

	PKT 300KTA Soda Ash Project	Code	T24B25		
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Specification for Painting

PRELIMINARY - NOT FOR CONSTRUCTION

R02	IFR	DQY	XCX	WM		14-07-2025
R01	IFR	DQY	XCX	WM		09-06-2025
REV	DESCRIPTION	PRE' D	CHK' D	REVIEW	APPR	DATE

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Change Log

14-07-2025	1. Added some color codes in Section 6.4.6 and 6.4.9;

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Comments and Reply

Date	Rev.	Page/ Section	Owner Comments	Contractor Reply
14-07-2025	R02	Section 6.4.6	Other services will decided in detail engineering	Added.
14-07-2025	R02	Section 6.4.9	The colors previously suggested by TCC is acceptable — specifically, ceiling white and instrument panel light grey. But for walls we will decided later	Added.

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1 SCOPE

This specification is to define the shop and field surface preparation protection and protective coating systems to be applied on all equipment, piping, structures steel, building and other associated items.

1.1 PROJECT INFORMATION

Project Name: PKT 300KTA Soda Ash Project

Owner: Pupuk Kaltim

1.2 PROJECT OUTLINE

Pupuk Kaltim plans to develop a new soda ash plant in East Kalimantan based on ammonia-soda ash process. The annual capacity of the plant is 300,000 Mt/y (Metric ton per year) dense ash and 300,000 Mt/y ammonia chloride. Light ash cooler capacity is 150,000 Mt/y.

2 GENERAL

2.1 REGULATIONS

This Specification requires compliance with local laws and regulations which may be applicable, including the Occupational Safety and Health Act, Construction Safety Act as well as rules, regulations, and standards of the Ministry of Manpower.

2.2 REFERENCE AND STANDARD

a. The requirements contained in the latest edition of the following standards shall form a part of this specification in the manner and to the extent specified herein.

- i. Steel Structure Painting Council (SSPC) Specifications.
- ii. National Association of Corrosion Engineers (NACE)
- iii. International Organization for Standardization (ISO)
- iv. Manufacturer Standard practice
- v. The climatic data and atmospheric conditions

- Design Basis for Equipment

Dry bulb temperature

Dry season : 36°C maximum

Wet season : 22°C minimum

Design : 35°C for design

Wet bulb temperature : 29 °C

- Humidity

Mean humidity, night (23°C) : 96%

Mean humidity, day (33°C) : 70%

Design condition : 100% humidity

- Design Basis for Air Blowers / Compressors

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Design Temperature	: 37°C
Humidity	: 100% RH
● Rainfall	
Max. for 15 minutes	: 80 mm
Max. for 1 hour	: 120 mm
Rainy seasons	: December through April
Design Rainfall Intensity (I)	: 120 mm/hr for respective plant
	: 70 mm/h for the whole plant
● Wind Velocity	
Wind velocity	: 30 km/h exceptionally 90 km/h
Basic Design Wind Velocity	: 120 km/hr (33.3 m/s)

- b. Since it is anticipated that purchase of equipment will be generally on a “worldwide” basis, standards other than the standards mentioned above will be acceptable provided that their construction conforms to the standards and codes of the other country of manufacture and that the governing standards are equal to or higher quality than the above standards.
- c. The term (MDFT) used in this Appendix stands for minimum dry film thickness in microns.
- d. Application temperature :
 - i. If the temperature of item to be painted is decided by the internal fluid at operation, application temp, means the temperature between maximum operating temp, and minimum operating temp, of internal fluid.
 - ii. If the temperature of item to be painted is decided by atmospheric temperature, application temp, means the temperature between maximum monthly average temp, and minimum monthly average temp, in application place.
 - iii. If pre-commissioning work using steam is performed, steam temperature shall be considered for its application temp.

3 DESIGN

3.1 PURPOSE

- a. The purpose of this Specification is to define surface preparation and protection and protective coatings systems to be applied on piping, structures, and other associated items.
- b. The procedures and materials outlined in this Specification are designed to assume through and complete painting of all areas specified in the purchase document.

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3.2 EXTENT OF PAINTING

3.2.1 GENERAL

- a. The CONTRACTOR must provide protection for carbon steel or low alloy steel surface where necessary by painting or other surface coatings, which must be suitable for use in a tropical environment.
- b. The protective system chosen should have a design lifetime of 5 years and consideration and great care must be given to the preparation of surfaces before coverings are applied.
- c. All work shall be done with proper equipment in good repair, by skilled workmen and according to recognized good painting practice.

The following items shall not be painted unless otherwise specified:

- Corten steel
 - Brick work and Tile
 - Transite
 - Aluminum, stainless steel, brass or galvanized surfaces.
 - Factory finished items
 - Machined parts of operating equipment and gasket surfaces.
 - Metal jacketing applied on insulating material, except color band on metal jacketing.
 - Valve stems, motor shafts, and other such moving parts in order not to impair their free movements.
- d. When catalyzed epoxy (or epoxy phenolic) coatings are specified the primer and finish coat shall be applied in the same location (shop or field).
 - e. Because of aging, no more than 48 hours should be elapsed between priming and top coating.
 - f. For drying time between coats, mixing of paint, application equipment, etc., the manufacturer's requirements shall be followed.
 - g. Fabricated piping, vessels and equipment shall be cleaned and primed or painted in the fabricator's shop.
 - h. Austenitic materials which are to be shipped as deck cargo, shall be coated with a rust inhibitive temporary coating which contains no metallic pigment.

3.2.2 PIPING

- a. Uninsulated, above ground piping shall be primed and finish coated.
- b. Insulated and uninsulated pipe for all operating temperature shall be painted with epoxy or silicone.

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- c. Uninsulated carbon steel or galvanized piping that is to be buried, having temperatures between 70°C and 120°C, shall be coated with two coats High Build Epoxy-Polyamide/amine (Appendix IX).
- d. Insulated, above ground piping shall be primed coated.
- e. Each coat of epoxy should measure approximately 200 microns dry film thickness (Appendix IX).
- f. All underground metallic piping shall be coated and wrapped and provided with cathodic protection. If sacrificial metal is used permanent testing arrangement shall be underground piping shall be covered with sand provided.

3.2.3 DIRECT FIRED HEATERS

Direct fired heaters and stacks shall be painted at Site.

3.2.4 MACHINERY AND INSTRUMENTS

- a. Equipment shall be top-coated in the field only if it is necessary to match a color scheme, or if the machinery is subject to attack from corrosive substances.
- b. When a corrosion resistant coating is required barrier type product shall be used as a tie coat.
- c. For rotating equipment, machine, instrument, and electrical items, which are painted at vendor's shop, the vendor's proven standard painting system shall be proposed to OWNER for approval.

3.2.5 BUILDING

- a. Administrative type buildings and control houses shall be painted in accordance with the architectural specifications and drawings.
- b. The finish coat color in Control Rooms shall be in accordance with Paragraph 6.4 of this Appendix unless otherwise shown on the Control Room Drawings.
- c. The painting of industrial type buildings shall be in accordance with the structural steel portion of the system selected and the masonry section when specified shall be per the Appendixes of this Appendix.

3.2.6 CONCRETE

- a. Concrete shall have a minimum curing time of 28 days before preparing the surface for coating.
- b. Concrete surfaces to be coated shall not contain hardeners or curing compounds.
- c. Contaminated surfaces or surfaces too smooth to receive a coating must be prepared by acid etching and neutralizing or sandblasting.
- d. Manufacturer recommendations shall be followed if they conflict with:
 - i. If surface preparation is done by sandblasting 40-50 mesh flint sand shall be used. The surface shall be washed and tested with litmus paper to assure a neutral surface.
 - ii. If acid etching is used the surface shall first be dampened by applying fresh water.
 - Spray a 15% muriatic acid solution (1 part commercial acid and 1 part water by volume) on the surface and scrub with a stiff bristle brush. (About 60 sq. ft/gal).

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- Allow to stand until bubbling stops (3 to 5 min) and rinse with fresh water while continuing to scrub in order to remove loose particles.
- Repeat the procedure if the surface is not properly etched (finish similar to medium grit sandpaper).
- Neutralize with a 10% solution of soda ash or trisodium phosphate in water.
- Allow to stand for 5 minutes or more and then rinse with clean water.
- The surface shall be neutral or slightly alkaline when checked prior to coating.

3.2.7 GALVANIZED STEEL

Hot dip galvanizing will be done in the shop and conform to the following requirements where applicable.

- ASTM-A-120 for piping
- ASTM-A-123 for structural shapes, plates, bars and fabricated assemblies.
- ASTM-A-153 for hardware and threaded components.

4 PAINTING APPLICATION

4.1 SURFACE PREPARATION

All surfaces to be painted shall be cleaned and prepared before paint is applied.

Surfaces shall be examined for traces of dirt, dust, oil, grease and other contaminants. Any such traces must be removed by use of solvent.

Surface preparation of all steel surfaces shall be done by one of the following methods as described by the following Specifications latest edition, published by the Steel Structures Painting Council (SSPC).

Specification Title	SSPC	ISO 8501-1
Solvent Cleaning	SSPC-SP1	n/a
Hand Tool Cleaning	SSPC-SP2	St 2
Power Tool Cleaning	SSPC-SP3	St 2 or St 3
Flame Cleaning of New Steel	SSPC-SP4	n/a
Blast Cleaning to "White" Metal	SSPC-SP5	Sa 3
Commercial Blast Cleaning	SSPC-SP6	Sa 2
Brush-off Blast Cleaning	SSPC-SP7	Sa 1
Pickling	SSPC-SP8	n/a
Weathering and Cleaning	SSPC-SP9	n/a
Blast Cleaning to Near-White Metal	SSPC-SP10	Sa 2½

When SSPC-SP6 or SSPC-SP10 is specified the anchor pattern shall conform to a minimum of 25 microns and a maximum of 38 microns.

Additional recommendations of manufacturers shall be observed.

Uninsulated surfaces of flanges located in insulated piping and valves in all systems shall not be flame or blast cleaned.

These surfaces shall be cleaned in accordance with SSPC-SP2 or SSPC-SP3.

Remove all traces of shop applied temporary coating.

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Solvent washing and steam cleaning are approved methods.

Thoroughly clean all unprimed surfaces.

Where original steel had been sandblasted, reblast or needle gun before repriming, all damage weld seams shall be prime with same primer as that used in the shop. Prime with same primer as that used in the shop.

Damaged areas of shop applied inorganic zinc or galvanizing shall be spot cleaned using Vacum-Blast; abrasive wheels or needle gun; then touched up with inorganic zinc.

A zinc rich organic coating may be substituted with the written approval of OWNER.

No blasted surface shall be allowed to remain uncoated for more than 4 hours after blasting indoors or 2 hours after blasting outdoors.

No prepared surface shall be allowed to remain uncoated for more than 4 (four) hours.

4.2 BLAST CLEANING

The removal of mill scale, rust scale and foreign matter from the surface shall be by propelled through nozzle or by centrifugal wheels.

Dry abrasive blasting is not permitted under any of the following conditions,

- Relative humidity is greater than 85 percent.
- When it rains or is about to rain and the work is out side.
- Any visible moisture is on the surface.
- The abrasive is wet.
- If the metal to dew point temperature difference is less than 5°F

Sand grit size 16-30 is recommended for abrasive blasting operations. The sand shall be silica.

To prevent such rusting, the elapsed time from the start of blast cleaning to the application of the coating shall not exceed the following:

<u>Relative Humidity</u>	<u>Time/Hours</u>
85	2
80	4
70	10
60	10

4.3 APPLICATION

Manufacturer's recommendations for Painting Application shall be adhered to.

In cases of conflict between the Specification and the materials manufacturer's printed instructions, OWNER's representative shall be notified by the contractor or fabricator of any conflict of instruction prior to commencing with product application.

The conflict shall be resolved in writing, but may be done verbally for expediency, then followed by a confirming letter.

In general, Paint shall not be applied on surfaces when:

- The surface temperature is not meeting requirement of at least 3°C (5°F) above dew point.
- The relative humidity is above 85 %

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- The wind velocity is such that dust and dirt may be deposited in the paint film, or it
- Will interface with spray painting.
- The surfaces are wet or damp from water or condensation

Avoid applying paint to surfaces exposed to the direct rays of the sun.

Fabricated piping, vessels and equipment shall be cleaned and primed in the fabricator's shop.

Primers shall be applied before the prepared surface discolors.

Dry film thicknesses shall be measured by an acceptable dry film thickness gauge, such as the "Elcometer Coating Thickness Gauge" or another eddy current thickness gauge type.

Low voltage-wet sponge inspections for acceptance of coating work shall be made on the completed coating system when required, using the "Bird Dog" holiday detector. Where successive coats of paint of the same color have been specified, alternated coats of paint shall be tinted, when practical, sufficiently to produce enough contrast to indicate compatibility with the paint and not detrimental to its service life.

Paints shall be delivered to the Site in the original packing in accordance with packing and working specifications.

Paints shall be stored indoors and kept above freezing.

Before application, they shall be stirred or agitated until the ingredients are thoroughly mixed.

Materials which tend to settle rapidly must be stirred frequently during application.

Spray pots must have an agitator when used for inorganic zinc.

Where the term "prime coat" or "finish coat" is used, it shall be understood that this applies to either "shop applied" or "field applied". In either case, the prime coat and/or finish coat shall satisfy the requirements of this Appendix.

Spot cleaning and retouching of areas abraded or otherwise damaged during shipping and/or erection, shall be the responsibility of the Contractor.

Touch-up material shall be the same as or compatible to the shop applied coat.

If a compatible paint is used, OWNER must approve the use in writing.

Where items have been shop primed or have had their finish coat (s) applied in the shop with indications of poor quality or of insufficient film thickness, it shall be the responsibility of the Contractor to rectify the deficiencies at his own expense.

Austenitic alloy (non-magnetic) surfaces shall be protected against over spray or drips of paints, particularly those containing metallic pigment.

If austenitic surfaces are accidentally spattered or sprayed, the paint shall immediately and thoroughly be removed.

This protection also applies to galvanized surfaces, gauges and name plates.

Wherever practical, materials shall be spray applied. Stop shop-applied primer 2 inches from all edges of plates to be welded. Inorganic zincs shall be stopped 0.5" from edge to be welded.

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When bad weather is expected to occur soon, outdoor painting work shall be stopped quickly.

4.4 PAINTING PROCEDURE

In principle, painting at field (except field shop) shall be applied with brush, roller or spray and with following care.

- 1) The paint shall apply evenly to produce a smooth coating of the required uniform thickness. Especially the edge of plates, corners and crevices shall be painted carefully to obtain the required thickness.
- 2) During painting at field, adjacent equipment or materials shall be protected from paint splashes and other blemishes.
- 3) High build paint such as epoxy paint shall be applied evenly to obtain the required dry film thickness by decreasing the thinning amount or increasing the number of coat unless the required thickness cannot be obtained in a normal way.
- 4) Open flames, smoking, exposed heating elements or sources of ignition of any kind shall be prohibited in areas where painting is being performed.
- 5) Spray pots must have an agitator, when used for inorganic zinc.
- 6) Overspray and dry spray of inorganic zinc shall be prior to application of inorganic zinc. Overspray shall be removed with a stiff wire brush or wire screen. Large areas may require the inorganic zinc primer to be completely removed by blasting and the surface reprimed.
- 7) Special care shall be taken for protection of high alloy steel (including stainless steel)
- 8) The substructure to be welded at field after shop painting shall not be coated min. 75 mm from all edges to be welded, but inorganic zinc shall not be coated min. 25 mm.

4.5 STORAGE OF PAINTING MATERIAL

4.5.1 GENERAL

Painting materials shall be stored as follows:

- a. Paint materials shall be stored in accordance with local law/regulation, if any.
- b. In principle, paint materials shall be stored in an independent warehouse.
- c. Paint materials shall not be stored together with dangerous materials and inflammable materials.
- d. Paint materials shall be stored in tightly sealed condition, never stored in open air condition.
- e. In case of outdoor storage of paint materials, provisions shall be taken against corrosion of a container and direct rays of the sun, but long-term outdoor storage shall be avoided.
- f. The maximum storage time for paint materials shall be in accordance with the manufacturer's recommendations.
- g. Paint materials shall be stored so that the oldest materials of each kind shall be used first.

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4.5.2 WAREHOUSE FOR STORAGE

Warehouse for storage of paint and thinner shall be as follows.

- a. It shall be well ventilated.
- b. Electric appliances such as switch, a electric light, etc. shall be explosion- proof type.
- c. It shall have a structure so that direct exposure of paint materials to the sun is avoided.
- d. "No Smoking" and other warning signs shall be posted around storage.

5 INSPECTION

- a. Surface Preparation

The prepared surface shall be compared with the standard photographs of SIS or SSPC. Where the prepared surface is deemed to be equivalent to those indicated in the above standard photograph, they shall be deemed acceptable.

- b. Paint

Inspection item, method, frequency, and criteria of surface preparation shall be approved by Owner.

- c. Film thickness

Dry Film Thickness shall meet with the requirement state on Appendix.

- d. Repair

Surface that fail to pass the inspection shall be corrected to approved procedure.

6 IDENTIFICATION OF PIPING SYSTEMS

6.1 GENERAL

- a. For piping service identification, insulated and uninsulated, pipe will be painted in accordance with paragraph 6.4.6
- b. Paint used for color shall be compatible with the coating or surface on which it is applied.
- c. The colors for pipework will be indicated in the line schedules by the colour code shown in Paragraph 6.4.6
- d. Fire protection piping shall not require color banding for identification of content, such piping will be painted red in its entirety.

6.2 LETTERING AND MARKING

- a. Lettering and marking shall be applied for identification of mechanical equipment, piping line, instrument equipment, electrical equipment, fire fighting equipment, etc.
- b. Lettering and marking indicate the equipment number, equipment name, line number, fluid direction, etc.
- c. Lettering and marking shall be placed where it can be easily seen from road and all areas of access.

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6.3 COLOUR CODING OF PIPES DURING STORAGE

<u>Material</u>	<u>Stripe Colour</u>
API 5L, A53	White
A120 Galvanized	No. Colour
A106, , A672	Yellow
A333, A671 Impact Tested	Blue
A335 Type P11	Green/Blue
A335 Type P22	Green/Yellow
A312, Type 321	Brown/Green
A312, Type 316 L	Red/Green
A312, Type 304 L	Mauve/Green
Titanium	Blue/Yellow

Lined Pipe to receive an additional colour strips indicating type of lining.

Epoxy	Black
Rubber	Black/White
Vinyl	Orange
PP Line Piping	Red

Stripes to be 9 mm wide for pipe up to 1.5" pipe and 12 mm wide for pipe 2" pipe and larger.

Stripe to run along length of pipe.

Flanges to have stripe across back of flange

Fittings to have stripe along length of fitting.

Valves to have a circle painted on side of valve body.

6.4 FINAL COAT COLORS

	<u>ITEM DESCRIPTION</u>	<u>FINAL COLORRAL</u>	
6.4.1	Vertical Vessels and Exchangers		
	Bare Surfaces (T<200°C)	Lt. Grey	7035
6.4.2	Spheres and Storage Tanks		
	Bare Surfaces; Inside Battery Limits	Lt. Grey	7035
	Bare Surfaces; Outside Battery Limits	White	9003
6.4.3	Cooler Boxes	Lt. Grey	7035
	Structural Steel	LT. Grey	7035
	Stumbling, Tripping or Falling Hazard	Yellow	1026
6.4.4	Direct Fired Heaters and Stacks	Silver	Silver
6.4.5	Machinery		
	Exposed	Lt. Grey (T≤120°C)	7035
		Lt. Grey (T>120°C)	9006
	Buried	Black	8022

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6.4.6 Piping

Service	Color Code	Final Color	RAL
Natural & Process Gas	PUR	Purple	4006
Fire Water	RED	Red	3000
Cooling Water, Chilled water	LGR	Lt. Green	6018
Process Water, Wash Water	LGRG	Lt. Green & Green band	6018
Potable Water	LGRB	Lt. Green & Blue band	6018
Waste Water, Drainage	BLK	Black & Green band	8022
Plant Air	DBG	Dark Brown & Grey band	8017
N ₂	LBR	Lt. Brown	1014
Instrument Air	DBR	Dark Brown	8017
Steam	SIL	Silver	Silver
Steam Condensate	SGR	Silver & Green band	Silver
Boiler Feed Water	MGR	Medium Green	6024
CO ₂	BLU	Blue	5015
NH ₃ (Liquid & Gas)	ORA	Orange	2003
Lube Oil Seal Oil, Oily Drain, Diesel Fuel	BLK	Black	8022
Oil & Gasoline Fuel			
Chemical Feed, Mother Liquor	LBL	Lt. Blue	5012
Acids and alkalis	VIO	Violet	4003
Vent	YEG	Yellow & Grey band	1026
Process Condensate	GRY	Grey	7037

	<u>ITEM DESCRIPTION</u>	<u>FINAL COLORRAL</u>	
6.4.7	Electrical		
	Transformer, Switchgears MCCs,		
	Generators	Lt. Grey	7035
	Panels	Lt. Grey	7035
	Motors	Green	6024
	Lighting Poles	Aluminum	
6.4.8	Fire and Safety Equipment		
	Water and Foamite hydrants,		
	fire-water piping, sprinkler piping,		
	fire protection equipment and apparatus	Red	3000
	Safety Showers, eye wash fountains	Green	6032
6.4.9	Control Rooms		
	Walls	Submit to Owner for approval	
	Ceiling	White	9003
	Instrument Panel	Lt. Grey	7035

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Note:

Standard for final coat color to be used will be specified later (BS/JIS or others).

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Surface Preparation and Coating System for masonry - Corrosive Area (Nitric Acid, Phosphoric Acid, Urea, and Melamine areas) 砌体表面处理和涂层系统-腐蚀区域（硝酸、磷酸、尿素和三聚氰胺区域）	XIV
Surface Preparation and Coating Systems for Manufacturer's Standard System Applied-Acid Area 制造商标准的应用酸性区域的表面处理和涂层系统	XV
Surface Preparation and Coating System for Uninsulated under 120 °C 120 °C 下未绝热的表面处理和涂层系统	XVI
Surface Preparation and Coatings System for Uninsulated and Insulated High Temperature Steel Surfaces, Vessels, Stacks, Mufflers, etc.	XVII

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未绝热和绝热的高温钢表面、容器、烟囱、消声器等的表面处理和涂层系统	
Surface Preparation and Coating Systems for Highly Corrosive Areas	XVIII
Structural Steel, Floor Plate, Handrails, Ladders, Etc.	
高腐蚀区域结构钢、地板、扶手、梯子等的表面处理和涂层系统	
Surface Preparation and Painting System for Moderately Corrosive Area	XIX
中等腐蚀性区域的表面处理和涂装系统	
Surface Preparation and Painting System for Potable Water Tanks	XX
饮用水箱表面处理和涂装系统	
Surface Preparation and Painting System for Demineralized Water Tanks	XXI
除盐水箱表面处理和涂装系统	
Surface Preparation and Painting System for Structural Steelwork, Handrails, Ladders, etc, in Marine Areas and on Jetties.	XXII
海洋区域和码头钢结构、扶手、梯子等的表面处理和涂装系统	
Surface Preparation and Coating Systems for Walls for Building	XXIII
建筑墙体表面处理和涂层系统	

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APPENDIX I

Painting Schedule for Structural Steel Platforms and Miscellaneous Steel

Carbon Steel and Low Alloy Steel	See Appendix
a. Highly Corrosive Areas for Caustic Environment)	X
b. Highly Corrosive Areas for Acid Environment	XI
c. Not Fireproofed (Moderately Corrosive Areas)	XIX
d. Not Fireproofed (Marine Areas and Jetties)	XXII
e. Alternate systems galvanizing	XVIII plus XIII

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APPENDIX II

Painting Schedule for Flares, Blowdown and Vent

Carbon Steel and Low Alloy Steel

a. Uninsulated up to 120 °C for Caustic Environment	See Appendix X
b. Uninsulated up to 120 °C for Acid Environment	XI
c. Uninsulated above 120 °C	XVII
d. Uninsulated up to 65 °C carrying Potable Water	XX
e. Uninsulated up to 65 °C carrying Demineralized Water	XXI
f. Insulated up to 175 °C	XII
g. Insulated above 175 °C	Not Painting

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APPENDIX III

Painting Schedule for Masonry Above Grade and Pavement

Under equipment, tower, structures and miscellaneous steel

See Appendix
XIV

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APPENDIX IV

Painting Schedule for Vessels, Tanks, Piping and Exchanger

Carbon Steel and Low Alloy Steel

See Appendix

- | | |
|---|-------------|
| a. Uninsulated up to 120 °C for Caustic Environment | X |
| b. Uninsulated up to 120 °C for Acid Environment | XI |
| c. Uninsulated above 120 °C | XVII |
| d. Uninsulated up to 65 °C carrying Potable Water | XX |
| e. Uninsulated up to 65 °C carrying Demineralized Water | XXI |
| f. Insulated up to 175 °C | XII |
| g. Insulated above 175 °C | <u>XVII</u> |

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APPENDIX V

Painting Schedule for Electric Equipment and Motors

- a. Preferred System from Manufacturers
- b. Over Manufacturers Standard Finish

See Appendix
X, XI, XX, or XXI
XVI or XVII

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APPENDIX VI

Painting Schedule for Pumps, Compressors and Drivers

Carbon Steel and Low Alloy Steel

See Appendix

a. Uninsulated up to 120 °C for Caustic Environment

X

b. Uninsulated up to 120 °C for Acid Environment

XI

c. Uninsulated above 120 °C

XVII

d. Uninsulated up to 65 °C carrying Potable Water

XX

e. Uninsulated up to 65 °C carrying Demineralized Water

XXI

f. Insulated up to 175 °C

XII

g. Insulated above 175 °C

Not Painting

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APPENDIX VII

Painting Schedule for Stainless and Alloy Material

Insulated below 175 °C

See Appendix
XV

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APPENDIX VIII

Painting Schedule for Underground Piping and Equipment

Metal Temperature 70 °C to 120 °C

See Appendix
IX

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APPENDIX IX

Surface Preparation and Painting Systems for Underground Piping and Equipment Limitations:

- Operating with Metal Temperature 70 °C to 120 °C
- For Carbon Steel and Low Alloy Steels.

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	High Build Epoxy-Polyamide/amine	200	
Finish Coat	High Build Epoxy-Polyamide/amine	200	
		400	

Note: All underground piping operating with a metal temperature below 70 °C is to be coated and wrapped.

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APPENDIX X

Surface Preparation and Coating Systems Highly Corrosive Areas for Caustic Environment

Limitations:

- Where Surface Temperature is 120 °C (Maximum)
- Uninsulated Carbon Steel and Low Alloy Steel Vessels, Piping, Structural Steel and Equipment.

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Zinc Rich Epoxy	75	
Finish Coat	Polyurethane	125	
		200	

- Uninsulated Galvanized or Stainless Steel pipework.

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	Sweep blast or Roughening the surface		
Primer Coat	Epoxy	80	
Finish Coat	Polyurethane	120	
		200	

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APPENDIX XI

Surface Preparation and Coating System for Highly Corrosive Areas for Acid Environment - Melamine Building (Nitric Acid, Phosphoric Acid)

Limitations:

- Where Surface Temperature is 120 °C Maximum
- Uninsulated Carbon Steel and Low Alloy Steel Vessels, Piping, Structural Steel and Equipment.

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Zinc Rich Epoxy	75	
Finish Coat	Polyurethane	125	
		200	

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APPENDIX XII

Surface Preparation for Carbon Steel and Low Alloy Steel Surfaces Under Insulation

Limitations :

- Metal Temperature up to 175 °C

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy Novolac	100	
Finish Coat	Epoxy Novolac	100	
		200	

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APPENDIX XIII

Surface Preparation and Coating System for Galvanized Surface

Limitations:

1. Acid Area

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy	80	
Finish Coat	Polyurethane	120	
		200	

2. Caustic Area

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy	80	
Finish Coat	Polyurethane	120	
		200	

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APPENDIX XIV

Surface Preparation and Coating System for masonry - Corrosive Area (Nitric Acid, Phosphoric Acid, Urea, and Melamine areas)

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy	80	
Finish Coat	Polyurethane	120	
		200	

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APPENDIX XV

Surface Preparation and Coating Systems for Manufacturer's Standard System Applied-Acid Area

Uninsulated Galvanized or Stainless Steel pipework

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy	80	
Finish Coat	Polyurethane	120	
		200	

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APPENDIX XVI

Surface Preparation and Coating System for Uninsulated under 120 °C

Manufacturer's Standard System Applied-Acid Area

Limitations:

- Uninsulated Carbon Steel and Low Alloy Steel Pump, Compressor, Electric Equipment and Drivers.
- Over manufacturer standard finish.

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy	80	
Finish Coat	Polyurethane	120	
		200	

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APPENDIX XVII

Surface Preparation and Coatings System for Uninsulated and Insulated High Temperature Steel Surfaces, Vessels, Stacks, Mufflers, etc.

a. The following are suitable for 120 °C to 250 °C

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Inorganic Zinc Silicate	50	
Intermediate Coat	Silicone Acrylic	25	
Finish Coat	Silicone Acrylic	25	
		100	

b. The following are suitable for above 250 °C

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Silicone aluminium	25	
Finish Coat	Silicone aluminium	25	
		50	

Note:

- Finish Coat Colors are usually silver/Aluminum, black or grey.
- Most finish coats above 200 °C will have to be heated to at least 260 °C to assure curing. The manufacturer's directions shall be adhered to.
- If no top coat is required, the primer shall be applied at a MDFT of 4.0 mils.

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APPENDIX XVIII

Surface Preparation and Coating Systems for Highly Corrosive Areas Structural Steel, Floor Plate, Handrails, Ladders, Etc.

Surface Preparation

1. Pickle in dilute hot sulfuric acid solution followed by thorough rinse with clean water.
2. When directed by Engineer blast cleaning may be substituted in lieu of pickling. Clean surfaces to SSPC-SP10.

Primer

Hot dip galvanized, See APPENDIX XIII.

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APPENDIX XIX

Surface Preparation and Coating Systems for Moderately Corrosive Areas

- a. Structural Steel, Platforms, Ladders, Handrails, Vessels, Storage Tanks, Piping, Miscellaneous Metal.

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Zinc Rich Epoxy	75	
Finish Coat	Polyurethane	125	
		200	

- b. Uninsulated Galvanized or Stainless Steel pipework

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy	80	
Finish Coat	Polyurethane	120	
		200	

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APPENDIX XX

Surface Preparation and Coating Systems for Potable Water Tanks

Limitations:

1. Maximum Temperature 65 °C
2. Internal Surfaces of Storage Tanks

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy Polyamide/amine	125	
Finish Coat	Epoxy Polyamide/amine	125	
		250	

Note: Allow 7 days drying with suitable forced heating, ventilation and/or circulation.
Meets. U.S. Public Health Service.

- *) Does not have U.S. Health Approval.
Flush with fresh water at least once before carrying potable water.

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APPENDIX XXI

Surface Preparation and Coatings Systems for Demineralized Water Tanks

Limitations:

1. Maximum Temperature 65 °C
2. Internal Surfaces of Storage Tanks.

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Epoxy Polyamide/amine	125	
Finish Coat	Epoxy Polyamide/amine	125	
		250	

*) Observe curing and air circulation requirements for at least 7 days before commissioning.

Note: Finish coat shall be cured by forced heating.

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APPENDIX XXII

Surface Preparation and Coating Systems for Structural, Steelwork, Handrails, Ladders, Etc., in Marine Areas and Jetties

a. For above Splash Zone

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Zinc Silicate	60	
Intermediate Coat	Epoxy	160	
Finish Coat	Polyurethane	60	
		280	

b. Splash Zone & Below Water Line

Process	General Name	MDFT (Microns)	Remarks
Surface Preparation	SSPC-SP10		
Primer Coat	Glass Flake Epoxy	300	
Finish Coat	Glass Flake Epoxy	300	
		600	

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APPENDIX XXIII

Surface Preparation and Coating Systems for Walls for Building

Acrylic Base Emulsion Paint will be applied on all finish wall surface

Exterior	Applied by Acrylic Emulsion Paint Weather Shield Type
Interior	Applied by Vinyl Acetate Paint Type
Steel Door	Applied by Alkyd Paint Type
Aluminium	Applied by Anodized Type