not be performed in the following cases:

- When air temperature is <10°C (except for products suitable for low temperature applications);
- When air humidity is greater than 85%;
- When steel temperature is < 3°C above dew-point temperature.

Paint supplier shall specify the maximum and minimum application and curing temperature, and other relevant limitations regarding application and curing condition for each product.

7. UNPAINTED SURFACES

The following surfaces (if any) shall not be blast-cleaned and painted:

- RF Flanges;
- Machined surfaces.

All these surfaces shall be properly protected with tape rubber, plastic caps, etc. before proceeding with blast-cleaning and painting.

8. PRE-BLASTING PREPARATION

All items / components shall be thoroughly inspected to ensure that sharps, edges, fillets, corners and welds have been smoothened to achieve a minimum preparation grade P2 of ISO 8501-3.

All flame and plasma cut surfaces shall be ground smooth before blasting. Special attention shall be given to all welded areas for removal of weld flux, fumes, silvers, welding spatter and other foreign objects.

Any surfaces defects, particularly surface laminations or scrubs, which can likely cause a detrimental effect to protective coating system, shall be smoothened. Spot and discontinue welds shall not be allowed for ambient with Corrosivity C5 I\M as per ISO 12944-2.

Surface contaminants such as oil and grease shall be solvent cleaned as per SSPC-SP1. Soluble salt deposit, oil and any exogenous compounds shall be removed by steam or water pressure cleaning and brushing if necessary, in combination with detergent. The degreaser shall be further washed with fresh water to remove all traces of the degreaser chemicals.

9. SURFACE PREPARATION

The abrasive material for all surface shall be Corundum. It shall be dry, clean and free from oil, grease and other contaminants that could lead to detrimental effects to long term coating performance.

The compressed air used for blast-cleaning shall be free from water and oil. Adequate separators and traps shall be provided and these shall be kept emptied of water and oil.

Periodical check of the compressed air cleanliness shall be done according to Standard ASTM D 4285. Carbon Steel blasted surfaces, cleaned to SA 2.5-ISO 8501-1, shall have a roughness Medium G as per ISO 8503-2.

Stainless and HDG surfaces shall be blasted according to SSPC-SP 16, with minimum blast profile of 25µ.

Blast profile measurement shall be carried out in accordance with ISO 8503-5 Replica tape method. Welding spatter, silvers, laminations underlying mill scale removed during fabrication but still visible after blast cleaning operations shall be dressed and the edges smoothed or made flush. After surface preparation any grit, dust, etc, shall be removed. The residual particle quality and particle size shall not exceed dust size class 2 rating 2 of ISO 8502-3.

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Salt concentration (chloride) detected on the cleaned surface shall not exceed 30 mg\m² NaCl for all surface, when checked per ISO 8502\6 and 8502\9 (Bresle Method).

Test panels used to carry out the adhesion test (for each paint system), shall receive the same surface preparation of the components.

Final blast-cleaning shall not be done on any moist surface, or on surfaces that may become moist, before the application of primer.

10. PAINT APPLICATION

All paints provided shall be in closed, clearly identified containers.

No expired paint shall be used.

Containers shall remain un-opened before being used. Coating application shall be carried out within 4 hours after blast cleaning phase and before any rusting occurs. The blast-cleaned surface shall be vacuum cleaned or blown free of dust and other loose contaminants.

All application data shall be in accordance with the PDS of the paint Manufacturer.

The interval time between each coat of the paint system is indicated in the PDS of the paint Manufacturer.The type of thinner used shall comply with the Manufacturer's recommendation. Airless or conventional spray pumps shall be used. Stripe-coating with brush of edges, went corners and all irregular surfaces shall be performed to obtain the specified film thickness and to avoid paint holiday / jeep.

The blast-cleaned test panels shall be painted with the same paint, same method and at the same time of the component. During the drying and curing time, the freshly applied coating shall not come in contact with high RH%, water, handling equipment or any other that may impact the quality of coating, and shall be stored in a covered place protected from dust, wind and rain.

Over-coating time shall be recommended by the Paint Manufacturer in the PDS.

11. INSPECTION AND TESTING

TEST TYPE	METHOD	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION IN CASE OF N.C.
Blotter Test	White adsorbent paper ASTM D 4285	Once per day	A piece of clean white absorbent paper shall be positioned at the air outlet. After about 1 min. of air discharge there shall be no trace of water / oil on the paper.	Any accumulated moisture and oil in the traps, separators and filters shall be emptied. The air supply shall then be checked once again until conformity is achieved.
Temperature Relative Humidity Dew point	Thermo hygrometer ISO 8502-4	Before and during blasting / painting operations	Air Temperature min. 10°C, excluding those products which are suitable for at low temperature application. See manufacturer PDS. 85% max. Steel Temperature 3°C or more above DEW POINT TEMPERATURE.	Work can proceed only if these parameters are met.

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Visual Examination	Visual ISO 8501-3	All surfaces	Sharp edges, fillets, corners, welds are dressed to achieve preparation grade P2 of ISO 8501-3. Flame and plasma cut surfaces are ground smooth. Welding is continuous. Raised slivers, burrs, scabs, weld spatter, laminations or hackles of steel are removed.	Non-Conformance items shall be kept aside. Vendor shall be notified.
Pre-cleaning of surfaces	Steam jet cleaner SSPC-SP 1	All surfaces	Surface contaminants such as oil and grease shall be cleaned with solvent as per SSPC-SP 1. Soluble salt deposits, soil and any exogenous compounds shall be removed by steam cleaning and brushing in combination with detergent. The degreased surfaces shall be further washed with fresh water to remove all traces of the degreaser chemicals.	If oil, grease and any exogenous compound is still visible on the surface the operations shall be repeated until accepted.
Surface Preparation Cleanliness	Blasting booth SSPC-SP 16 ISO 8501-1	All surfaces	For Carbon Steel the required visual standard of blast cleaning shall correspond to SA 2.5 Blast cleaning to visually clean steel as per SSPC-SP16.	Re-blasting and retesting until accepted.
Water Soluble Salts	Bresle-kit ISO 8502-6 ISO 8502-9	Spot checks	The salt concentration (chlorides) tested on the blast-cleaned surfaces shall not exceed 30 mg/m2 for all surfaces' types.	Washing with potable water and retesting until accepted.
Blasted Surface Roughness	Replica tape NACE RP0287 ISO 8503-5	Spot checks	For Carbon Steel the surface profile shall be 50 to 75 µm. For Stainless Steel the surface profile shall be 35 to 50 µm.	Re-blasting.
Surface Dust Cleanliness	Transparent adhesive tape ISO 8502-3	Spot checks	After surface preparation any grit, dust, etc. shall be removed. The residual particle quantity and particle size shall be class 2, rating 2.	Reclining and retesting until accepted.
Wet Film Thickness	Comb type ISO 2808 Method 1°	Spot checks	As indicated in PDS.	Additional coating to be applied.
Visual Inspection	Visual	During all phases of coating application	The coating shall be Smooth, uniform in colour, free of runs, sags, visible paint holiday, blisters, orange peel, scratches, dust inclusions, solvent retention or any other irregularities.	Repair and repeat test.

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Dry Film Thickness	Electromagnetic and eddy-current thickness gauge ISO 2808 & ISO 19840	See table 1 ISO 19840.	Gauge shall be calibrated at least once per shift on a smooth surface. Single measurement shall have min. value of 0,8 x NDFT (Nominal DryFilm Thickness) and max value as indicated in the Paint Manufacturer's PDS. DFT values higher than those areas subjected to stripe-coating.	Repair, additional coats or recoating as appropriate.
Adhesion Test	PAT adhesion tester ASTM D 4541 X-Cut or Cross –Cut ASTM D 3359	One test panel for each paint system.	Performed on the coated test panels when the coating system is fully cured. Minimum acceptable adhesion value: Pull Off: 5 MPa. X-Cut: 4A Cross-Cut: 4B	In case of poor Adhesion, test is repeated on the coated surfaces of the items. If test fails again, the items shall be blast-cleaned and coated again.

Every working day the painting operator fills a daily log where it is reported:

- **the environmental conditions (temperature, humidity, dew point)**
- **the valves painted with reference to AST job**
- **painting systems applied**
- **products batches**
- **DFT measured**

12. COATING TOUCH-UP

- For standard AST systems, use the following touch-up instructions:

TOTAL DAMAGED COATING TO BARE METAL	DAMAGED COATING NO BARE METAL
SURFACE PREPARATION SSPC-SP 1 and SA 2 ½ of the damaged area and adjacent areas (for a min distance of 50 mm into the adjacent undamaged coating). If blasting is not possible, strong sand-papering of the damaged area and adjacent areas to ST 3 shall be performed. The non-damaged painted surfaced shall be properly protected with shields or screens to prevent it from possible damage.	**SURFACE PREPARATION** SSPC-SP 1 and sand-papering of the damaged area and its surrounding (for a min distance of 50 mm into the adjacent undamaged coating). The non-damaged coated surface shall be properly protected with shields or screens in order to prevent it from any possible damage.
Apply the complete coating system	**Apply Top-Coat only**
DFT of each single layer and the final DFT shall be as per original application.	

OVER-THICK COATING THICKNESS
Where over-thickness cannot be accepted (as per PDS), for example if it shows mud cracking, wrinkling, sags, etc., coating shall be removed by blast cleaning or scraping. It is necessary to grind until bare metal until a proper visual appearance and DFT is achieved. Proceed then with operations as indicated in the relevant system.
THIN DRY FILM THICKNESS
An additional layer of Primer, Intermediate or Top-coat shall be applied whenever their DFT is too thin.

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Final DFT shall be as per original application.

- For HT systems, when Inorganic zinc presents small damages, apply one coat of acryl silicone, silicone or silicate.

Do not apply inorganic zinc for touch up.
In case of touch-up on HT systems, only apply acryl silicone, silicone or silicate.

- For customized systems refer to related system data sheet.

13. HANDLING AND STORAGE

Finished painted items shall be handled and/or stored with extreme care, in order to protect coating from damages.
Painted items shall not be dropped or thrown against other objects. The use of ropes, hooks, chains or cables is not allowed.
Only rubber or nylon belts shall be used for lifting, lowering or hanging the items.
Coated items shall be stored off the ground on sufficiently padded skids, properly levelled and spaced.
Once loaded for transportation, they are packed in order to avoid scratches and to prevent hitting.
Nonabrasive and non-metallic supports, wooden board, pallets, mats or rubber strips shall be used.

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	SPECIFICA TECNICA DI VERNICIATURA **Painting Specification**	**TEC015-L1** **REV 3** SHEET 1 OF 1

This paint procedure is in accordance to SYSTEM 1 of Spec. 123A90-DDL-MAT-SP-60006

PAINTING SYSTEM L1

COAT	TYPE	N.D.F.T.
FIRST COAT	ORGANIC ZINC RICH EPOXY PRIMER CARBOZINC 858	60 µm
SECOND COAT	MODIFIED EPOXY MASTIC CARBOMASTIC 15 LT ATEX	190 µm
THIRD COAT	ALIPHATIC POLYURETHANE CARBOTHANE 134 HP	50 µm
FOURTH COAT	N/A N/A	N/A µm

N.D.F.T.= NOMINAL DRY FILM THICKNESS:	300 µm
TEMPERATURE RANGE:	UP TO 120 °C

SURFACE PREPARATION & CHECKS	ENVIRONMENTAL CONDITIONS ACCORDING TO:	ISO 8502-4
	SURFACE CLEANING ACCORDING TO:	SSPC-SP1
	VISUAL EXAMINATION ACCORDING TO:	ISO 8501-3
	SURFACE PREPARATION ACCORDING TO:	ISO 8501-1 / Sa 2½
	WET FILM THICKNESS ACC. TO:	ISO 2808
	BLASTER SURFACE ROUGHNESS REPLICA TAPE:	ISO 8503-2
	DRY FILM THICKNESS ACCORDING TO:	ISO 19840
	VISUAL INSPECTION DURING ALL PHASES OF COATING APPLICATION	
	BATCH NUMBER	
ADDITIONAL FEATURES	PAINT MANUFACTURER QUALIFIED AS SUPPLIER BY AST:	CARBOLINE
	PAINTING SUITABLE FOR:	CARBON STEEL
	FINAL COLOR AS STD AST:	RAL 9002
	CORROSION CLASS ACC. TO ISO 12944:	ISO 12944 CX
	ATEX COMPLIANCE:	YES
NOTE		

LAST REV.	DESCRIPTION	DATE	ISSUED	CHECKED	RELEASED
3	GENERAL REVISION	25/06/2021	AI	FC	EM

	SPECIFICA TECNICA DI VERNICIATURA **Painting Specification**	**TEC015-6C** **REV 0** SHEET 1 OF 1

This paint procedure is in accordance to SYSTEM 6C of Spec. 123A90-DDL-MAT-SP-60006

PAINTING SYSTEM 6C

COAT	TYPE	N.D.F.T.
FIRST COAT	EPOXY PHENOLIC THERMALINE 440	125 µm
SECOND COAT	EPOXY PHENOLIC THERMALINE 440	125 µm
THIRD COAT	N/A N/A	N/A µm
FOURTH COAT	N/A N/A	N/A µm

N.D.F.T.= NOMINAL DRY FILM THICKNESS:	250 µm
TEMPERATURE RANGE:	UP TO 205 °C

SURFACE PREPARATION & CHECKS	ENVIRONMENTAL CONDITIONS ACCORDING TO:	ISO 8502-4
	SURFACE CLEANING ACCORDING TO:	SSPC-SP1
	VISUAL EXAMINATION ACCORDING TO:	ISO 8501-3
	SURFACE PREPARATION ACCORDING TO:	ISO 8501-1 / Sa 2½
	WET FILM THICKNESS ACC. TO:	ISO 2808
	BLASTER SURFACE ROUGHNESS REPLICA TAPE:	ISO 8503-2
	DRY FILM THICKNESS ACCORDING TO:	ISO 19840
	VISUAL INSPECTION DURING ALL PHASES OF COATING APPLICATION	
	BATCH NUMBER	
ADDITIONAL FEATURES	PAINT MANUFACTURER QUALIFIED AS SUPPLIER BY AST:	CARBOLINE
	PAINTING SUITABLE FOR:	STAINLESS STEEL
	FINAL COLOR AS STD AST:	RAL 9002
	CORROSION CLASS ACC. TO ISO 12944:	ISO 12944 CX
	ATEX COMPLIANCE:	NO
NOTE		

LAST REV.	DESCRIPTION	DATE	ISSUED	CHECKED	RELEASED
0	EMISSION	25/06/2021	AI	FC	EM

Product Data

Carbozinc®858

formerly Carbozinc 858 (P)

Selection & Specification Data

Generic Type
Two component zinc filled, cross linked epoxy primer.

General Properties
Carbozinc 858 is high solids, organic zinc epoxy primer, for protection of structural steel in salt or weathering environments

Features
- Easily applicable
- Cures at low temperatures, 2°C (35°F)
- Hard tough film
- Pre-Thinned product, may be applied without thinner addition
- Good flexibility
- Excellent abrasion resistance
- Meets the requirements of SSPC-Paint N° 20 (rev. 11/2004) Type II Level 1.

Recommended Uses
Excellent as a maintenance or general use zinc epoxy primer over blasted steel. Used within industry, petrochemical process, off-shore or other heavy industries in severe environments with appropriate topcoats.
Recommended for shop application where fast handling and re-coating are requested.

Not Recommended
Direct exposure to strong acids and alkalies

Chemical Resistance
(with proper topcoat)

	Splash & Spillage	Fumes
Acids	Very Good	Excellent
Alkalies	Very Good	Excellent
Solvents	Very Good	Excellent
Salt Water	Excellent	Excellent
Fresh Water	Excellent	Excellent

Color
Gray / Green

Finish Gloss
Matte

Dry Temp. Resistance
Continuous: 150°C (300°F)
Non-Continuous: 200°C (400°F)

Substrates
Blasted steel or other as recommended

Compatible Coatings
May be top-coated with epoxy, polyurethane, or other as recommended

Solids Content
By Volume: 64 ± 2 %

Zinc Content
By Weight: 85 ± 2 % in dry film

Dry Film Thickness
50-150 microns (2-6 mils)

Theoretical Coverage Rate
25.2 m^2/l at 25 microns (1mil)
8.4 m^2/l at 75 microns (3mils)
Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

VOC Values
VOC+ (Volatile Organic Content) are coating with high solids, in other words, coating that are less hazardous, more environmentally safe, and more economical for the users.

Substrates & Surface Preparation

General
Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants in accordance with Standard SSPC-SP1.

Steel
Blasted to minimum SA2 ½ (ISO 8501-1), SSPC-SP10, and obtain 25-50 microns (1-2 mils) blast profile. Alternative blast cleaning with Ultra high pressure water jetting to the standard of min CHB2 M.

Application Equipment

Spray Application (General)
This is a high solids coating and may require adjustments in spray techniques. Wet film thickness is easily and quickly achieved. The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional Spray
Agitated pressure pot equipped with dual regulators, 3/8" I.D. minimum material hose, .070" I.D. fluid tip and appropriate air cap.

Airless Spray

Pump Ratio:	30:1
GPM Output:	3.0 (min.) 11.5 liters/min.
Material Hose:	3/8" I.D. (min.)
Tip Size:	.017-.021"
Output PSI:	2000-2200
Filter Size:	60 mesh

Teflon packings are recommended and available from the pump manufacturer.

Brush & Roller (General)
Recommended for touch up, striping of weld seams and hard-to-coat areas only. Avoid excessive re-brushing or re-rolling.

Brush
Use a medium bristle brush.

Roller
Not Recommended.

Mixing & Thinning

Mixing
Power mix separately, then combine and power mix for a minimum of two minutes.
DO NOT MIX PARTIAL KITS.

Ratio
3:1 Ratio by volume (A to B)

Thinning
Normally not required but may be thinned up to 6% by volume, with Thinner N°2. Use of thinners than those supplied by Carboline, may adversely effect product warranty, whether expressed or implied.

Pot Life
24°C (75°F) 4 Hours lower at more elevated temperature
Pot life ends when coating loses body and begins to sag.

Cleanup & Safety

Cleanup Use #2 Thinner or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

Safety Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Caution This product contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Normal	15-30°C	15-30°C	15-30°C	0-90%
Minimum	4°C	2°C	2°C	0%
Maximum	32°C	50°C	43°C	95%

Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel and interfere with proper adhesion to the substrate. Special application techniques may be required above or below normal application conditions. Do not apply when the surface temperature is less than 3°C above the DEW- POINT

Curing Schedule

Surface Temp. & 50% R. H.	Minimum Recoat Time	Final Cure
2°C (35°F)	8 Hours	10 Hours
10°C (50°F)	5 Hours	6 Hours
24°C (75°F)	2 Hours	3 Hours
32°C (90°F)	1 Hour	1 Hour

These times are based on a 75 microns (3 mils) dry film thickness. Higher film thickness, insufficient ventilation, high humidity or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure.

Packaging, Handling & Storage

Package Part A: 7.5 litres Part B: 2.5 liters
Thinner N°2: 20 liters

Flash Point (PMCC)
Part A: 9°C
Part B: 3°C
Thinner N°2 -5°C

Storage (General) Store Indoors.

Storage Temperature & Humidity 5°-30°C
0-90% Relative Humidity

Shelf Life 12 months at 24°C (75°F)

Storage at temperatures higher than 30°C reduces the shelf life of Part A considerably

11/08 – BM mod. 08/07 Norge

Carboline Italia SpA
Part of the StonCor Group

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Product Data

carboline®

Carbomastic®15 LT ATEX

Selection & Specification Data

Generic Type	Two component, high build, modified epoxy mastic with antistatic agents according to CEI EN 60079 (electric construction for explosive gas atmospheres)
General Properties	Carbomastic® 15 LT Atex is a high build coating with excellent and low temperature curing.
Features	▪ Carbomastic 15 LT Atex has fast curing at Low Temperature ▪ High solid give good coverage and reduce solvent emissions
Color	Black
Finish	Semi gloss
Primers	It has to be applied over organic or inorganic zinc primers. A mist coat may be required to minimize bubbling over inorganic zinc primers.
Topcoats	Can be top coated with CC 1290 Atex recommended within 7days.
Dry Film Thickness	100-300 microns (4.0-12.0 mils) per coat, , normally 150µ
Solids Content	By Volume: 79 ± 2%
Theoretical Coverage Rate	5.3 m^2 / l at 150µ Allow for loss in mixing and application.
Dry Temp. Resistance	Continuous: 70°C Non-Continuous: 120°C
Limitations	Epoxies lose gloss, discolor and eventually chalk in sunlight exposure. Not recommended for immersion service in acids, alkalies or solvents.

Substrates & Surface Preparation

General	Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants.
Stainless Steel	SSPC SP 7 with non metallic abrasive and surface profile roughness of 35-45 µ

Application Equipment

Spray Application (General)	The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.
Conventional Spray	Pressure pot equipped with dual regulators, 3/8" I.D. minimum material hose, .070" I.D. fluid tip and appropriate air cap.
Airless Spray	Pump Ratio: 30:1 GPM Output: 3.0 (min.). (12 liters) Material Hose: 3/8" I.D. (min.) Tip Size: .023-.027" Output PSI: 2000-2400 Filter Size: 60 mesh Teflon packings are recommended and available from the pump manufacturer.
Brush & Roller	For touch up, small areas and strip coat only. Use a medium bristle brush and medium nap synthetic roller cover with phenolic core

Mixing & Thinning

Mixing	Power mix separately, then combine and power mix.
Ratio	1:1 Ratio by volume (A to B)
Thinning	May be thinned up to 15% with Thinner#2 Use of thinners other than those supplied or recommended by Carboline, may adversely effect product performance and void product warranty, whether expressed or implied.
Pot Life	1 ½ Hours at 20°C and less at higher temperatures.

Cleanup & Safety

Cleanup Use Thinner#2 or 25..

Safety Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Ventilation When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used.

Caution This product contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking shoes.

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Normal	15-30°C	15-30°C	15-30°C	35-80%
Minimum	5°C	2°C	2°C	0%
Maximum	35°C	75°C	40°C	90%

Do not apply when the surface temperature is less than 3°C above the dew point. Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel. Special application techniques may be required above or below normal application condition. Note: this product contains conductive pigments and cannot be holiday

Curing Schedule

Surface Temp. & 50% R. H.	Dry to Recoat/Topcoat	Final Cure
5°C	18 Hours	7 Days
10°C	10 Hours	5 Days
20°C	6 Hours	3 Days
30°C	4 Hours	2 Days

These times are based on recommended DFT. Higher film thickness, insufficient ventilation or cooler temperatures will require longer cure times and could result in solvent entrapment and premature failure.

Note 1: Carbomastic® 15 LT ATEX contains conductive pigments and cannot be holiday tested.

Packaging, Handling & Storage

Shipping Weight (approximate)

CARBOMASTIC 15 LT ATEX Part A: 10lt

Part B: 10lt

Storage (General) Store Indoors.

Storage Temperature & Humidity 5°-38°C
0-90% Relative Humidity

Shelf Life 12 months at 24°C (75°F)

Rev 01 July 2012

Carboline Italia SpA

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Product Data

carboline®

Carbothane®134 HP
(Formerly Carbothane®834)

Selection & Specification Data

Generic Type	Acrylic aliphatic polyurethane
Description	Carbothane 134 HP (formerly Carbothane 834), is an attractive, high gloss, high solids urethane topcoat which is easily applied by airless or conventional spray to yield a hard, very cleanable surface. It exhibits excellent flow and leveling properties to minimize dry spray and lampmarks.
Features	▪ Excellent weatherability ▪ Excellent flexibility ▪ Excellent abrasion resistance ▪ Meets most VOC (Volatile Organic Content) requirements
Color	Ral Color Chart, is standard, other colors may be required a special order.
Finish	High Gloss- with special order, can be manufactured in LG (Low Gloss) version
Primers	May be used over epoxies, urethanes and others as recommended. Typically applied as topcoat for CG 893, CM 15 LO/LT, CM 90, CG 890, CZ 858 (P)
Topcoats	Normally none
Dry Film Thickness	50-75 µm (2.0-3.0 mils) per coat over smooth. Certain colors may require multiple coats for adequate hiding. Additional thickness may be required over rough surfaces for appearance. Dry Film Thickness in excess of 150 µm (6.0 mils) per coat is not recommended.
Solids Content	By Volume: 65 ± 2%
Theoretical Coverage Rate	26.m^2/l at 25 microns Allow for loss in mixing and application
Dry Temp. Resistance	Continuous: 93°C (200°F) Non-Continuous: 121°C (250°F)
Limitations	Immersion service

Substrates & Surface Preparation

General	Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.
Steel	Prime with specific Carboline primers or as recommended. Refer to the primer's Product Data Sheet for detailed requirements of the specific primer or intermediate coat.
Previously Painted Surfaces	Lightly blast or abrade to roughen surface and degloss the surface. Existing paint must attain a minimum 3B rating in accordance with ASTM D3359 "X-Cut" adhesion test

Application Equipment

Spray Application (General)	This is a high solids coating and may require adjustments in spray techniques. Wet film thickness is easily and quickly achieved. The following spray equipment has been found suitable and is available from manufacturers such as Binks, De Vilbiss and Graco
Conventional Spray	Pressure pot equipped with dual regulators, 3/8" I.D. minimum material hose, .070" I.D. fluid tip and appropriate air cap.
Airless Spray	Pump Ratio: 30:1 (min.) GPM Output: 3.0 (min.) Material Hose: 3/8" I.D. (min.) Tip Size: .015"-.017" Output PSI: 2100-2400 Filter Size: 60 mesh Teflon packings are recommended and available from the pump manufacturer.
Brush & Roller (General)	Multiple coat may be required to obtain desired appearance, recommended dry film thickness and adequate hiding: Avoid excessive re-brushing or re-rolling.
Brush	Brushing recommended only for touch-up of small areas. Use natural bristle brush applying in full stokes. Two coats may be required to obtain desired appearance, hiding and recommended DFT
Roller	Use a short nap mohair roller with phenolic core. Avoid rerolling. Two coats may be required to obtain desired appearance, hiding and recommended DFT

Mixing & Thinning

Mixing Power mix separately, then combine and power mix.
DO NOT MIX PARTIAL KITS

Ratio CT 134 HP Part A: 4 by volume
CT 134 HP Part B: 1 by volume

Thinning Spray : up to 15% by volume with Th.# 25
Brush : up to 10% by volume with Th.#215
Roller : up to 10% by volume with Th.#215
Use of thinners other than those supplied or recommended by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.

Pot Life 4 hours at 24°C (75°F) and less at higher temperature
Pot-life end when material becomes too viscous to use. **This product is moisture sensitive. Avoid moisture contamination.**

Cleanup & Safety

Cleanup Use #2 Thinner or Acetone. In case of spillage, absorb and dispose of in accordance with local applicable regulations.

Safety Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.

Ventilation When used as a tank lining or in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to insure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved supplied air respirator.

Caution This product contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with the National Electric Code. In areas where explosion hazards exist, workmen should be required to use non-ferrous tools and wear conductive and non-sparking

Application Conditions

Condition	Material	Surface	Ambient	Humidity
Normal	16-29°C	16-29°C	16-29°C	40-60%
Minimum	10°C	4°C	4°C	10%
Maximum	38°C	49°C	35°C	80%

Do not apply when the surface temperature is less than 3°C above the dew point.
Special thinning and application techniques may be required above or below normal condition.

Curing Schedule

Surface Temp. & 50% Relative Humidity	Dry to Handle and To Recoat	Final Cure
2°C	18 Hours	14 Days
10°C	8 Hours	7 Days
24°C	4 Hours	3 Days
32°C	1 Hours	1 Day

These times are based on a 50-75 µm dry film thickness. Excessive film thickness, insufficient ventilation or cooler temperatures will lengthen cure time.

