SURFACE TREATMENT SPECIFICATION, PAINT

Rev	Reason of Change	Date	Made By	Reviewed By	Approved By	Status
2	Added Clause 3.2.2	23-09-2012	KKM	J Gulati	KKD	Released
3.	Add WFT in clause 3.1, add clause 10.0 and 11.0	15-05-2019	USR	HU	KKD	Released
4.	Add 2.14 & 2.2.3 and amend clause 3.2.2.1 & 3.2.2.5	01-01-2021	SK	USR	JG	Released

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1.0 SCOPE

1.1 This Specification describes paint coatings designed to resist a broad range of environments and provide a tough, durable, abrasion resistant surface that will not chalk or fade.

1.2 The colors to be used by SARA SAE shall be identified by the numbering system assigned by the Federal Standard No. 595A for paint colors.

1.3 Protective coatings shall be applied to all SARA SAE products prior to shipment, either to a customer or to another shop for further fabrication unless otherwise stipulated by the customer in his purchase order.

2.0 SPECIFICATIONS AND APPROVED SUPPLIER

2.1 Steel Structures Paint Council (SSPC) Specifications

2.1.1 SSPC-SP-2, Hand Tool Cleaning
2.1.2 SSPC-SP-3, Power Tool Cleaning
2.1.3 SSPC-SP-10, Near White Blast Cleaning
2.1.4 SSPC-AB1, Mineral and Slag Abrasives

2.2 ASTM Standards

2.2.1 ASTM D1640 "Test Methods for Drying, Curing or Film Formation of Organic Coatings at Room Temperature."
2.2.2 ASTM D2697 "Test Methods for Non-volatile Matter, in Clear or Pigmented Coating."
2.2.3 ASTM D4417 "Standard Test Methods for Field Measurement of Surface Profile of Blast Cleaned Steel

2.3 Federal Standards

2.3.1 The following colors identified by the Federal Standard No. 595A / EU RAL standards that shall be used for SARA SAE products.

2.3.1.1 Red: RAL 3003
2.3.1.2 Blue: RAL 5019
2.3.1.3 Gray: RAL 7040
2.3.1.4 Orange: RAL 2005

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3.0 EQUIPMENT FOR EXPOSURE TO MARINE ATMOSPHERE WITH THE FOLLOWING TOP COATS: SARA SAE

3.1 Materials

3.1.1 Base coat: Self-curing water based, inorganic zinc primer consisting of high silicate ratio formulation.

a.	Finish:	Flat
b.	Color:	Gray
c.	Components:	Zinc powder, liquid vehicle, Zinc Clad XI.
d.	Cure:	Self-curing drying time for top coat, 2 hours
e.	Volume solids:	ASTM D2697: Zinc Clad XI - 68%
f.	**Wet film thickness (WFT)**	**75 micron to 100 micron**
g.	Dry film thickness (DFT)	50 micron minimum, 75 micron maximum
h.	Coats:	One
i.	Pot life:	5 hours @ 77^{o}F

3.1.2 Intermediate coat: Two component, polyamide high-build epoxy.

a.	Color:	White / Grey
b.	Components:	Resin solution, dura-pox cold cure, 60%
c.	Cure:	Solvent release & chemical reaction
d.	Volume solids:	ASTM D2697: dura-pox cold cure, 60%
e.	**Wet film thickness**	**125 micron to 175 micron**
f.	Dry film thickness:	110 micron minimum ,147 micron maximum
g.	Coats	One

3.1.3 Finish coat: Two component, polyamide high-build epoxy.

Note: In the event that parts are to be assembled prior to the finish coat being applied, the mating surfaces will be sufficiently protected by the base, and intermediate coats, and will not require the finish coat on those surfaces.

a.	Finish:	Flat/Low Sheen
b.	Color:	Orange / Red RAL 3003
c.	Components:	Resin solution, dura-pox cold cure, 60%
d.	Cure:	Solvent release and chemical reaction
e.	Volume Solids:	ASTM D2697: dura-pox cold cure - 60%

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f. **Wet film thickness**	**240 micron to 285 micron**
g. Dry Film Thickness:	200 micron minimum to 250 micron max
h. Coats:	Two
i. Pot Life:	4 hours @ 75°F

3.2 Surface Preparation:

3.2.1 All parts are to be cleaned with thinner sufficiently to remove any oil or grease.

3.2.2 All parts are to be shot blasted or pickled except SS to remove all scale, rust and corrosion. SS structures are to be etch primed (carbomatic-15) before applying primary coat only in case paint is required.

3.2.2.1 Steel test plates for performance evaluations shall meet a Rockwell hardness of 76 ± 5 HRBW when tested in accordance with ASTM E18. The blasting shall be done using a 9.5-mm (3/8-inch) #6 or 6.3-mm (1/4-inch) #4 venturi nozzle with a nozzle pressure of 670 ± 35 kilopascals [kPa] (95 ± 5 psig) at a distance of 61 ± 15 cm (24 ± 6 inches) from the surface at an angle of 75 to 105. All shot blasted parts are to be blasted to near white metal per SSPC-SP10/SSPC-AB1 producing an anchor pattern of 25 to 64 micron.

3.2.2.2 Surfaces to be protected from blasting:

a. ring grooves
b. end connections
c. hydraulic ports
d. threaded holes
e. seal surfaces
f. bearing bores
g. close tolerance pin holes.

3.2.2.3 Blasting of a fully assembled unit is permissible except when residual blasting material will interfere with proper operation.

3.2.2.4 After blasting, remove all residual shot by blowing with dry compressed air and/or brushing.

3.2.2.5 Moisture condenses on any surface that is colder than the dew point of the surrounding air. It is therefore

recommended that the temperature of the steel surface be at least 3 °C (5 °F) above the dew point during dry blast cleaning operations. It is advisable to visually inspect for moisture and periodically check the surface temperature and dew point during blast cleaning operations and to avoid the application of coating over a damp surface.

3.3 Material Application

3.3.1 Primer Coat

3.3.1.1 The primer coat of inorganic zinc is to be applied as soon as possible after blasting and before any visual evidence of rust blooms or contamination appears. If rusting or contamination is evident, return to Section 3.2.

3.3.1.2 Application is to be by airless or conventional spray method.

3.3.1.3 Powder and liquid are packaged separately. Gradually stir powder into liquid. Total contents of each can are to be mixed together until powder is well dispersed and mixture is free of lumps. **Caution: Do not pour liquid into powder.**

3.3.1.4 Strain mixture into paint pot with 30 mesh screen to prevent clogging of equipment.

3.3.1.5 Continuous slow stirring of the mixture is required during application to prevent segregation of powder from liquid.

3.3.1.6 Adjust spray equipment to apply an even wet coat with minimum overspray.

3.3.1.7 Apply in even parallel passes, overlapping each pass 50%.

3.3.1.8 Drying time before intermediate coating is 2 to 6 hours.

3.3.2 Intermediate Coat

3.3.2.1 Primer coat must be applied in accordance with 3.3.1, and shall be dry, and free of dirt, grease or other contamination prior to application of intermediate coat.

3.3.2.2 Application is to be by airless or conventional spray method.

3.3.2.3 Resin and curing solutions are packaged separately. Stir each component thoroughly and then combine total contents of each can and mix until uniform.

3.3.2.4 Apply a mist coat and allow mist coat to stand for 1

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minute. Then apply one or two wet coats in even, parallel passes, overlapping each pass 50%.

3.3.2.5 Drying time for intermediate coat is 6 hours minimum.

3.3.3 Finish Coat

3.3.3.1 Surface to be coated must be clean and dry and prepared in accordance with 3.3.1 and intermediate coat per 3.3.2.

3.3.3.2 Application is to be by airless or conventional spray methods.

3.3.3.3 The finish coat is packaged in components A and B. Stir each component separately and then combine total contents of A and B and mix until uniform.

3.3.3.4 Ensure adequate air pressure and volume when conventional spray is used.

3.3.3.5 Apply one or two wet coats in even, parallel passes, overlapping each pass 50%.

3.3.3.6 Drying time is 4 hours to touch and 8 hours through at 70^{o}F.

3.3.3.7 Other parameters like viscosity and spray gun pressure etc. shall be followed as per respective TDS.

3.3.4 Quality Assurance Requirements

3.3.1.4 Personnel applying the coating are responsible for following this specification.

3.3.4.2 Spraying personnel will be responsible for inspecting film thickness and overall inteshoty of each coating. When the coating thickness is below spec, the unacceptable areas are to receive an additional coat to conform to the specified minimum thickness. If the thickness exceeds the range allowed, it shall be the responsibility of Engineering to determine if the inteshoty of the coating is endangered.

3.3.5 Repair (Touch Up) of Damaged/Unpainted Areas after Application of Final Coat

3.3.5.1 Repair or touch up of equipment before shipment or for equipment in the field shall be in accordance with 7.0.

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3.3.6 All specifications and application instructions of the paint manufacturer apply. If it is determined that this specification differs from the manufacturer's recommendations, SARA SAE Engineering shall determined which procedures will be followed.

4.0 EQUIPMENT FOR OFFSHORE SERVICE WITH TOP COLOR COAT: Orange / Red RAL 3003

4.1 All procedures and specifications in 3 apply except 3.1.3b becomes OSHA blue per Federal Standard 595A No. 15092.

5.0 EQUIPMENT FOR OFFSHORE SERVICE

5.1 Equipment for Offshore Service with Top Color Coat: Red

5.1.1 All procedures and specifications in 3 apply except 3.1.3b becomes SARA SAE Red per Federal Standard 595A No. 11350.

5.2 Equipment for Offshore Service with Top Color Coat: Light Gray (Equal to Hempel #1148)

5.2.1 All procedures and specifications in 3 apply except 3.1.3b becomes SARA SAE Light Gray per Federal Standard 595A No. 16314.

5.3 Equipment for Offshore Service with top Color Coat: International Red CCC 287

5.3.1 All procedures and specifications in 3 apply except 3.1.3b becomes International Red CCC 287

6.0 EQUIPMENT FOR LAND USE IN DRY ATMOSPHERE WITH ONE TOP COLOR COAT: RED PER FEDERAL STANDARD 595A NUMBER 11350

6.1 Follow instructions in paragraph 7.0 of this Specification, except finish coat is SARA SAE Red.

7.0 REPAIR AND TOUCH UP OF DAMAGED FINISH COATS

7.1 Materials

7.1.1 Finish Coat: Two component aliphatic high-build urethane coating.

a. Finish: Semi-gloss

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b. Color:	Shaffer Blue for Offshore, Ruby red for Onshore.
c. Components:	Resin solution, curing solution:enviro-guard, 60%
d. Cure:	Solvent release and chemical reaction
e. Volume solids:	ASTM 2697: enviro-guard - 60%
f. Dry film thickness:	8 mils minimum; 10 mils maximum
g. Coats:	One
h. Pot life:	6 hours @ 77°F

7.2 Surface Preparation

7.2.1 Mechanically clean damaged area down to base material. Feather edges of remaining paint and remove all particles with brush or compressed air.

7.3 Material Application

7.3.1 Finish Coat

7.3.1.1 The self priming aliphatic urethane coat is to be applied as soon as possible after mechanically cleaning or picking and prior to the formation of any rust blooms or contamination. If contamination occurs, return to 7.2.

7.3.1.2 Application is to be airless or conventional spray method.

7.3.1.3 Stir resin solution and curing solution separately. Pour curing solution into resin solution and mix thoroughly.

7.3.1.4 Apply a heavy, wet coat in even, parallel passes, overlapping each pass 50% to avoid holidays, bare areas, and pin holes.

8.0 APPROVED COATINGS AND VENDORS

8.1 All prospective vendors must be approved by SARA SAE who will verify that the requirements of this specification are met.

8.2 Submittal Requirements

8.2.1 Two copies each of physical and safety data sheet and application instructions are required.

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9.0 DEVIATIONS

No deviations from this specification are allowed unless specifically agreed to in writing by SARA SAE.

10.0 Tape Test :

Tape test to be carried for check the adhesion of paint. Adhesion test to be carried out on test panel.

Following are the procedure of tape test.

1.Select an area free of blemishes and minor surface imperfections. For tests in the field, ensure that the surface is clean and dry.

2. Make two cuts in the film each about 40 mm (1.5 in.) long that intersect near their middle with a smaller angle of between 30 and 45°. When making the incisions, use the straightedge and cut through the coating to the substrate in one steady motion.

3. Place the center of the tape at the intersection of the cuts with the tape running in the same direction as the smaller angles. Smooth the tape into place by finger in the area of the incisions and then rub firmly with the eraser on the end of a pencil. The color under the transparent tape is a useful indication of when good contact has been made.

4. Within 90 ± 30 s of application, remove the tape by seizing the free end and pulling it off rapidly (not jerked) back upon itself at as close to an angle of 180° as possible.

11.0 Acceptance criteria-

Inspect the X-cut area for removal of coating from the substrate or previous coating and rate the adhesion in accordance with the following scale:

5A - No peeling or removal
4A - Trace peeling or removal along incisions or at their intersection.
3A - Jagged removal along incisions up to 1.6 mm on either side.
2A - Jagged removal along most of incisions up to 3.2 mm on either side.
1A - Removal from most of the area of the X under the tape.
0A - Removal beyond the area of the X.

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