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<b>Technical Specification for Painting and Coating</b>						
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## 1. SCOPE

### 1.1 Scope

This specification covers paint types, application methods, test and inspection, and others for corrosion prevention, color finishing, or other special function rendering of the LNG Fueled Facility Safety & Performance Test Bed in Korea (hereinafter referred to as the "TEST BED"), their auxiliary equipment, piping, and steel structures in TEST BED.

### 1.2 Code and standards

The following latest editions of publications and standards shall be used when referenced in this specification:

ASTM A123	Standard Specification for Zinc (Hot galvanized)
BS 729	Coatings on products fabricated from rolled, pressed and forged steel shapes, plates, bars and strip.
SIS-055900	Pictorial Surface Preparation Standards for Painting Steel Surfaces
ISO 8501-1	Preparation of Steel substrates before application of paints and related products.
SSPC-PA 1	Paint Application Guide, Shop, Field and Maintenance Painting
SSPC-SP 1	Surface Preparation Specifications, No. 1 Solvent Cleaning
SSPC-SP 2	Surface Preparation Specifications, No. 2 Hand Tool Cleaning
SSPC-SP 3	Surface Preparation Specifications, No. 3 Power Tool Cleaning
SSPC-SP 5	Surface Preparation Specifications, No. 5 White Metal Blast Cleaning.
SSPC-SP 6	Surface Preparation Specifications, No. 6 Commercial Blast Cleaning.
SSPC-SP 7	Surface Preparation Specifications, No. 7 Brush-off Cleaning.
SSPC-SP 8	Surface Preparation Specifications, No. 8 Pickling
SSPC-SP10	Surface Preparation Specifications, No. 10 Near-White Blast Cleaning
SSPC-PS 8.01	SSPC Paint System Specifications, Rust Preventive Compounds (Thick Film)
SSPC-PS 12.00	SSPC Paint System Specifications, Guide to Zinc Rich Coating Systems
BS 5493	Code of Practice for Protective Coating of Iron and Steel Structures against Corrosion
ANSI A13.1	Scheme for the identification of piping systems
ANSI Z 53.1	Safety Color Code for Marking Physical Hazards
KS	KS A 0011, KS A 0062, KS A 0503, KS A 3501
KOSHA	Korea Occupational Safety & Health Agency (former KISCO)

### 1.3 Definitions

#### 1.3.1 Painting materials


Painting materials are generally composed of pigments, polymers, thinners, and additives. When the painting materials are applied, the thinner is dispersed to the air by physical and chemical changes in the painting materials and the pigment, polymer, and part of additives are left to form dry films on the painted surfaces

#### 1.3.2 Pigments

Pigment are materials used to add colors such as white and red to the painting materials or to increase their durability (coloring pigments), to prevent rust on metal surfaces (rust-inhibitive pigments), to adjust the luster, to increase the dry film strength, or to lower the paint cost (constitutional pigments).

#### 1.3.3 Polymers

Polymers are included in all paints and play an important role in their performance. The names of

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melamine resin paint and epoxy resin paint are the names of the polymers in those paints. Painting materials

#### 1.3.4 Thinners

Thinners are used to dissolve polymers in paints for adjusting drying speed, improving workability or smoothness (fluidity) of the dry films.

#### 1.3.5 Additives

Additives such as plasticizers, drying agents, dispersion agents, etc. are added in a small amount to the paints to adjust the properties of paints. No additives are added to some paints.

#### 1.3.6 Primers

Primers are the first paint surfaces applied to the metallic bodies for close adhesion and protection of the film of previously applied paints and for provision of satisfactory surfaces for the next applications. Therefore, the primer film shall have good resilience and adaptability to the expansion and contraction that accompany temperature changes. Primers include rust-preventing pigments.

#### 1.3.7 Putty


Putty is usually applied thick with a scoop to the surfaces with holes, cracks, and deep dents to be painted to fill them up. It is better not to use putty as long as possible because it contains a large portion of pigment and has poor shockproof characteristics.

#### 1.3.8 Oven drying or baking

Painted surfaces may be left in the air for a time to be partly hardened and then be dried by heating in an oven at a constant temperature for a certain period of time. Temperature shall be gradually increased to prevent pinholes in the paint films.

#### 1.3.9 Prepared surface

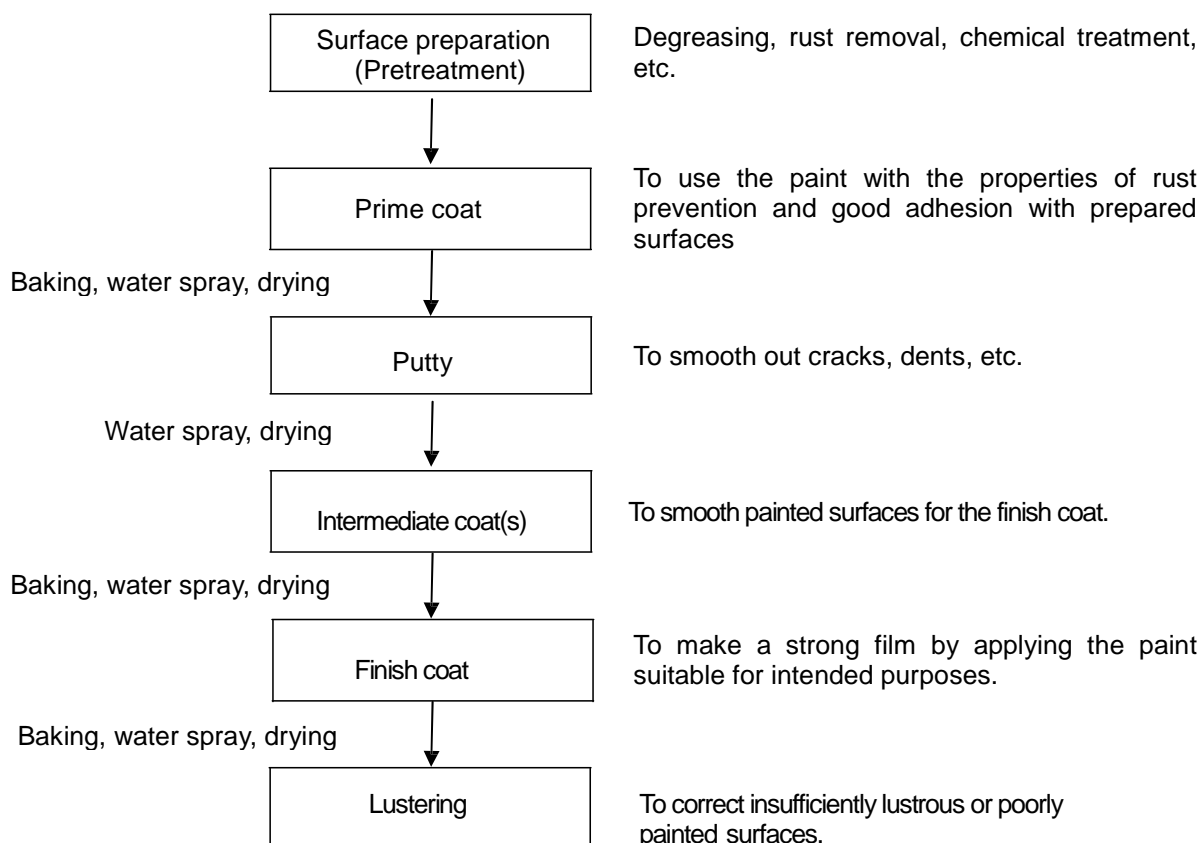
A prepared surface is a surface to be painted after having been surface-treated by removing rust, degreasing, and chemical treating to assure good performance of the primer coating

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## 2. GENERAL

### 2.1 Painting process

General painting work procedure is as follows. Some parts of the process may be repeated or cancelled according to circumstances.



### 2.2 Surface preparation

Surface preparation is cleaning and treating the surfaces to be painted by removing from the surfaces all foreign materials that may cause early defects listed in painting specifications and by making it possible for the paint to adhere to the surfaces. It is classified into A1 to A15 according to the preparation methods and related specifications, and its details are as Table 1.

### 2.3 Paint types and paint film


Paint types are classified into B1 to B14, and B20 to B28, and thickness, color, and solid contents of the film are as Table 2.

### 2.4 Methods of paint application

Methods of paint application are classified into C1 to C12, and their details are as Table 3.

### 2.5 Drying methods

Paint, whether of reaction type or of non-reaction type, is dried and hardened by air drying method or oven-drying


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method. Basic conditions for drying are as follows:

- 1) Painting work places and air shall be clean and free of dust.
- 2) Moderate air flow shall be maintained for air drying (excessive air flow helps the paint dry in short time but leaves rough painted surface).
- 3) The temperature in the drying room shall be maintained at above 10℃, and humidity below 90% Rh. The best drying condition would be of 20℃, and 75% Rh.
- 4) In the case of multiple coat painting, each coat shall be applied after the preceding coats are adequately dried. The application intervals for each type of paint are as below table.
- 5) In the case of oven drying, the painted parts shall be baked after they are set to a certain extent, and the volatile organic thinner shall be exhausted from there.

<Application intervals for each type of paint>

Under Coat Painting System	Upper Coat Painting System	Application Interval (min. – max.)
Etching primer	~ Zinc oil rust preventing paint	1 day ~ 3 months
Zinc rich primer	~ Epoxy under coat paint (mist coat)	1 day ~ 10 months
Thick zinc rich primer	~ Epoxy under coat paint	2 day ~ 12 months
Zinc oil rust preventing paint	~ Zinc phthalic acid rust preventing paint	2 day ~ 6 months
Zinc Phthalic acid rust preventing paint	~ Phthalic acid intermediate coat paint	1 day ~ 6 months
Phthalic acid intermediate coat paint	~ Phthalic acid intermediate coat paint	1 day ~ 10 days
Phthalic acid rust preventing paint	~ Phenol MIO	2 day ~ 6 months
Phenol MIO	~ Chlorinated rubber intermediate coat paint	2 day ~ 12 months
Chlorinated rubber under coat paint	~ Chlorinated rubber intermediate coat paint	1 day ~ 12 months
Chlorinated rubber intermediate coat paint	~ Chlorinated rubber top coat paint	1 day ~ 1 month
Epoxy under coat paint	~ Chlorinated rubber intermediate coat paint	1 day ~ 7 days
Epoxy under coat paint	~ Epoxy intermediate coat paint	1 day ~ 3 months
Epoxy MIO	~ Epoxy intermediate coat paint	1 day ~ 12 months
Epoxy intermediate coat paint	~ Polyurethane top coat paint	1 day ~ 7 days
Epoxy intermediate coat paint	~ Fluoride upper coat paint	1 day ~ 7 days
Tar epoxy	~ Tar epoxy	1 day ~ 7 days
Vinyl ester	~ Vinyl ester	1 day ~ 3 days


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### 3 TECHNICAL SPECIFICATION

#### 3.1 Items to be painted

- 3.1.1 Structural steel, equipment (e.g. vessels, heat exchangers, tanks and pumps) and above ground piping, shall be externally painted in accordance with the systems summarized in Table No. 1 to 12. The tables provide a summary of the various items to be painted, surface preparation, type of primer, finish paints, the number of coats required and the final coat color and markings for both ambient, high temperature and low temperature service.
- 3.1.2 Pressure equipment shall be painted after all pressure tests and heat treatments.
- 3.1.3 The piping systems including pipes, fittings, flanges, strainers, traps, and valves shall be repainted suitable for operating temperatures if the manufacturers' specifications fail to meet the operating temperatures.
- 3.1.4 Parts not insulated of insulated facilities such as nozzles, man way covers, valves, and safety valves of pressure vessels shall be painted suitable for their operating temperature.
- 3.1.5 Painting systems suitable for operating temperature of up to 80℃ shall be applied to the supports such as skirts, legs, saddles, etc.
- 3.1.6 In general, painting systems shall conform to the highest operating temperatures of the facilities and piping. As exceptions, supports shall be painted in accordance with Paragraph 3.1.7, and facilities including steam vents shall comply with Paragraph 3.1.5. Facilities that may be subject to abnormal temperature increase shall be excepted from the operating temperature application in this paragraph. Painted facilities in low temperature service shall conform to the lowest operating temperature.
- 3.1.7 The design temperature of venting steam shall be considered for the painting system of piping and facilities venting high temperature steam.
- 3.1.8 Parts not to be painted
  - 1) Buried bare steel piping with operating temperatures above 149℃.
  - 2) Aluminum, stainless steel or galvanized metal including insulation weatherproofing and earth proofing. However, street lampposts are exempted. (But, the galvanized metal surface for platform & ladder with handrail and small firewater piping less than 2" shall be painted in accordance with Purchaser's requirement.)
  - 3) Screwed items of valves, or gasket contact surfaces.
  - 4) Finished machined parts of machinery.
  - 5) Any equipment furnished completely primed and final painted by the manufacturer (e.g.
  - 6) Instruments, Instrument boards, motor) unless specifically required to repair paint damage or to match a color scheme.
  - 7) Internal surfaces of tanks (except water tanks).
  - 8) Aluminum pigmented or White insulation coating (fabric reinforcement and mastic).
  - 9) Cold-insulated stainless steel surfaces. However, those located in corrosive atmosphere are excluded .

#### 3.2 Specific requirements

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- 3.2.1 The specific requirements for surface preparation applicable to both shop and field protective coatings shall be designed in accordance with Table No. 1 and Table No. 5 to 11.
- 3.2.2 The specific requirements for paint type, color and thickness applicable to both shop and field protective coatings shall be designed in accordance with Table No. 2 and Table No. 5 to 11.
- 3.2.3 The specific requirements for method of paint application to both shop and field protective coatings shall be designed in accordance with Table No. 3 to 4 and Table No. 5 to 11.
- 3.2.4 No substitution or modification to materials and methods of application detailed in this Specification is permissible unless prior approval has been obtained from the Purchaser.
- 3.2.5 Where conflicts arise between this Specification and any other contract and related document, the Contractor shall obtain a written ruling before proceeding with the work affected.


### 3.3 Surface preparation

- 3.3.1 Surface preparation and pre-treatment shall be in accordance with the Steel Structures Painting Council descriptive standards listed in column 'A' of Table No. 1.
- 3.3.2 In general, steel grit, shot, and sand are suitable for spray-type air blasting surface preparation. The abrasives shall be clean, dry, and suitable to form proper roughness on the surface to be painted. The surface roughness corresponding to the kind and size of the abrasives are as the following Table:

Type of abrasive		Max. particle size (mesh)	Max. profile (μm)
Sand	Very fine	80	40
	Fine	40	50
	Medium	18	65
	Large	12	70
Grit	SAE G-80	40	30 ~ 75
	SAE G-50	25	85
	SAE G-40	18	90
	SAE G-25	16	100
	SAE G-16	12	200
SHOT	SAE S-170	20	45 ~ 70
	SAE S-230	18	75
	SAE S-330	16	85
	SAE S-390	14	90

- 3.3.3 The abrasive for the surfaces of which principal ingredient is inorganic zinc silicate ( $ZnSiO_3$ ) shall be of sharp and pointed shapes and shall not be used as shots.
- 3.3.4 Flange faces and valves that may be harmed by blasting during surface preparation shall be prepared with hand tools or power tools in accordance with SSPC SP2 or SSPC SP3.
- 3.3.5 Surfaces of austenitic stainless steel pipes or facilities shall be prepared by using silica safe abrasive that has less chlorides or heavy metals. Surfaces prepared by light blasting in accordance with SSPC SP6 will be equal to the Sa2 surface of SIS 055900 (ISO 8501-1) specification. In case the blasting method is inapplicable, other alternative method shall be employed with the purchaser's approval.
- 3.3.6 The thinner used for preparing stainless steel surfaces shall not contain any metal ingredients and its chloride contents shall be 50 ppm or less.
- 3.3.7 Extreme care must be taken with regard to over coating times so that pin-holing does not occur.



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### 3.4 Selection of Paint

- 3.4.1 Rust-preventive paints used for rust prevention during transportation shall satisfy SSPC PS8.01.
- 3.4.2 Organic or inorganic primers whose principal ingredient is zinc shall conform to SSPC PS12.00, Section 3. However, the inorganic paint whose zinc content is 82wt% to 90wt%, the organic paint whose zinc content is 85wt% to 90wt%, and those inorganic and organic paints whose zinc contents are respectively under 82wt% and 85wt% in dry film are not to be governed by that section.
- 3.4.3 Unless otherwise specified, paint shall be selected in accordance with SSPC PA1 and the recommendation by the paint manufacturer.
- 3.4.4 The painting contractor shall keep the latest data sheets including paint ingredients issued by the paint manufacturer. These data shall include special guidelines for shelf time, pot life, thinners, guidelines for thinning and mixing, drying time, hardening time, recommendations on sprayers, safety equipment, cleaning thinner, and the guideline for priming coat and finishing coat. These articles shall include the contents of this standard and other related specification.
- 3.4.5 Unless otherwise specified, the paints to be applied on prime-coated surfaces shall be manufactured by the same manufacturer of that prime coat paint, to guarantee the performance of the prime coat. It shall conform to Table No. 2.

### 3.5 Application of Paint

- 3.5.1 If surfaces to be applied with rust preventive paints are contaminated, they shall be cleaned with clean water or proper thinner. Those surfaces contaminated during drying shall also be cleaned. In the case of surfaces applied with the paint whose principal ingredient is ZnSiO<sub>3</sub>, zinc salts shall be manually cleaned with clean water by using stiff brushes that can spray high- pressure water.
- 3.5.2 If the film thickness fails to satisfy the specification, additional paint shall be applied.
- 3.5.3 The calculation formula of wet film thickness to obtain specified dry film thickness is as follows:
- 3.5.4 Wet film thickness = [dry film thickness / volumetric percentage of solid contents (%)]\*100
- 3.5.5 Blasted surfaces shall be applied with paint within 5 hours after the blasting to prevent any defect due to the contamination of the surface by its oxidation or by other contaminants. Surfaces prepared otherwise may be applied with paint within 8 hours after the surface preparation.
- 3.5.6 Paint application conditions
- 1) Temperature : Paint shall be applied when the atmospheric temperature and the temperature of the surface to be painted is 10 to 40℃.
  - 2) Humidity : The desirable relative humidity for paint application is 40% to 80%, and all types of paint shall be applied only when the temperature of the surface is 3℃ higher than the dew point. If paint is applied at the temperature below 3℃ above the dew point, there may be moisture condensation on the surface and the adhesion of paint may be decreased.
  - 3) Wind: Outdoor paint application shall be avoided when wind velocity is 6 m/s or over. Strong wind will cause severe paint loss and environmental contamination.
  - 4) Rain or snow: During rain or snow, outdoor paint application shall be avoided to prevent film defects such as decreased adhesion, film peeling off, poor appearance, film performance deterioration, etc.

#### 3.5.7 Storage and use of paint

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- 1) Paint shall be kept in principle in an exclusive paint storage and in a place free of direct sunlight, fire, and other materials prone to hazards. If ventilation fans are not installed, the storage shall be of a structure with smooth ventilation. The storage room temperature shall be maintained at 5 to 35℃.
- 2) Paint shall be kept in a site storage approved the purchaser and the storage shall be marked with the signs of 'PAINT STORAGE' and 'NO FIRE'.
- 3) Precaution shall be taken against fire in the paint storage and no fire shall be allowed in the storage and around it.
- 4) Only necessary quantity of paint shall be taken out for use from the storage, and the lot of each type delivered earlier shall be taken out first.

### 3.6 Manufacturers' standard paint system

In case the shop painting systems for priming coat and finish coat are allowed, the followings shall be conformed to:

- 1) The painting system shall have anti-oil performance and have the service life of 3 years or over in the design conditions.
- 2) The painting system for the operating temperature up to 80℃, shall have minimum 3 coats of dry film about 150 microns thick. This type of paint will be self-hardened or chemically hardened, and shall not rely on air-drying to obtain the maximum strength.
- 3) The painting system for the operating temperature over 80℃ shall be of heat-resisting paint system to withstand high temperature.
- 4) Surfaces shall be prepared by blasting, and power tools shall be used where the blasting is not possible.
- 5) The manufacturer shall provide the purchaser with the information on the types of paint for possible field painting on the damaged shop-painted parts.
- 6) The shop painting system shall be approved in writing by the purchaser.
- 7) In the painting system for low temperature service, the effect of the foreseeable lowest temperature shall be considered.

### 3.7 Austenitic stainless steel surfaces


3.7.1 The austenitic stainless steel piping and equipment need not be coated except:

- 1) where surface operating temperature is between 60℃ and 120℃
- 2) where specially required by Owner

All stainless steel surfaces shall be cleaned free from dirt, dust, etc. and shall be passivated at shop where not coated. Passivation procedure shall be submitted for Owner's review.

3.7.2 For all priming and or finishing coats applied to austenitic stainless steel, the coating manufacturer shall produce certificates to confirm that the coating is free of contaminants i.e. metallic pigments, sulphur or chlorine which would harmfully affect stainless steel at ambient or elevated temperatures. The certificates shall include a chemical analysis for halogens in accordance with ASTM D808 and shall provide confirmation that the halogen content is below 200 PPM.

3.7.3 For all priming and finishing coats applied to austenitic stainless steel in cryogenic service, the coating manufacturer shall produce certificates in the form of test results to demonstrate that the applied coating

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will remain stable when subjected to operating temperatures within the range of +120℃ to -196℃ and when subjected to cyclic conditions of temperature and thermal shock.


## 4 TEST AND INSPECTION

- 4.1 The quality assurance program shall be submitted to the purchaser for the approval on the products and services, and the products shall be tested and inspected in accordance with the quality assurance program. The scope of tests shall follow the manufacturer's standard. The purchaser is entitled to let the manufacturer have the tests proved.
- 4.2 For the prime coat and finish coat on austenitic stainless steel, the paint manufacturer shall submit the guarantee letter that the paints do not include any impurities such as metal pigments, sulfuric acid, hydrochloric acid that may damage the stainless steel at atmospheric or higher temperature.
- 4.3 For the prime coat and finish coat on austenitic stainless steel in cryogenic service, the paint manufacturer shall submit the guarantee letter that the paint is safe in the temperature cycle between +120℃ and -196℃ and from heat impact.
- 4.4 Paints shall be delivered in safely sealed condition to the site, and their names, types, lot numbers, manufacturing dates, and quantities are to be confirmed by the purchaser.
- 4.5 Unless otherwise specified, the tolerance in the dry paint film thickness shall be within 0 to 20%. The film thickness of each paint layer shall be measured with film thickness gages such as Elcometer, Micro-test, and Tinsley. These gages shall be corrected at least twice a day after the manufacturers' recommended methods.
- 4.6 For the correct measurement of dry film thickness, wet film thickness should be measured often with a wheel type or a comb type Elcometer during the paint application.
- 4.7 Paint shall not cause coriaceous surface phenomenon, gelling, segregation of pigment.
- 4.8 When paint is being applied, there shall be no defects such as brush trace, foam and seeding, pitted surface, flowing and drooping, spattering, stained luster, thread marks, pinholes, wrinkles, blots, lifting, brushing, under-baked and over-baked parts, gas checking, transparency, faded color, metallic stains, color stains, etc.
- 4.9 After the paint application, there shall be on the painted surface no defects such as deoxidization, peeling off, discoloration and fading, excessive over-baking, swelling and blister, white foam, cracks, mold, etc.
- 4.10 All materials shall be certified by KS specification from Law for Industrial Standardization in Korea. Vendor shall procure and use KS certified materials, unless otherwise specified. In case there is no KS certified materials for applications, Vendor shall use the highest grade among materials standardized by related laws and regulations.

## 5 QUALITY ASSURANCE

- 5.1 The manufacturer of the products specified or the contractor providing the painting of the systems or services shall have quality assurance system and in line with ISO 9000 standards or equivalent schemes.
- 5.2 The contractor or manufacturer shall submit certificates and guarantee letters to the purchaser.
- 5.3 The paint supply contractor shall supply major materials and services within the supply scope in accordance with the standards and specifications summarized in this standard. The contractor's supply includes the followings:

For instance, all materials necessary for the paint system such as basic materials, all accessory materials, tools, and all services necessary for painting and testing of the system such as detail drawings, documents,

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process, material storage and control, painting, test, insulation, repairs, turnover documents, and data sheets for recording, work, and maintenance, described in this document.


The materials delivered to the site shall be properly packed and identified with necessary information such as the manufacturer's name, product name, class, batch no, applicable specification, safety data sheets, pot life, etc.

Delivered materials shall be accompanied by important documents such as purchaser order, guarantee letter, and confirmation letter, and shall conform to the transportation requirements.

- 5.4 Appropriate quality plans shall be presented to the Purchaser for review and approval concerning the products and services provided. Inspection and testing during manufacture shall form the basis of these quality plans, extend of test shall be according to manufacturer's standards. The Purchaser will have the right to witness any relevant tests.

## 6 SAFETY

- 6.1 Finishing materials of the work shall be stored in a place protectable from fire.
- 6.2 Care shall be taken of heavy loads applied to the knees when they are bent or drawn up.
- 6.3 Storage rooms shall be provided with explosion-proof lighting fixtures and enclosed switches.
- 6.4 Product markings shall be kept attached in proper and correct manner.
- 6.5 Finishing materials shall not be stored without proper covers in the storage room.
- 6.6 Floors, walls, ceilings, and the painting room shall be regularly cleaned.
- 6.7 Protection devices shall be ready and be maintained in good condition.
- 6.8 In limited space, sufficient ventilating system shall be provided to facilitate proper drying of paint film and to keep the atmosphere below the explosion limit that may be challenged by the evaporation of thinner.
- 6.9 The procedure of safety certification for approval from KOSHA, KTL or KGS shall be followed to under Korean Industrial Safety Health Law.


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**Table No. 1 Surface Preparation**

CODE	TYPE	SSPC DESCRIPTIVE STANDARD 'A'	ISO-8501-1 PICTORIAL STANDARD 'B'
A1	SOLVENT CLEAN (PER SECTION 7.4 IN THE CASE OF S.S. SURFACES)	SP1	-
A2	HAND TOOL CLEAN	SP 2	St 2
A3	POWER TOOL CLEAN	SP 3	St 3
A4	MANUFACTURERS' STANDARD FLASH/ PICKLING FLUXING PRETREATMENT PROCESS	-	-
A5	WHITE BLAST CLEAN	SP 5	Sa 3
A6	COMMERCIAL BLAST CLEAN	SP 6	Sa 2
A7	BRUSH-OFF BLAST CLEAN	SP 7	Sa 1
A8	PICKLING	SP 8	-
A9	CLEAN DOWN WITH STIFF BRUSHES IN CONJUNCTION WITH CLEAN UNCONTAMINATED H.P. WATER HOSE SPRAY	-	-
A10	NEAR WHITE BLAST CLEAN	SP 10	Sa 2 1/2
A11	VACUUM BLAST WITH PORTABLE EQUIPMENT TO EQUIVALENT STANDARD USED ON ADJOINING SURFACES	-	-
A12	REMOVE ALL ACCESSIBLE WELD SPATTER	SP 2	-
A13	REMOVE REMAINING DETRIMENTAL WELD FLUX DEPOSITS	SP 1	-
A14	LIGHTLY BLAST CLEAN STAINLESS STEEL SURFACES TO REQUIREMENTS OF SECTION 7.4	SP 6	Sa 2
A15	THOROUGHLY ABRASE WITH COARSE EMERY CLOTH IN CONJUNCTION WITH SOLVENT CLEANING A1	-	-

**Note**

Surfaces shall receive the required degree of surface preparation as described in the appropriate S.S.P.C. descriptive standard, Column 'A', when read in conjunction with the quality grade of preparation corresponding in appearance to the pictorial standards presented in ISO-8501-01 Standard


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**Table No. 2 Paint Type, Color and Thickness**

CODE	TYPE	RAY FILM THICKNESS PER COAT MICRONS	COLOUR	MIN VOL SOLIDS ASTM D 2697-86
B1	TWO PACK INORGANIC ZINC SILICATE (SELF CURING) ETHYL SILICATE BASED	75	METALLIC GREY	58
B2	TWO PACK ORGANIC ZINC RICH POLYAMIDE CURED EPOXY PRIMER	65	METALLIC GREY	45
B3	TWO PACK POLYAMIDE CURED EPOXY TIE COAT	40	RED OXIDE	45
B4	TWO PACK POLYAMIDE CURED EPOXY HIGH BUILD COAT	125	OFF-WHITE	60
B5	TWO PACK ALIPHATIC URETHANE	NOTE 2	NOTE 1	45
B6	TWO PACK ALUMINIUM FILLED MODIFIED EPOXY – CARBOMASTIC 15 OR EQUAL	125	ALUMINIUM	
B7	ONE PACK ACRYLIC MODIFIED SILICONE ALUMINIUM HEAT RESISTING	25	ALUMINIUM	37
B8	TWO PACK POLYURETHANE RED OXIDE PIGMENTED PRIMER (LEIGHS RESISTEX K570 SS)	35/50	RED OXIDE	42/46
B9	POLY SILOXANE INORGANIC PAINT (AMERON 738)	125	DARK GREY	65
B11	TWO PACK ALUMINIUM FILLED MODIFIED EPOXY- CARBOMASTIC 15 OR EQUAL	50	ALUMINIUM	90
B12	TWO PACK POLYAMIDE CURED HIGH BUILD EPOXY/MIO.	125	CHARCOAL GREY	60
B13	TWO PACK POLYAMIDE CURED HIGH BUILD EPOXY/MIO	125	SILVER GREY	60
B14	ONE PACK CURE SILICONE ALUMINIUM HEAT RESISTING COATING	25	ALUMINIUM	
B20	HOT DIP GALVANIZED TO ASTM A123( OR ASTM A153)	86 (610 g/m2)	SELF COLOUR	
B22	ALUMINIUM SPRAY TO BS EN 22063: 94	300 ± 75	SELF COLOUR	
B23	MANUFACTURERS STANDARD PREPARATION AND NON-BITUMINOUS TRANSIT PROTECTIVE COATING		-	
B24	MANUFACTURERS STANDARD CORROSION INHIBITIVE COMPOUND CAPABLE OF BEING EASILY REMOVED IN THE FIELD	-		
B25	RUST PREVENTATIVE COMPOUND IN COMPLIANCE WITH SSPC - PS 8.01	-	-	
B26	TWO PACK AMINE CURED COAL TAR EPOXY	200	DARK BROWN	
B27	TWO PACK AMINE CURED COAL TAR EPOXY	200	BLACK	
B28	INORGANIC SILICATE TOPCOAT	75	WHITE	43
B29	EPOXY PHENOLIC PRIMER	75	WHITE	55
B30	EPOXY PHENOLIC FINISH	100	GREY	55
B31	TWO PACK HIGH BUILD EPOXY AMERON 400C OR INTERGARD 410 OR EQUIVALENT	125	NOTE 1	85
B32	AMINE ADDUCT EPOXY PRIMER	100	RED OXIDE	
B33	AMINE ADDUCT EPOXY	100	WHITE	
B34	WATERSOLUBLE EPOXY PRIMER	40	RED OXIDE	
B35	WATERSOLUBLE EPOXY	100	WHITE	
B36	FIREPROOFING COATING	750	MAKER STD	
B37	POLYAMIDE CURED EPOXY PRIMER	50	GREY	

NOTE)

1. B5 & B31 Code colour : Refer to Table No. 4
2. For equipment : 50 microns, For structural steel : 100 microns

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**Table No. 3 Method of Paint Application**

CODE	DESCRIPTION
C1	PAINT SHALL BE BRUSH APPLIED
C2	PAINT SHALL BE AIR SPRAY APPLIED
C3	PAINT SHALL BE HOT SPRAY APPLIED
C4	AIRLESS OR HIGH PRESSURE SPRAY APPLIED
C5	SPOT CLEAN AND TOUCH-UP DAMAGED AREAS (SEE NOTE C.5)
C6	DO NOT PREPARE PRIME OR PAINT
C7	MANUFACTURERS STANDARD PREPARATION AND FINISH, MEETING REQUIREMENTS OF SECTION 9
C8	LEAVE SELF COLOUR
C9	PAINT IN ACCORDANCE WITH LOCAL STANDARDS
C10	APPLY PRIMING AND FINISHING COAT SYSTEM IDENTICAL TO THAT APPLIED TO ADJACENT SURFACES (SEE NOTE C.10)
C11	NO FINISHING COAT SYSTEM TO BE APPLIED
C12	HEAT CURE SILICONE BASED COATINGS IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS

Note:

(C5) For C5 where spot clean and touch-up of damaged areas of galvanized surfaces and shop applied inorganic zinc silicate coating (B1) is involved, use organic zinc rich polyamide cured epoxy primer (B2) for operating temperatures up to 150 °C, and limit the use of inorganic zinc silicate (B1) to surfaces having an operating temperature in excess of 150 °C.

(C10) For C10 where it is required to apply a priming and finishing coat system identical to adjacent surfaces in way of bolted areas etc., use the specified inorganic zinc silicate primer (B1) where it has been possible to blast clean the surface or where the operating temperature is in excess of 150 °C, and use aluminium filled modified epoxy (B6) as a primer for surfaces up to 150 °C where it has only been possible to power tool clean the surface.


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**Table No. 4 Final Coat Colors, Marking and MUNSELL & RAL CODE Table**

**4-1. Final coat colors and Marking**


GROUP	APPLIED FACILITIES	FINISH COLOR (Munsell No)	BAND COLOR (Munsell No)	LETTER'G	LETTERING COLOR
Safety device	High expansion foam facilities, dry chemical extinguish facilities, foam crib, monitor, hydrant	Red (5.0 R 4 / 13)	-	-	White(N 9.0)
	Fire water piping		Blue (7.5 B 5 / 9)	FW	
	Fire extinguishing agent pumps, equipment (fire truck, extinguishers, etc), and switch panel (SPB)				
	Radioactivity equipment & storage area	Yellow (2.5 Y 8 / 14)	Red Purple (10 RP 4.5/13)		
Hot & Cold insulated piping	LNG	Silver grey (aluminium)	Yellow (2.5 Y 8 / 14)	LNG	Black (N1.0)
	NG, BOG		Yellow Red (7.5 YR 6 / 12)	NG, BOG	
	Industrial water, Potable water, Cooling water, Raw water		Blue (7.5 B 5 / 9)	IW, PW, CW, RW	White (N 9.0)
	B-C oil	Silver grey (aluminium)	Red Purple (10 RP 4.5/13)	BC	
Piping	NG	Green grey (7.5 GY 5.5 / 1)	Yellow Red (7.5 YR 6/12)	NG	White (N 9.0)
	BOG			BOG	Black (N1.0)
	Fuel gas	Yellow Red (7.5 YR 6 / 12)	Neutral grey (N 7.5)	FG	White (N 9.0)
	Nitrogen gas	Neutral grey (N 7.5)	White (N 9.0)	N2	
	Plant & Instrument air	White (N 9.0)	Green (2.5 G 5.5 / 7)	IA, PA	White (N 9.0)
	Odorant	Yellow (2.5 Y 8 / 14)	Neutral grey (N 7.5)	ODOR	Black (N1.0)
	Industrial water, Potable water, Cooling water,	White (N 9.0)	Blue (7.5 B 5 / 9)	IW, PW, CW	White (N 9.0)
	Seawater (for vaporisers)			SW	
	B-C oil	Silver grey (aluminium)	Red Purple (10 RP 4.5/13)	BC	Black (N1.0)
	Diesel oil	Red Purple (10 RP 4.5/ 13)	Neutral grey (N 7.5)	DO	
Valves	Valves	Green grey (7.5 GY 5.5/ 1)			White (N9.0)
Tanks	Nitrogen Tank	White (N 9.0)			Black (N1.0)
	HCL storage tank	Red Purple (10 RP 4.5/ 13)			White (N 9.0)
	B-C oil storage tank	Silver grey (aluminium)			Black (N1.0)
	Diesel oil storage tank	Neutral grey (N 7.5)			
	Odorant tank	Yellow (2.5 Y 8 / 14)			
	Industrial water, Potable water, Fire water	White (N 9.0)			
Drums	Purge & Cool-down Drum, LNG drain drum	Silver grey (aluminium)			Black (N1.0)
	Nitrogen drum	White (N 9.0)			
	Air Receiver drum	Green grey (7.5 GY 5.5 / 1)			White (N9.0)



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GROUP	APPLIED FACILITIES	FINISH COLOR (Munsell No)	BAND COLOR (Munsell No)	LETTER'G	LETTERING COLOR
Pumps	LNG pump	Silver grey (aluminium)	-	-	Black (N1.0)
	Industrial water, Potable water, Fire water, Cooling water, Rain & Drain water pump	Blue (7.5 B 5 / 9)	-	-	White (N9.0)
	Nitrogen pump	Neutral grey (N7.5)	-	-	Black (N1.0)
	HCL pump	Red Purple (10 RP 4.5/ 13)	-	-	White (N9.0)
	Sea water pump (vaporizer & fire sea water)	Neutral grey (N 7.5)	-	-	Black (N1.0)
	Odorant pump	Yellow (2.5 Y 8 / 14)	-	-	
Comp.	RGB, BOG comp., Air comp.	Purple blue (2.5 PB 3 / 9)	-	-	White (N9.0)
Heat exchanger / Heaters	ORV, Gas heater, S/W heater, HP & LP nitrogen vaporiser	Silver grey (aluminium)	-	-	Black (N1.0)
	Air dryer	Green (2.5 G 5.5/ 7)	-	-	White (N 9.0)
Others equipment	Loading/Unloading arm	White (N 9.0)	-	-	Black (N1.0)
	Cooling tower & Gas filter	Green grey (7.5 GY 5.5 / 1)	-	-	White (N 9.0)
	Crane & Hoist, Elevator	Yellow (2.5 Y 8 / 14)	-	-	Black (N1.0)
	Sluice gate	Black (N1.0)	-	-	White (N 9.0)
	S/W filter	Neutral grey (N 7.5)	-	-	Black (N1.0)
	Silencer	Silver grey (aluminium)	-	-	
Electric equipment	Emergency generator, transformer, UPS, condenser, panel	Neutral grey (N 7.5)	-	-	Black (N1.0)
	Paging system, electric motor, supports (panel & J/B)		-	-	
Steel structure	Flare stack	White (N 9.0) /	-	-	
	Vent stack	Red (5.0 R 4 / 13)	-	-	
	Pipe rack, Support	Green yellow (10 GY 6 / 5)	-	-	
	Platform & Ladder	Green grey (7.5 GY 5.5 / 1)	-	-	
	Ladder cages, handrail and handrail stanchion, kick plate	Yellow (2.5 Y 8/14)	-	-	
	Grating	Silver grey (aluminium)	-	-	
	Cable trench cover, valve box cover	Green grey (7.5 GY 5.5 / 1)	-	-	
	Door & shutter, Gate	Neutral grey (N 7.5)	-	-	
	Shelter for Fire water pump	Blue (7.5 B 5 / 9)	-	-	White (N 9.0)
	Signboard, bulletin board	Neutral grey (N7.5)			
CON'C	HP ORV, LP ORV, Dike for tank	Green (2.5 G 5.5 / 7)	-	-	
	Sub-station, ware house, maintenance shop, air compressor room, bunker-C boiler room	Neutral grey (N 7.5)	-	-	Black (N1.0)
	Protection wall	Yellow (2.5 Y 8 / 14) / Black (N1.0)	-	-	
Envir.	Waste water treatment system	Neutral grey (N 7.5)	-	-	Black (N1.0)

Note : Tolerance for color is Hue  $\pm 2$ , Value  $\pm 0.3$ , Chromatism  $\pm 1$

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#### 4-2. MUNSELL& RAL CODE


COLOR	MUNSELL No.	RAL CODE	COLOR	MUNSELL No.	RAL CODE
RED	5.0 R 4 / 13	3000	BLUE	7.5 B 5 / 9	5012
YELLOW RED	7.5 YR 6 / 12	1007	PURPLE BLUE	2.5 PB 3 / 9	5005
YELLOW	2.5 Y 8 / 14	1003	RED PURPLE	10 RP 4.5 / 13	3027
GREEN YELLOW	10 GY 6 / 5	6021	WHITE	N 9.0	9010
GREEN	2.5 G 5.5 / 7	6001	NEUTRAL GRAY	N 7.5	7038
GREEN GRAY	7.5 GY 5.5 / 1	7033	BLACK	N 1.0	9017
ALUMINIUM (SILVER GRAY)	-	9006			

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**Table No. 5 Vessels, Exchangers and Utility Tanks**


ITEM	PORTION OF ITEM (PAINT SYSTEM)	SURFACE PREPARATION AND PAINT INDEX				
		PREPAR'N	PRIMER	2nd COAT	3rd COAT	4th COAT
Field erected cone roof storage tanks (External)	Shells & roof, uninsulated, Amb ~ 93 °C (S11)	A1+ A10	C4/B2	C4/B13	A9+C5+C4/B5	
	Field welds (S12)	A1+A2+ A12+A13	C4/B6			
Field erected cone roof storage tanks (External)	Shells & roof, insulated, Amb ~ 93 °C	A1+ A10	C4/B2			
	Field welds (S12)	A1+A2+ A12+A13	C4/B6			
Field erected cone roof storage tanks (All internal)	Bunker-c storage tank Diesel	A1+ A10	C4/B2	C4/B26	A9+C5+C4/B26	
	oil storage tank Industrial	A1+ A10	C4/B32	C4/B33	A9+C5+C4/B33	
	water storage tank Potable	A1+ A10	C4/B3	C4/B12	A9+C5+C4/B13	
	water storage tank	A1+ A10	C4/B34	C4/B35	A9+C5+C4/B35	
Vessels & exchangers Carbon and ferritic alloy steel construction	Uninsulated -40°C ~93°C (S1)	A1+A10	C2 or C4/B1	C4/B3	A9+C5+C4/B13	C4/B5
	Uninsulated 94°C ~200°C (S2)	A1+A5	C2 or C4/B1	A9+C5+C4/B7	C4/B7	
	Uninsulated 201°C~400°C(S3)	A1+A5	C2 or C4/B1	A9+C5+C4/B14	C4/B14	
	Uninsulated 401°C~538°C(S4)	A1+A10	C2 or C4/B14	C2 or C4/B14	C5+C11+C12	
	Insulated -40 °C~400 °C (S13)	A1+A10	C2 or C4/B1	C4/B28	C5+C11	
Vessels & exchangers Austenitic stainless steel construction	Uninsulated 60°C ~120°C (S7)	A1+A14	C2 or C4/B8	A9+C5+C4/B3	A9 + C4/B13	
	*Insulated +60°C ~120°C (S7)	A1+A14	C2 or C4/B8	As above	As above	
	Uninsulated or insulated 121°C ~538 °C (S4)	A1 + A14	C2 or C4/B14	C2 or C4/B14		
Vessels & exchangers supports Carbon steel Construction	Carbon steel skirts & saddles (S1)	A1+A10	C2 or C4/B1	C4/B3	A9+C5+C4/B13	C4/B5
	Carbon steel skirts & saddles to be fireproofed (S14)	A1+A10	C2 or C4/B1	C4/B12	C5+C11	
	Bolting on vessel / exchanger flanges etc	B23	A1+A11+C10			
	Bolting on vessel / exchanger flanges where vacuum blasting is not practicable	B23	A1+A3+C10			

Note: \*Alternative paint system under insulation for S.S. is (B29 + B30), system S10.

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**Table No. 6 Pump Casings and Compressors**

ITEM	PORTION OF ITEM	SURFACE PREPARATION AND PAINT INDEX				
		PREPAR'N	PRIMER	2nd COAT	3rd COAT	4 <sup>th</sup> COAT
Pump casings and compressors Carbons and ferritic alloy steel construction	Uninsulated -170 °C ~93 °C (SM)	C7	C5			
	Uninsulated 94°C ~350°C(SM)	C7	C5			
	Insulated -170 °C ~93 °C (SM)	C7	C5			
	Insulated 94 °C ~350 °C (SM)	C7	C5			
	Compressor surfaces including main casings, base plate, air coolers, lube/seal oil filters and piping (SM)	C7	C5			
	Electric motors (SM)	C7	C5			
Pump casings Austenitic stainless alloy construction	Uninsulated +60 °C ~93 °C (S15)	A1+A14	C2 or C4/B6	A9+C5+ C4 /B5		
	Insulated +60 °C ~93 °C (S12)	A1+A14	C2 or C4/B6	C5+C11		
Pump casings aluminium alloy construction	Uninsulated -170 °C ~93 °C (SM)	B24	A1			
	Insulated -170 °C ~93 °C (SM)	B24	A1			

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**Table No. 7 Structural Steel**

ITEM	PORTION OF ITEM (PAINT SYSTEM)	SURFACE PREPARATION AND PAINT INDEX				
		PREPAR'N	PRIMER	2nd COAT	3rd COAT	4th COAT
Structural steel	Bare structural steel members and platform supports (S1)	A1+A10	C2 or C4/B1	C4/B3	A9+C5+C4/B13	C4/B5
	Structural steel members to be concrete fireproofed (S14), or	A1+A10	C2 or C4/B1	C4/B12	C5+C11	
	Structural steel members to be paint fireproofed.	A1+A10	C2 or C4/B1	C4/B3	A9+C5+C4 / B36	C4/B5
	Contact steel surfaces in way of friction type bolted joints (S16)	A1+A10	C2 or C4/B1	C11		
	CS pipe supports 40 °C ~93 °C (S1)	A1+A10	C2 or C4/B1	C4/B3	A9+C5+C4 / B13	C4+B5
	CS pipe supports 94 °C ~350°C (S3)	A1+A10	C2 or C4/B1	A9+C5+C4/B14	C4+B14	
	SS pipe supports -170°C~93°C (S8)	A1+A14	C2 or C4/B8	A9+C5+C4/B5		
	Field welds on structural steel	A13+A11	C10			
	Field welds on galvanised steel	A13 + A11	C5 + C11			
	Ladder cages, handrail & handrail stanchion, kick plates, platform & ladder (S23)	A1+A8+A4	B20	C2 or C4/B37	C5+C4/B5	
	Open grid flooring, platforms, stair assemblies (S17)	A1+A8+A4	B20	C5 +C11		
	Steel piles (S24)	A1+A10	C2 or C4/B26	C2 or C4/B27		

Note:


According to Korea Fire Protection Regulation, fire-protection paint shall be applied to the pipe rack of 6m height and over.

The bolts, nuts and washers on painted or galvanised structures may be either hot dip galvanised to ASTM A123 or ASTM A153 as appropriate, or mechanically galvanised in accordance with ASTM B695, Class 50 or higher. Galvanised high strength bolting shall be to ASTM A325 Type 1.

The rods, clevises, clamps used in pipe support and guide assemblies, excluding springs and other standard manufactured items, shall be to the above mentioned standards.


The galvanised items are unpainted, unless specified for safety markings on other considerations.

For the detailed specification and work procedure for the fireproof coating, Refer to Construction Specification for Steel Structure provided by Architecture Discipline.

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**Table No. 8 Electrical and Instrument Equipment**

ITEM	PORTION OF ITEM	SURFACE PREPARATION AND PAINT INDEX				
		PREPAR'N	PRIMER	2nd COAT	3rd COAT	4th COAT
Electrical and instrument equipment other than control valves	Cable trunking (S17)	A1+A8+A4	B20	C5+C11		
	Cable trays (S17)	A1+A8+A4	B20	C5+C11		
	Electric motors (SM)	C7	C5			
	Switches, transforms etc (SM)	C7	C5			
	Instruments & instrument boxes (SM)	C7	C5			
	Wall type panels (SM)	C7	C5			
	Console type panels, all surfaces incl. cabinets and desks (SM)	C7	C5			
	Instrument support steelwork (S1)	A1+A10	C2 or C4/B1	C4/B3	A9+C5+C4/B13	C4/B5

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**Table No. 9 Carbon & Ferritic Alloy Steel Piping & Fittings**

ITEM	PORTION OF ITEM	SURFACE PREPARATION AND PAINT INDEX				
		PREPAR'N	PRIMER	2nd COAT	3rd COAT	4th COAT
Above ground carbon and ferritic steel piping including nipples, fittings, flanges, line blinds	Uninsulated -40 °C ~93 °C (S1)	A1+A10	C2 or C4/B1	C4/B3(S)	A9+C5+C4 /B13	C4/B5
	Uninsulated 94 °C ~200 °C (S2)	A1+A5	C2 or C4/B1	A9+C5+C4 /B7	C4/B7	
	Uninsulated 201 °C ~400 °C (S3)	A1+A5	C2 or C4/B1	A9+C5+C4 /B14	C4/B14	
	Uninsulated 401 °C ~538 °C (S4)	A1+A10	C2 or C4/B14	C2/C4/B14	C5+C11+ C12	
	Insulated -40 °C ~150 °C (S5)	A1+A10	C2 or C4/B1	C4/2B3	C5+C11	
	Insulated 151 °C ~400 °C (No)	C6	C6			
Above ground galvanized piping including nipples, fittings, flanges, line blinds	Uninsulated -40 °C ~93 °C	A1	C2 or C4/B37	C5+C4/B5		
	Uninsulated -40 °C ~150 °C	A1+C5				
Weld end speciality inline components such as strainers where not galvanised	Weld margins 50 mm from each of all pipes and fittings	A13+A11	C10			
Carbon and ferritic alloy steel valves including control valves, flanged end speciality inline components such as flow indicators, flanged strainers, steam traps etc.	Uninsulated -40 °C ~93 °C (S6)	C7	A1+A3+C4 /B6	C4/B5		
	Uninsulated 94 °C ~400 °C (SM)	C7	C5			
	Uninsulated -40 °C ~150 °C (SM)	C7	C5			
	Insulated -40 °C ~150 °C (SM)	C7	C5			
	Insulated 151 °C ~400 °C (SM)	C7	C5			
	Valve handwheels, valves spindles, flange facings, orifice plates (SM)	C7	C5			
	Machined surfaces and threads	B25	A1+C6			

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**Table No. 10 Austenitic Stainless Steel Piping & Fittings**

ITEM	PORTION OF ITEM	SURFACE PREPARATION AND PAINT INDEX				
		PREPAR'N	PRIMER	2nd COAT	3rd COAT	4th COAT
Above ground austenitic stainless steel piping incl. nipples, fittings, flanges, line blinds, weld end speciality Inline components such as strainers	Uninsulated 60 °C ~120 °C *1)	A1+A10(S)	C2 or C4/B8(S)	C5+C4/B5	C5+C4/B13	
	Insulated 60 °C ~120 °C *1)	A1+A14(S)	C2 or C4/B8(S)	C5+C11	As above	
	Weld margins 50 mm from each end of all pipes and fittings	A13+A11	C10			
Austenitic stainless valves incl. control valves, flanged end speciality inline components such as flow indicators, flanged strainers etc.	Uninsulated -170 °C ~80 °C (S8)	A1+A14(S)	C2 or C4/B8(S)	C5+C4/B5		
	Insulated -170 °C ~80 °C (S9)	A1+A14(S)	C2 or C4/B8(S)	C5+C11		
	Valve handwheels, valves spindles, flange facings, orifice plates (SM)	C7(S)	C5			
	Machined surfaces, threads	B25(S)	A1+C6			

Note:


SHOP PREPARATION OR COATING

When the letter (S) signifying shop preparation or coating suffixes the code

i.e. A3 or C1(S) the required operation shall be carried out in the shop by the Vendor or in a fabrication shop at site.

\* 1) : See Para. 11.1 for area to be painted




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**Table No. 11 Flare Stack and Support Structures**

ITEM	PORTION OF ITEM	SURFACE PREPARATION AND PAINT INDEX				
		PREPR'N	PRIMER	2nd COAT	3rd COAT	4th COAT
Austenitic stainless steel surfaces of risers and piping associated with flare stacks (Note 1)	Zone A, radiation temp. below 120 °C (S18)	A1+A14	C2 or C4/B8	A9+C5+C4/B12	A9+C5+C4 /B13	
	Zone B, radiation temp. between 121 °C and 260 °C (S19)	A1+A14	C2/B7/C12	C2/B7/C12	C5	
	Zone C, radiation temp. between 261 °C and 540 °C (S4)	A1+A14	C2/B14/C12	C2/B14/C12	C5	
	Stainless steel bolting	B25	A1+A11+C10	Field painting to be carried out after final tightening of bolts to exposed threads only		
	Flare tip	B24	A1+C6			
Carbon steel surfaces of piping, support structures, handrail, ladders, ladder cages, walkways, stairways, grating, motors, gearboxes, winches, coupling and tackle associated with flare stack (Note 1)	Zone A, Radiation Temp. Below 120 °C (S20)	A1+A10	C2 or C4/B1	C4/B3	A9+C5+C4 /B12	C4/B13
	Zone B, Radiation Temp. 121 °C ~400 °C (S21)	A1+A5	C2 or C4/B1	A9+C5+C4/B9	C4/B9	
	Zone C, Radiation temp. 261 °C ~ 540 °C (S22)	A1+A5	B22	C4/B9	C4/B9	C5
	Heads and Nuts of Structural Steel and Pipework Bolting (S16)	A1+A10	C2 or C4/B1	A9+C5+C10		
	Threads of Structural Steel and Pipework Bolting	B25	A1+A11+C10	Field painting to be carried out after final tightening of bolts to exposed threads only		

Note:

1. In Zones A, B, C, one paint system based on 2 coats of polysiloxane inorganic paint at 125 microns each coat can be considered (S22).

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**Table No. 12 Paint Systems and Codes**

PAINT SYSTEM	PAINT CODES (See Table No. 2 for code description.)	PAINT SYSTEM	PAINT CODES (See Table No. 2 for code)
No	NO PAINT IS APPLIED	S13	B1+B28
S1	B1+B3+B13+B5	S14	B1+B12
S2	B1+B7+B7	S15	B6+B5
S3	B1+B14+B14	S16	B1
S4	B14+B14	S17	B20
S5	B1+B3	S18	B8+B12+B13
S6	B6+B5	S19	B7+B7
S7	B8+B3+B13	S20	B1+B3+B12+B13
S8	B8+B5	S21	B1+B9+B9
S9	B8	S22	B22+B9+B9
S10	B29+B30	S23	B20+B37+B5
S11	B2+B13+B5	S24	B26+B27
S12	B6	SM	Manufacturer's Standard Approved System