Packaging, Handling & Storage

Kit Standard Part A: 16 liters Part B: 4 liters

Flash Point (PMCC)
Part A: 32°C (90°F)
Part B: 53°C (106°F)
Thinner# 25: 30°C (87°F)
Thinner#215 54°C (128°F)

Storage Temperature & Humidity
Store indoors.
4°-43°C (40°-110°F)
0-80% Relative Humidity

Shelf Life 24 months at 24°C (75° F)
NOTE: Polyurethane materials are moisture sensitive. Keep tightly covered before use. Moisture contamination will cause poor cure of the coating or gellation of Part B

Carboline Italia SpA

02/12-08/08 ITA CT 834

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Thermaline 440

PRODUCT DATA SHEET

SELECTION & SPECIFICATION DATA

Generic Type	Modified epoxy-phenolic, amine adduct cured.
Description	Thermaline 440 (formerly Thermaline 400 EU) is a high performance, immersion grade coating system which has excellent resistance to wet/dry cycling conditions at elevated temperatures. Used to protect steel substrates under thermal insulation.
Features	• Temperature resistant up to 204ºC • Very good flexibility • Excellent overall chemical resistance • Very good abrasion resistance • Easily applied by spray • Acceptable for use over stainless steels
Color	Primer red Finish White and grey Coating discolouration can be expected when exposed to elevated temperatures. This discolouration does not affect performance.
Finish	Semi-Gloss
Dry Film Thickness	Th 440 Primer : 125 - 150 µm Th 440 Finish : 125 - 150 µm Dry film thickness above 250 microns per coat is not recommended.
Solid(s) Content	Th 440 Primer : 55 ± 2% Th 440 Finish : 51 ± 2%
Theoretical Coverage Rates	**Th 440 Primer** DFT 125 microns 4,4 sq.m/l DFT 150 microns 3,6 sq.m/l **Th 440 Finish** DFT 125 microns 4,0 sq.m/l DFT 150 microns 3,4 sq.m/l Mixing and application losses will vary and must be taken into consideration when estimating job requirements.
Dry Temp. Resistance	Continuous: 204°C (399°F) Non-Continuous: 232°C (450°F)
Limitations	Not recommended for strong mineral and organic acids.

SUBSTRATES & SURFACE PREPARATION

General	Surface must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants in accordance with Standard SSPC-SP1.
Steel	Abrasive blast to ISO 8501-1 Sa 2½ to obtain a 35 – 75 µm blast profile. Alternative Ultra High Pressure water jetting (UHPWJ) to the standard of min. CHB2 M, provided existing surface profile (e.g. maintenance projects)
Stainless Steel	Blast cleaning with non-metallic abrasive to obtain 25 – 50 µm profile.

MIXING & THINNING

Mixing	Power mix separately, then combine and power mix for a minimum of two minutes. **DO NOT MIX PARTIAL KITS.**
Thinning	May be thinned up to 25% by volume with Thinner #33 for spray application. Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether expressed or implied.
Ratio	2 : 1 Ratio by volume (A to B)
Pot Life	4 hours at 24ºC and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION EQUIPMENT GUIDELINES

Listed below are general equipment guidelines for the application of this product. Job site conditions may require modifications to these guidelines to achieve the desired results.

General	Thermaline 440 is a high solid coating and may require adjustments in spray techniques. Wet film thickness is easily and quickly achieved. The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.
Conventional Spray	Pressure pot equipped with dual regulators, 3/8” I.D. minimum material hose, .055 - .070” I.D. fluid tip and appropriate air cap.
Airless Spray	Pump ratio: 30:1 (min.) * GMP Output: 3.0 (min.) Material Hose: 3/8” I.D. (min.) Tip Size: .015 - .019” Output PSI: 2100 - 2300 Filter Size: 60 mesh * Teflon packings are recommended and available from the pump manufacturer.
Brush & Roller (General)	Recommended for touch-up, striping of weld seams and hard-to-reach areas only. Apply in full strokes, avoid re-brushing or re-rolling. Use a natural bristle brush and short nap mohair roller with phenolic core.

APPLICATION CONDITIONS

Condition	Material	Surface	Ambient	Humidity
Minimum	13°C (55°F)	5°C (41°F)	5°C (41°F)	0%
Maximum	35°C (95°F)	75°C (167°F)	40°C (104°F)	85%

Condensation due to substrate temperatures below the dew point can cause flash rusting on prepared steel and interfere with proper adhesion to the substrate. Special application techniques may be required above or below normal application conditions. Do not apply when the surface temperature is less than 3°C above the dew-point.

CURING SCHEDULE

Surface Temp.	Between Coats	Final Cure Immersion
5°C (41°F)	24 Hours	NR
10°C (50°F)	15 Hours	4 Days
15°C (59°F)	10 Hours	3 Days
25°C (77°F)	6 Hours	2 Days

These times are based on the recommended dry film thickness. Excessive film thickness or inadequate ventilation conditions after application require longer dry times and will cause premature failure in extreme cases.
Maximum recoat time is normally 60 days. If exceeded and depending on curing time and exposure, pretreatment may be required prior to overcoating. Contact Carboline for further information.
EXCESSIVE HUMIDITY OR CONDENSATION ON THE SURFACE DURING CURING MAY RESULT IN SURFACE HAZE OR BLUSH; ANY HAZE OR BLUSH SHOULD BE REMOVED BY WASHING WITH WATER BEFORE RECOATING.

CLEANUP & SAFETY

Cleanup	Use Carboline Thinner #33. In case of spillage, absorb and dispose of in accordance with local applicable regulations.
Safety	Read and follow all caution statements on this product data sheet and on the MSDS for this product. Employ normal workmanlike safety precautions. Hypersensitive persons should wear protective clothing, gloves and use protective cream on face, hands and all exposed areas.
Ventilation	When used in enclosed areas, thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. User should test and monitor exposure levels to insure all personnel are below guidelines. If not sure or if not able to monitor levels, use MSHA/NIOSH approved supplied air respirator.
Caution	This product contains flammable solvents. Keep away from sparks and open flames. All electrical equipment and installations should be made and grounded in accordance with applicable regulations. In areas where explosion hazards exist, workmen should be required to use nonferrous tools and wear conductive and nonsparking shoes.

PACKAGING, HANDLING & STORAGE

Shelf Life	24 months at 24ºC
Storage Temperature & Humidity	4° - 43ºC 0 - 95% relative humidity
Flash Point (Setaflash)	THERMALINE 440 Primer Part A: 18°C THERMALINE 440 Finish Part A: 18°C THERMALINE 440 Primer/Finish, Part B: 18°C Thinner 2 : -5°C
Storage	Stores indoors.
Packaging	Part A 13,3 litres Part B 6,7 litres or Part A 6,7 litres * Part B 3,3 litres * * Not available in all Carboline.

WARRANTY

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PAINTING REPORT

PAINTING REPORT No.	PAGE:	DATE:

IDENTIFICATION DATA

CUSTOMER*:*	PROJECT*:*
JOB NO.:	LOCATION*:*
MATERIAL DESCRIPTION*:*	

WEATHER CONDITIONS, STEEL and SURFACE PREPARATION

DATE – TIME*:*	STEEL PREPARATION - ISO 8501-3:
BLOTTER TEST- ASTM D 4285	ABRASIVE TYPE and SIZE - ISO 11124/26:
AIR TEMPERATURE °C – ISO 8502-4*:*	BLAST PROFILE - ISO 8503-2/5:
STEEL TEMPERATURE °C – ISO 8502-4*:*	ABRASIVE CONDUCTIVITY - ISO 11127-6:
RELATIVE UMIDITY % – ISO 8502-4*:*	SURFACE SOLUBLE SALTS - ISO 8502-6/9 Bresle:
DEW POINT – ISO 8502-4*:*	SURFACE CLEANLINESS - ISO 8503-2: Class Rating
DEGREE OF CLEANLINESS*:* *SSPC-SP1:* *SSPC-SP16:* *ISO 8501-1:*	Note:

APPLICATION

REF. SPECIFICATION*:*	COATING SYSTEM*:*

TYPE of COATS	PRIMER	INTERMEDIATE	INTERMEDIATE	TOP COAT	TYPE of INSTRUMENTS
Ambient Conditions	Date: Hour: Air °T: Surface °T: RH% Dew Point:	Date: Hour: Air °T: Surface °T: RH% Dew Point:	Date: Hour: Air °T: Surface °T: RH% Dew Point:	Date: Hour: Air °T: Surface °T: RH% Dew Point:	
STRIPE COAT by brush/roller					
APPLICATION METHOD					
PRODUCTS TYPE BRAND NAME					
BATCH NUMBER A) B)					
Thinner N° % BV					
COLOUR *COLORE*					
DFT. REQUIRED µ					
WFT APPLIED. µm					
SSPC-PA2 D.F.T. µ ISO 19840 DFT µ					
VISUAL CHECK					
MEK TEST ASTM D 4752 for inorganic zinc only					
NOTE:					

Q.C. SIGNATURE *FIRMA CONTROLLO QUALITA'*	INSPECTOR SIGNATURE *FIRMA ISPETTORE*	INSPECTOR SIGNATURE *FIRMA ISPETTORE*	INSPECTOR SIGNATURE *FIRMA ISPETTORE*
DATE:	DATE:	DATE:	DATE: