

BALOCHISTAN ENERGY COMPANY LIMITED

DEVELOPMENT OF LPG TESTING LABORATORY AT TAFTAN

GENERAL SPECIFICATION FOR PAINTING & COATING



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GENERAL SPECIFICATION FOR PAINTING & COATING

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GENERAL SPECIFICATION FOR PAINTING & COATING

1.0 SCOPE

This specification covers the minimum requirements for the supply of painting materials, application of painting materials on vessels, piping, structure, platforms and other equipment's located at LPG Testing Laboratory at Taftan during fabrication & construction. However, it is responsibility of contractor to provide most suitable & economical painting material for service condition.

- 1.1 The painting works to be performed by the Contractor shall include all necessary steps like supply of material, surface preparation, protection of the other works, application of primer, intermediate and top (finish) coats, cleaning of the working area as well as all intermediate and final inspection works.

1.2 Terminology

The following terminology will be applied throughout this specification.

Facility	Taftan, Pakistan
Company	Balochistan Energy Company Limited
Company Representative	A Company designated Personnel, Party/Parties duly authorized by the company to act on behalf of the company with whom the Supplier shall consult at all reasonable times and whose instructions, request and decision shall be binding on Supplier.
Supplier	Entity with whom the Company will execute a Contract for supply of equipment/material as per this document
Project	Development of Feasibility Study of LPG Testing Laboratory at Taftan
Application Contractor	As appropriate; the suppliers of equipment and the contractors engaged for the application of



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blast cleaning and painting of skids and off site-mounted equipment.

- 1.3 In the case of equipment suppliers the complete painting works shall be performed by the Supplier as per this specification and term “Application Contractor” shall be considered as same as “Supplier” defined above. At site “Application Contractor” is an entity engaged by Company.
- 1.4 All deviations to this Specification, other related specifications or attachments shall be brought to the knowledge of the Company. All deviations made during the procurement, design, manufacturing, testing and inspection shall be with written approval of the Company prior to execution of Work. Such deviations shall be shown in the documentation prepared by the Contractor.
- 1.5 In the event of any conflict, inconsistency or ambiguity between the Contract scope of work, this Specification, National Codes & Standards, referenced in the Project Specification or any other documents, the Contractor shall refer to the Company whose decision shall prevail.
- 1.6 Company reserves the right to revise any or some clauses of this specification or may give additional requirement if deemed at any stage of design/ fabrication construction and shall not be liable for extra cost.



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2.0 CODES AND STANDARDS

2.1 Codes, Standards and Regulations

The surface preparation and coatings shall be in accordance with this Statutory Regulations (where applicable):

“Steel Structures Painting Manual Vol. 1” “Good Painting Practice” Steel Structures Painting Council 4440 Fifth-Avenue, Pittsburgh, PA 15212, U.S.A.

“Steel Structures Painting Manual Vol. 2” “System and Specifications” Steel Structures Painting Council 4440 Fifth-Avenue, Pittsburgh, PA 15212, U.S.A.

“Echelle European de Degrees D’ Enrouillement Pour Peintures Antirouille” (“European Scale of Rusting for Anticorrosive Paints”) European Committee of Paint and Printing Ink manufacturers Association obtainable from: Paint Manufacturers Assn. of Great Britain, Alembic House, Albert Embankment, London

ASTM. A123 American Society for Testing & Materials
“Zinc (Hot Galvanized) Coatings on Products from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip”. 1916 Race Street Philadelphia, PA 19103 U.S.A.

Surface preparation of all steel surfaces shall be done by one of the following methods described in the following specifications publishing specifications published by the steel structures Painting council, 4400 Fifth Avenue, Pittsburgh, Pa. 15213, or Swedish Standards.

SSPC Specification No.	Swedish Standard	SSPC Specification Title
SSPC-SP-63		Solvent Cleaning
SSPC-SP2-63		Hand Cleaning
SSPC-SP3-63		Power Tool Cleaning
SSPC-SP4-63		Flame Cleaning of New Steel
SSPC-SP5-63	Sa3	Blast Cleaning to “White” Metal
SSPC-SP6-63	Sa2	Commercial Blast Cleaning
SSPC-SP7-63		Brush-off Blast Cleaning
SSPC-SP8-63		Pickling



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SSPC-SP10-63T

Sa2 1/2

Blast Cleaning to "Near-White"
Metal

Painting and coating shall be carried out according to the relevant Standard of Steel Painting Council (SSPC). The acceptable standard for surface preparation of storage tanks, vessels, piping and structures shall be SSPC-SP10, "near white metal".

Any deviation from this specification shall be approved in writing by Engineering Contractor/Owner.

2.2. **Order of Precedence**

In case of conflict between this specification and its associated specifications and the above codes and standards, the Application Contractor shall bring the matter to the contractor's attention for resolution and approval in writing. In all cases the most stringent requirement shall apply.

Should any conflict occur as a result of applying paint manufacturers data sheets and specifications, the order of precedence shall be as follows:

- Data Sheets
- This specification
- Other referenced Project Specifications
- Codes and Standards referred to within this specification and its attachments.



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3.0 SCOPE OF SUPPLY

3.1 General

The overall scope of supply for the preparation and painting shall be as indicated within this specification.

3.2 Scope of Supply

The Application Contractor appointed to carry out surface preparation and painting shall provide the following as a minimum:

- Supply all labor sufficient to complete the work
- Supply all equipment, special tools and power
- Supply suitable grit/sand
- Supply all coating materials
- Responsibility for safe storage of consumable/Non consumable materials
- Provision of daily accurate records of plant consumable materials and ambient conditions during operations.
- Inspection and testing in accordance with this specification and its attachments.
- All documentation as required by this specification and its attachments.



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4.0 MATERIALS

- 4.1 Painting and finishing products for all work shall be best grade produced for each particular kind of material.

Above Ground Piping

Uninsulated above ground piping operating b/w -18°C and 93°C shall be shop primed and field finish coated unless otherwise specified in the applicable purchase document.

Insulated above ground piping operating b/w -1°C and 93°C shall be shop primed, unless otherwise specified in the applicable purchase document

Uninsulated, above ground piping operating b/w 93°C and 482°C shall be shop primed and field finish coated unless otherwise specified in the Applicable Purchase Document.

Underground Piping and Equipment

Underground uninsulated piping and equipment having temperature b/w -25°C and 93°C , when specified to be painted, shall be coated with two coats of coal tar epoxy, with both primer and finish coat applied either in shop or field.

Each coat of coal tar epoxy shall measure approximately 200 micrometers dry film thickness.

4.2 Approved Paint Manufacturers

Coating systems listed in this Specification are to be applied with suitable materials from the owner approved paint manufacturers available in Pakistan, i.e., Berger, ICI, Joton, etc.

Any deviation from above shall be subjected to prior approval by the Purchaser or Contractor.

Before supply, the Contractor will provide samples and specifications of primer and paints for Engineering Contractor's/Owner's approval.



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- 4.3 Material for primers and paints will be supplied in 20-liter containers. It should be clearly marked on each container that "Specially Manufactured for Engineering Contractor/Owner".
- 4.4 Materials for primer and succeeding coats shall preferably be the products of the same manufacturer. Compatibility of primer and succeeding coats shall be checked before execution of work.
- 4.5 The storage and preparation of paints and other coating materials shall be in accordance with the manufacturers' instructions.

5.0 ENVIRONMENTAL DESIGN CRITERIA

5.1 General

Unless otherwise stated on the data sheets, all equipment's and structures will be located in an open exposed area.

5.2 Site Environmental Data

Environmental conditions for all equipment's and structures covered by this specification will be listed in the Project Specification on Site Data and Utilities.

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6.0 APPLICATION PROCEDURE

6.1 General

6.1.1 Manufacturer's Representative/Guarantee

The Application Contractor may arrange for the services of a technical representative of the selected coating manufacturer to visit the work site before the beginning of cleaning and coating operations to advise the Application Contractors personnel regarding proper equipment, surface preparation and coating procedures. The technical representative shall assist the Application Contractor in applying and curing the products and systems as recommended by film thickness.

Coating Manufacturer and Application Contractor shall give a joint 5-year guarantee as follows:

- All coatings will be 'sound' and give a 'degree of paint protection efficiency' similar to scale 8 of the European Scale of Degree of Rusting for Anti Corrosive Paints"- for a period of five years.
- The guarantee period will start from the provisional acceptance of the completed work.

6.1.2 Inspection

The Contractor's representatives and the Paint manufacturer's representative shall have access to the Application Contractors worksites at all times during blasting and coating application and shall be permitted to inspect the work at will. Both representatives shall be given at least two days' notice prior to initial starting of any work covered by the specification. The Contractor's representatives shall have the authority to reject any work that does not conform to the specification.

6.1.3 Contractor's Personnel

The Application Contractor shall select only competent and fully skilled personnel and shall keep an experienced foreman on the job at all times when work is in progress. Any instructions or notices given to the Contractor's site representative by the Contractor's representatives shall be deemed to be given to the Application Contractor.



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6.1.4 Site Preparation

Prior to the commencement of the work, Contractor shall submit for Engineering Contractor/Owner review a blast cleaning procedure, details of equipment and personnel assigned to the blast cleaning operation. Blast cleaning shall be done in case of storage tanks & vessels while the remaining piping and structure shall be cleaned by mechanical means or as desired by Engineering Contractor/Owner.

6.2 Surface Application – General

6.2.1 Cleaning

All steel surfaces to be coated shall be cleaned by abrasive blasting.

Abrasive material for blast cleaning shall be of a particle size to achieve the anchor profile/surface cleanliness detailed below:

- Blasting abrasives shall be dry, clean and free from contaminations.
- Blasted surfaces shall conform to SA 2.5 by visual comparison with the Swedish Standard SIS 05 59 00.
- An average surface amplitude of 50 microns peak height shall be obtained (± 25 microns), every hour and tested every hour with a Testex Press-O-Film and retained with the inspection records.

Preliminary blasting may be done at night with the prior consent of the Contractor's representatives provided that all surfaces blasted shall again be blasted to within the specified tolerances before any coating materials are applied.

Final blast cleaning shall be permitted only during daylight hours but when the surfaces show traces of condensation and if the relative humidity of the ambient air is higher than 80 to 85% the work shall be interrupted in the presence of the Contractor's representative.

All metal parts, which show traces of oxidation after cleaning and before painting shall be cleaned again, Greasy substances on surfaces to be re-cleaned, shall be removed through solvent scrubbing before re-cleaning.

All tools shall be used so as not to leave rough or sharp surfaces. No cuts shall be made on steel surface.



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For storage tank, plates after beveling, rolling and cleaning should be transferred to a shot-blasting area remote from other cleaning or coating operations.

During transportation and coating care shall be taken to avoid damage to bevels, and the steel surface.

All blast-cleaned surfaces shall be coated with the specific primer within four hours after blasting, prior to sundown on the same day before rusting occurs. All dust and abrasive shall be thoroughly removed from surfaces before the application of any coating. A minimum of 50mm around the edges of blast cleaned surfaces shall be left uncoated unless joining a coated surface. No acid washes or other cleaning solutions or solvents shall be used on metal surfaces after they are blasted. This includes inhibitive meshes intended to prevent rusting.

Blast cleaning shall not be done on surfaces that are moist or that may become moist before the application primer.

All NDT of components and surfaces to be coated must be ascertained to have been completed prior to preparation and coating. Any steel not primed on the same day as it was blasted or any steel wet by rain or moisture shall be re-blasted.

No blasting shall be permitted when metal surface temperatures are less than 30°C above the dew point, or when the relative humidity of the air is greater than 80%. Temperatures and humidity shall be recorded twice a day.

Blast cleaning shall not be done in proximity to surface coating operations or near other surfaces susceptible to dust and particle contamination.

Any portion of the fabrication to be blast cleaned, including the drilling of both holes, shall be complete and in final condition before blasting is started, unless otherwise authorized by the contractor. All welded areas shall be given special attention for removal of weld flux stag, weld heat oxides, weld flux fumes, slivers and other foreign objects before blasting. Any oil or grease contamination shall be removed by solvent cleaning and the area re-blasted. Only approved safety solvents, which do not leave a residue shall be used. Pipes, which have been subjected to salt spray in transportation



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shall be water washed and dried. Blasting shall continue a minimum of 20mm into adjacent coated surfaces.

6.3 **Blast Cleaning Requirements**

6.3.1 As a minimum, all cleaning shall be to a NEAR-WHITE-BLAST CLEANING in accordance with and as illustrated by Swedish Standard SIS 05 5900 Grade SA 2 ½

A Near-White-Blast Cleaned Surface Finish is defined as one free from all oil, grease, dirt, mill scale, rust. Corrosion products, oxides, paint and other foreign matter have been completely removed from the surface except for the very light shadows, very slight streaks, or slight discolorations caused by rust stain, mill scale oxides, or slight residues of paint or coating that may remain. At least 95 percent of each 5cm², of surface area shall be free of all visible residues, and the remainder shall be limited to the light discoloration mentioned above.

Size of abrasive particles shall be such that anchor profile achieved is maximum 50 microns unless otherwise approved by Contractor. The abrasive selected for use, which will be angular in nature, shall be in accordance with the recommendations of the coating manufacturer. The anchor profile shall be measured and recorded or replicated with:

- The "Testex Press-O-Film" system or equivalent
- The "Rugotest LCA-CFA No. 3" or equivalent

Sand blasting equipment is to be inspected with respect of discharge rate and pressure, hose sizes and air-drying.

Sand/grit is to be stored under cover and shall be "DRY" for feeding into the spray hopper.

After blasting, all grit/sand shall be removed by dry air blowing or vacuum.



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6.4 Coating

6.4.1 Supply of Materials

All coating materials and thinners shall be furnished by the Application Contractor in original, unopened containers bearing the manufacturer label and instructions. For materials having a limited shelf life, the date of manufacture and the length of life and the quantity shall be shown.

6.4.2 Preparation of Materials

All coating materials shall be stirred in a pot with a power mixer before use to thoroughly mix the pigments and thinners. Only thinners specified by the coating manufacturer shall be used. Mixing and thinning directions as furnished by the coating manufacturer shall be followed.

6.4.3 Use of Materials

If the coating material requires the addition of a catalyst, the pot life under application conditions shall be clearly stated on the container label and this pot life shall not be exceeded. When the pot life limit is reached, the spray pot shall be emptied, remaining material discarded, the equipment cleaned and new material catalyzed.

Coating materials which have livered, gelled or otherwise deteriorated during storage shall not be used. Thixotropic materials which may be stirred to obtain normal consistency are not subjected to this restriction.

Depending upon location, the Application Contractor shall employ the suitable system as listed in this Specification

Coating systems shall be supplied by one manufacturer who shall assure the Application Contractor that the various components of the coating system are compatible.



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6.5 Coating Application

6.5.1 Surface Defects

All surface defects including cracks, surface laminations and deep pitting, likely to be detrimental to the protective painting system shall be removed in accordance with the relevant equipment, vessel, piping or structural code or specification covering surface defects. All fins at saw cuts; barbs and sharp edges shall be similarly removed. Where extensive grinding has been necessary, the dressed areas shall be re-blasted to remove all rust and provide an adequate paint key.

6.5.2 Weather

No coating shall be applied during fog, mist, rain, frost, or when (the metal surface temperatures are less than 3°C above the air dew point or when the relative humidity of the air is greater than 85% (95% for application of inorganic zinc Silicate paints). The Contractor or his representative may suspend application of coating when in their opinion damage to the coating may result from actual or impending weather conditions.

6.5.3 Coating

Each coat shall be applied uniformly over the entire surface. Skips, runs, sags and drips shall be avoided. When these occur they shall be brushed out immediately or the material shall be removed and the surface recoated. On beams and irregular surfaces, edges shall be coated first and an extra pass made later.

Each coat shall be allowed to dry for the time specified by the coating manufacturer. Paint rollers shall not be used.

6.5.4 Film Thickness

Specified film thickness for coating materials shall be strictly observed. Film thickness shall be checked with appropriate film thickness gauges furnished by the Application Contractor. The Application Contractor shall calibrate gauges for the thickness range to be checked, over the type of surface to be coated. When dry film thicknesses are less than those specified, additional coats shall be applied as required at no additional cost to the Contractor.



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6.5.5 Integrity of Coating

Coating shall be free from pinholes, voids, bubbles and other discontinuities. Any such defects shall be repaired at the Application Contractor's expense. Prior to the application of a coating, any damage to the previous coating shall be repaired with the specified material. Upon completion, any damage or fault to the coating system shall be repaired to the satisfaction of the Contractor at no additional cost.

6.5.6 Contaminations

Precautions shall be taken to prevent the deposition of dust, moisture or other foreign matters on the surface after coating. Any coated surface that becomes contaminated with dirt etc., shall be air-blasted or washed down and allowed to dry. If the contamination still exists the affected surfaces shall be re-blasted.

6.5.7 Spray Application

The Contractor reserves the right to inspect all equipment for spray application prior to commencement of spraying. Spray guns, lines and pressure pots shall be cleaned before adding new material. An adequate moisture trap shall be installed between the air supply and each pressure pot. Suitable pressure regulators and gauges shall be provided for both the air supply to the pressure pot and the air supply to the spray gun. Spray equipment and operating pressure shall comply with the recommendations of the coating manufacturer.

The length of the material hose between pressure pot and spray gun shall not exceed 15 meters. Pressure pot, material hose and spray gun shall all be kept at as nearly the same elevation as possible. The spray gun shall be held at right angles to the surface and each pass shall overlap the previous pass by 50%.

Large surfaces shall receive two passes (except when applying solvent based inorganic zinc) at right angles to each other (crosshatched). Spray shall be applied in a heavy, wet coat. Coating materials containing heavy or metallic pigments that have a tendency to settle shall be kept in suspension in the pressure pot by a power driven continuous agitator. Other coating materials shall be agitated as frequently as work-ability requires.

The Application Contractor shall follow the paint manufacturer's recommendation in his selection and use of paint spray equipment, and any specific instructions for application.



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6.5.8 Brush Application

When coatings are to be applied by brushing, brushes shall be of a style and quality that will permit proper application of material. Round or oval brushes are generally most suitable for bolts, irregular surfaces and rough or pitted steel. Flat brushes are suitable for flat area. Flat brushes shall not be more than 100mm wide. No extending handles shall be used on brushes. Brushing shall be done so that a smooth coat, as nearly uniform in thickness as possible, is obtained. There shall be no detrimental brush marks. Paint shall be worked into all corners and crevices. When applying solvent type coatings, care shall be taken to prevent lifting of previous coats.

Adhesion tests shall be made at the discretion of the Contractor or his representative.

6.6 Protection

The Application Contractor shall protect buildings, structures and equipment from droppings and spray, and shall be solely responsible for all damages to other equipment's and facilities as a result of coating operations.

6.7 Field Welds

No coating shall be placed on edges or surfaces prepared for field welds or within 50mm of these areas.

6.8 Bolt Holes

Care should be taken to ensure that bolt holes receive the required coatings.



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7.0 GALVANIZING

7.1 General

All grating, and other items so specified on the Project Drawings, shall be hot-dipped galvanized in accordance with ASTM A-123.

7.2 Repair of Galvanized Surfaces

All galvanized surfaces that require welding, cutting, drilling or other preparation and any galvanized surface that has been damaged shall be repaired with the specified coating repair system.

Before application of repair coating, surface shall be washed with fresh water; rust and other deposits shall be removed by power sanding and the area thoroughly cleaned with solvent and/or grease removing agent. Coating material shall be applied immediately after completion of surface preparation.

8.0 PREPARATION OF NON-FERROUS SURFACES

8.1 General

Prior to applying coating material, surfaces shall be degreased using an emulsifying agent and then washed thoroughly in fresh water and allowed to dry. All surfaces shall be given a 'sweet blast' immediately before coating.

8.2 Stainless Steel Parts

Stainless steel parts shall not be painted.



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9.0 SURFACES NOT TO BE COATED

Equipment and component drawings will indicate areas that do not require coatings, which will generally include:

- Flanged faces
- Tapped holes
- Machined parts
- Stainless steel parts
- Plastic or PVC based materials
- Cupro-nickel parts

Grit or sand blasting is NOT to be carried out local to:

- Machined surfaces
- Running bushes or bearings
- Instrument glasses
- Cables
- Or any other items of equipment that will incur damage without adequate covering or protection

All openings in mechanical equipment and process piping are to be adequately plugged or covered prior to blasting to prevent the ingress of sand or grit.

Any coatings, drips, runs or streaks that go accidentally onto the above listed surfaces, are to be removed without the use of power tools.

All tapped holes are to be re-tapped after painting of equipment.

Nameplates and "Tag" identifications shall not be painted so obliterating markings thereon.

Prefabricated parts that require welding shall not be painted local to the weld preparation.

A strip 50mm wide from the weld bevel is to be left unpainted.



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10.0 DEVIATIONS

"Small" items of proprietary equipment can be supplied with a preparation and protective coating system and finish to the equipment Contractors "own standard"; provided that the Contractor conforms to the Contractor or his representative, in writing, that the Contractor's "own standard" is "as good as" or "better than" the preparation and finish as required by this Specification inclusive of the "five year" guarantee specified in para. 5.1.1 of this specification.

Upon request the Contractor will be supplied with details of climatic and environmental conditions applicable.

Contractors who 'choose' the above deviation are required to provide:

- A written data sheet of "own standard" paint system and topcoat color, to be included in the Contractors data book or installation/maintenance manual.
- A written data sheet of a "Repair Procedure" for the paint system, to be included in the Contractors data book or installation/maintenance manual.
- Quantity of 'primer - tie coat' and 'topcoat' (matching color), for making good by others. The paint is to be included as part of the equipment.

NOTE: THE CONTRACTOR'S PAINT SYSTEM MUST BE COMPATIBLE WITH THE PAINT SYSTEMS (FOR SPECIFIC AREAS) AS LISTED IN THIS SPECIFICATION.



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11.0 COATINGS REPAIR PROCEDURE

When the surfaces show traces of condensation and if the relative humidity of the ambient air is higher than 80 to 85% the work shall be interrupted.

11.1 General

This Repair Procedure is to be used (or repairing 'small' areas of coating damage incurred:

- During fabrication in equipment Contractors work's
- During fabrication/construction of steelwork
- During hook-up work
- During pre-commissioning and start up
- During full on stream operation, up to a five year period from start up.

11.2 Exclusions

This Repair Procedure does not cover:

- Major or extensive areas of repair
- Major or extensive repair/maintenance of areas after startup

In such cases, the remaining 'undamaged' coatings are to be removed back to base metal, and the applicable preparation and coating system is to be applied a new.

The Contractor or his representative is to be informed of any major damage to coatings during stages of fabrication and/or construction.

11.3 Small Areas

Repairs to 'small' areas of coatings will apply to two separate standards:

11.3.1 The Standard Coating Systems as listed in this Specification.

11.3.2 The Standard Coaling System as used by a Contractor of some small items of equipment.

Repairs covered by (10.3.1) are to be as per systems shown.



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Repairs covered by (10.3.2) are to be as per the specific 'Coatings Repair Procedure', which will be located within the equipment Contractors installation/maintenance manual, for the item of equipment requiring repair. The Contractor will have also included for quantities of 'primer' 'tie coat' of mating color in his 'spares' supply.

11.4 **Dressing Back**

For all small repairs, the damaged coating is to be removed back to base metal and to an area that overlaps into 'sound' undamaged coating. Damaged areas of coatings are to be removed with hand tools or power tools and not by 'grit or sand blasting'. The preparation (prior to coating) shall be as per this Specification (10.3.1) or Contractors specification (10.3.2) whichever is applicable.



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12.0 PAINT SYSTEMS

12.1 Key List

Code	Work Location	
1A	Shop or Field	Surface preparation - Blast clean SA 3
1B	Shop or Field	Surface preparation - Blast clean SA 2
2	Field	Surface preparation - needle gun, water wash and scrub, power tool clean ST 3
5	Shop	Primer - 75 microns DFT zinc phosphate (high build)
8	Shop or Field	Prime 40 microns DFT urethane zinc rich (moisture tolerant)
9	Shop or Field	Prime 50 microns DFT urethane pitch rich (moisture tolerant)
10	Field	Intermediate - 75 microns DFT urethane M10 (moisture tolerant)
11	Shop or Field	Top Coat - 75 microns DFT modified Alkyd gloss (high build)
12	Shop or Field	Top Coat - 150 microns DFT urethane pitch (moisture tolerant)
13	Shop or Field	Top Coat - 50 microns DFT urethane, gloss (moisture tolerant)
14	Shop or Field	Undercoat - 30 microns DFT urethane undercoat (moisture tolerant)



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15	Shop	Primer - Inorganic zinc silicate 75 microns DFT
16	Field	Top Coat - Aluminum silicone 25 microns DFT
17	Field	Touch up - Inorganic zinc silicate 75 microns DFT
18	Field	Coal tar Epoxy (CS 200) – Special Grade Coal tar pitch and Epoxy-resin 125 microns DFT.

12.2 Application

Details of paint systems and the applications are listed below:

- System 1 - Structural steel for Buildings
- System 2 - Structural supports, tank internals
- System 3 - External roofs, tank externals
- System 4 - Structural steel, piping and vessels below 100° C
- System 5 - Piping and Vessels above 100°C
- System 6 - Buried Piping - (In plant)

	System-1	System-2	System-3	System-4	System-5	System-6
Surface Preparation	1B	1B	1B	1A	1A	1A
Primer	5-AS	9-AS	8-AS	5-AS	15-B	5-AS
Undercoat	14-AS	10-AS	10-AS	14-AS	-	18 AS
Top Coat	13-AS	12-AS	13-B	13-AS	16-AS	18 AS
TOUCH UP	13-Brush	12-Brush	13-Brush	13-Brush	17-Brush	18-Brush
Minimum DFT (microns)	150	250	130	150	90	325
Maximum DFT (microns)	170	280	160	170	100	350

Legend: AS - Airless spray application
B - Brush application



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12.3 Pumps, Machinery and Electrical Equipment

12.3.1 Surface Preparation and Painting at manufacturer's Works for Equipment Installed Outside Buildings.

Manufacturers shall specify their standard painting system (for the site conditions, and shall Specify surface preparation, type of coating, number of coats, dry film thickness and color. Should this system be unacceptable to the Purchaser, the requirements of this specification shall govern.

- Painting at Site
- No painting is permitted but the shop finish shall be made good if damaged.
- Color matching
- If required by the Purchaser, finish painted items shall be painted for color matching.

12.4 Instruments, Instrument Panels, Consoles and Cabinets

12.4.1 Surface Preparation and Painting at Manufacturer's Works for Equipment Installed Inside Fully Enclosed Buildings.

This equipment shall have its surface prepared, primed and finished in accordance with Manufacturer's standards. In general this shall consist of:

- One coat of primer and
- Two coats of enamel

12.4.2 Surface Preparation and Painting at Manufacturer's Works for Equipment Installed Outside Buildings

This equipment manufacturer shall specify their standard system (or the site conditions and shall specify surface preparation, type of coating, number of coats, dry

film thickness and color. Should this system be unacceptable to the Purchaser, the requirements of this specification shall govern.



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Painting at Site

No painting is permitted but the shop finish shall be made good if damaged.

Color Matching

If required by the Purchaser, finish painted items shall be painted for color matching.

12.5 Protective Coatings for Valves

12.5.1 Scope

This specification covers the preparation and external coating requirements for assembled valves.

12.5.2 Surface Preparation and Application

Following complete assembly of valves, all oil and grease shall be completely removed and surface thoroughly wire brushed to remove all loose and friable material.

Apply one coat of System No. 2 (a Zinc Dust Filled Primer) to a dry film thickness of 75 microns. All valve stems and stuffing box guides shall be suitably protected with grease after coating has been completed.

This does not apply if the Contractor's standard practice of preparation is by grit or shot blasting either before assembly or, with proper masking precautions, after assembly. If abrasive blasting is carried out, the use of an inorganic primer (System No. 1) is to be applied.



GENERAL SPECIFICATION FOR PAINTING & COATING

13.0 COLOR CODING

Firewater piping shall be painted solid red in a suitable weather resistant paint available in Pakistan.

Pipe work shall generally be painted silver with color-coding as below.

Color-coding of pipe work shall be as per the Piping Service Designations. Each pipe shall be color coded with three painted bands (with the exception of Fire Water piping) identifying

- Product Medium
- ANSI Piping Class
- Piping Material

Color-coding shall be prepared by Contractor and agreed by Engineering Contractor/Owner from the appropriate range of suitable paints available in Pakistan.