



NATIONAL PETROCHEMICAL COMPANY STANDARDS

CONSTRUCTION STANDARD FOR PAINTING

NPCS-CS-TP-06

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1 SCOPE

- 1.1 This standard covers the minimum requirements for initial construction and for maintenance, for the surface preparation and paint application to miscellaneous machinery, piping, and Steel structures, etc. , which will be exposed to different corrosive environments in petrochemical industries.
- 1.2 Whilst the content of this standard defines the essential requirements of surface preparation and painting, they do not relieve the contractor from his responsibility to carry out the work in accordance with the appropriate codes and industry standards listed in section 2.
- 1.3 Contractor shall supply all tools, brushes, rollers, spray guns , blast materials, hand power tools for cleaning and all equipment, scaffolding materials, shot/sand blasting equipment and air compressors, oils, greases and other consumables, etc., required to be used and all other tools, tackles required for the work. These items shall always be kept in good order and shall be sufficient in quantity to the full satisfaction of client representative.
- 1.4 Contractor shall provide skilled and experienced personnel to carry out the work together with competent and qualified supervisors. The requirement of workforce and supervisors shall be as per work schedule and to the full satisfaction of client.

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STANDARDS AND CODES

2.1

The following Design Codes, Standards and Specifications shall be used for the design and application of painting and protective coatings, where referred to in this standard:

- SSPC-PA 1-82 Paint Application Specification No.1: Shop, Field and Maintenance Painting.
- SSPC-PA 2-82 Paint Application Specification No.2: Measurement of Dry Paint Thickness with Magnetic Gauges.
- SSPC-PA 3-82 Paint Application Guide No.3: A guide to safety in Paint Application.
- SSPC-SP COM-89 Surface Preparation Specifications, Surface Preparation Commentary.
- SSPC-vis 2-82 Colour Photographic Standards for Evaluating Degree of Rusting on Painted Steel Surfaces.
- SSPC Guide to vis 2-82 Guide to Visual Standard No.2: Guide to Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces.
- SSP-SE' 1-82 Surface Preparation Specification No.1: Solvent Cleaning.
- SSPC-SP 1-89 Surface Preparation Specification No.2: Hand Tool Cleaning.
- SSPC-SP 3-89 Surface Preparation Specifications No.3: Power Tool Cleaning.
- SSPC-SP 5-89 Surface Preparation Specifications No.5: White Blast Metal Cleaning.
- SSP-SP 6-89 Surface Preparation Specifications No.6: Commercial Blast Cleaning.

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- SSSPC-SP 7-89 Surface Preparation Specifications No.7: Brush-off Blast Cleaning.
- SSSPC-SP 8-82 Surface Preparation Specifications No.8: Pickling.
- SSSP-SP 10-89 Surface Preparation No.10: Near-White Blast Cleaning.
- SSPC-Paint 20-82 SSPC Paint Specifications, Zinc-Rich Primers (Type 1, "Inorganic", and Type 2, "Organic").
- Volume 1 Steel Structures Painting
Second Edition Manual. Good Painting
1982 Practice.
- ASTM D4414-84 Standard Practice for Measurement of Wet Film Thickness by Notch Gauges.
- ASTM D3359-90 Standard Methods for Measuring Adhesion by Tape Test.
- ASTM D2697-86 Volume Non Volatile Matter in Clear or Pigmented Coatings; Standard Test Method.
- ASTM A153-82 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- ASTM A123-89a Specification for Zinc (Hot Galvanised) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars and Strip.
- BS 729: 1971 Specification for Hot Dip Galvanized Coatings on Iron and Steel Articles.
- BS 5493: 1977 Code of Practice for protective Coating on Iron and Steel Structures against Corrosion;

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- BS 7079:
Part A:1989
ISO 8501-1:
1988
Preparation of Steel Substrates before Application of Paints and Related Products.
Group A. Visual Assessment of Surface Cleanliness.
Part A1. Specification for Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings.
- BS 1079:
Part C2:1988
ISO 8503-2:
1988
Method for the Grading of the Surface Profile of Abrasively Blast-Cleaned Steel Substrates Using a Comparator.
- CP 3012: 1972
Code of Practice for Cleaning and Preparation of Metal Surfaces.
- Svensk Stand-
ard SS 05 59
00- 1988
Preparation of Steel Substrates before Application of Paints and Related Products-Visual Assessment of Surface Cleanliness.
Part 1 : Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coating.
- RAL-K1
Ubersichtkart (Colour Chart).

GENERAL

- 3
- 3.1 No substitution or modification to materials and methods of application detailed in this standard is permissible unless prior approval of client has been obtained.
- 3.2 Prior to the commencement of work contractor shall submit for the approval of client, fully detailed proposal as to how he intends to carry out the work within the frame work of this standard. Contractor shall provide full details regarding the use of a lower tier subcontractor, location of work, choice of materials and any such further information.



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- 3.3 *The following surfaces and materials shall require painting.*
- 3.3.1 All Steel structures, sheds, pipe racks, Steel supports, ladders, stairs, handrails, platforms, walkways, monorails, cranes and all other Steel members.
- 3.3.2 All uninsulated Carbon and low alloy piping, fittings and valves including painting of identification marks .
- 3.3.3 All uninsulated equipment like columns, vessel drums, storage tanks, heat exchangers, coolers, pumps, compressors, filters, silos, conveyors and all other type of handling or bagging equipment. and storage bins, etc.
- 3.3.4 All uninsulated portions of insulated equipment comprising vessel, nozzles, manway covers, valves, relief valves, etc., shall be painted to suit temperature condition involved.
- 3.4 The following surfaces and materials shall not require painting.
- 3.4.1 Stainless Steel, Copper, Brass, Aluminium or glass surfaces, plastic or plastic coated materials, insulated surface of equipment, pipes except colour coding wherever required, painted equipment like blowers, pumps, valves, etc., with finishing coats in good condition, with matching condition and with matching colour code, are not to be painted except otherwise specified.
- 3.4.2 Galvanized surfaces, e.g. stair treads, are not to be painted except in acid areas.
- 3.4.3 Friction grip bolted areas are not to be painted.
- 3.5 The equipment listed below shall be shielded to prevent damage during surface preparation and painting operations. All openings, including those which are flanged or threaded, shall be sealed to prevent entry of sand, dust, or coating materials used for shielding and sealing shall be removed:
- Nameplates and notices.'
 - Packing glands.
 - Packing seals.



- Bearings.
- Rotating equipment couplings.
- Rotating equipment shafts.
- Lubrication fittings.
- Pressure gauges.
- Gauge glasses.
- Motor starters.
- Instruments dials.
- Vents.
- Exposed linkages.
- Valve stems.
- Light bulbs.
- Light bulb enclosures.
- Light reflectors.
- Air intakes.
- Rubber parts and plastic.

3.6 The paint manufacturer's instructions shall be followed at all times. Particular attention shall be paid to the following:

3.6.1 Proper storage to avoid exposure, as well as extremes of temperature.

3.6.2 Surface preparation prior to painting.

3.6.3 Mixing & thinning.

3.6.4 Application of paints and the recommended limit on time intervals between coats.

3.7 The recommended painting system obtained from the paint manufacture will be supplied to contractor by client.

3.8 Contractor shall perform the work in accordance with the following documents issued to him for execution of work:



3.8.1. Schedule of quantities for piping, equipment, etc.,
machinery and structure.

3.8.2 Pipeline list.

4 SURFACE PREPARATION

4.1 Oil and grease, dirt, welding slag and fume deposit,
rust and loose millscale, prevent good adhesion and
should be removed. Weld edges shall be free from
weld spatter, welds and edges shall be ground smooth
and corners rounded and the weld areas shall be
cleaned of salt deposits, etc.

4.2 Blast cleaning shall not be carried out on wet
surfaces, or surfaces which will be wet after
blasting; nor shall blast cleaning be carried out
when surface temperature is less than 3°C above
ambient dew point, or when the relative humidity is
greater than 80% or beyond daylight hours on exterior
location.

4.3 The type and size of blast cleaning abrasive for any
particular job shall be selected to give a surface
amplitude acceptable to the manufacturer of the
primer. The maximum amplitude is to be 100 microns;
the particle size shall be in accordance with
BS-7079.

4.4 All abrasives shall be free of all dust, dirt and
other foreign matter. They shall be kept dry all the
times and shall not be recycled, unless permitted by
client.

4.5 The compressed air supply used for blasting shall be
free of water and oil. Adequate separators and traps
shall be provided and these shall be kept emptied of
water and oil. Accumulations of water and oil shall
be removed from the air receiver by regular purging.
This clause shall also apply to air used for the
dusting of cleaned surfaces. The pressure and the
volume of compressed air supply for blast cleaning.
shall meet the work requirement.

1.6 No acid washes or other cleaning solutions or
solvents shall be used on metal surfaces after they
have been blasted. This includes inhibitive washes
intended to prevent rusting.

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4.7 Chipping, scraping and Steel wire brushing using manual or power driven tools can not remove firmly adherent millscale and shall only be used where blast cleaning is impractical, with the approval of client and in accordance with the grade C ST2 or ST3 as will be specified.

4.8 Surface irregularities including weld spatter, rough capping, undercut and slag together with sharp or rough edges and burrs, surface laminations and laps shall be removed or made smooth prior to commencement of surface preparation. Such irregularities which become apparent after surface preparation by blast cleaning or hot acid pickling shall be similarly treated.

5 SURFACE PREPARATION FOR RE-PAINTING

Initially all areas of loosened paint and scale and all points of rusting should be located and treated in a manner essentially similar to the preparation detailed in the previous section. If such areas are sufficiently numerous as to make exact location and definition a difficult proposition, then the whole paintwork should be prepared overall by sand-blasting, chipping, scraping and power wire brushing to the standards detailed in the previous section. All prepared areas should then be degreased, where necessary, with White spirits (Note a) and prime within 4 hr (Note b) of preparation with a brush applied "wetting type" of primer. After completing all preparation and patch priming, remaining sound paintwork should then be thoroughly washed down with warm 1% By Pi-ox (Note c) solution and then preferably hosed down or thoroughly rinsed with fresh water until all traces of detergent are removed. The surface shall then be allowed to dry out before further coating.

NOTES:

- a) Carbon tetrachloride could be used as alternative in nonenclosed spaces.
- b) Longer or shorter intervals may be specified in contaminated atmospheres or for special paint systems, and will be indicated in the particular specification.
- c) Proprietary alternative would be acceptable.



6 PRIMING

- 6.1 Prepared surfaces should be primed generally within four hours or before visible l-e-rusting occurs. Cleaned surfaces shall never be left overnight prior to coating, in such case reblasting or recleaning is neccessary.
- 6.2 Blast cleaned surfaces may be protected for short periods by a thin coat of pre-treatment or pre-fabrication primer. It is imperative that such gap primers should be applied as a continuous coating in an even manner to achieve a minimum film thickness of 20 microns. Such primers do not replace the full thickness of permanent primer
- 6.3 The priming coat or coats on Steel shall have a tota dry film thickness not less than 50 microns, except for certain special paint systems. When applied in two coats, a shade contrast between coats is essential.
- 6.4 In order to minimize contamination between successive coats of paint, overcoating of the preceeding coat shall be done as soon as i-t is permitted by the particular specification, and not delayed beyond the period specified. When delays are unavoidable, the painted surface shall be thoroughly cleaned and dried to the satisfaction of client before overcoating may take place. Painting and priming shall be done by airless spray device; alternatively brush can be used only with client's approval.

6.5 PREPARING OF SHOP PRIMED SURFACES FOR OVERCOATING

- 6.5.1 Any primed surface which has been exposed for more than a few days will have become contaminated and should be cleaned down with fresh water and allowed to dry before overcoating.
- 6.5.2 Primed and painted surfaces which have been exposed to marine conditions, including shipment overseas, will be contaminated with salt and should be lightly wire brushed, then washed with fresh water, before overcoating.
- 6.5.3 Although Zinc rich primer are very effective in preventing rust ing , extended exposure develops a surface contaminated of Zinc corrosion products which can impair the adhesion of subsequent coats. Zinc rich primers, both organic and inorganic which have been exposed Song enough to develop white surface staining, should be prepared for overcoating by one of the following methods: