



NATIONAL PETROCHEMICAL COMPANY
STANDARDS

ENGINEERING STANDARD
FOR
PAINTING & COLOR CODING

NPCS-ES-TP-01

REVISION : 0

DECEMBER 1992

THIS DOCUMENT IS THE PROPERTY OF NP.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED, TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NP.C.



CONTENTS

1	<u>SCOPE</u>
2	<u>STANDARDS AND CODES</u>
3	<u>DESIGN REQUIREMENTS</u>
4	<u>GENERAL</u>
5	<u>SURFACE PREPARATION</u>
6	<u>PRIMING</u>
7	<u>PAINTING</u>
8	<u>GALVANIZING</u>
9	<u>INSPECTION</u>
10	<u>QUALITY CONTROL AND TESTING</u>
11	<u>PAINT SYSTEM</u>

THIS DOCUMENT IS THE PROPERTY OF N.P.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED, TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF N.P.C.



1 SCOPE

1.1 This standard covers the minimum requirements 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.

2 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.

THIS DOCUMENT IS THE PROPERTY OF N.P.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF N.P.C.



THIS DOCUMENT IS THE PROPERTY OF N.P.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED, TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF N.P.C.

- 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.
- SSSP-SP 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.
- SSSP-SP 6-89 Surface Preparation Specifications No.6: Commercial Blast Cleaning.
- 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.



THIS DOCUMENT IS THE PROPERTY OF N.P.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED, TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF N.P.C.

- ASTM D2697-86 Volume Non Volatile Matter in Clear or Pigmented Coatings; Standard Test Method for.
- ASTM A153-82 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- ASTM A123-89a Specification for Zinc (Hot Galvanized) 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.
- 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 7079:
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 Standard 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).

3

DESIGN REQUIREMENTS

3.1

Coating for the protection of equipment, piping, structural Steel, tanks, etc., shall be designed and manufactured for the application over the specified minimum surface preparation standards detailed in this standard in combination with the codes and industry standard listed in section 2.

3.2

All coatings shall be suitable for application and service in respective environments conditions. The coating shall provide the dual function of protection against corrosion or deterioration and decoration of the surfaces painted.

3.3

The paint system shall generally be based on the maximum operating temperature of the equipment and piping except the items affected by clauses 3.4 and 3.5, the items where higher temperatures are in cyclic or intermittent operation including steam out, start-up, regeneration, etc.

3.4

The painting system for external application to internally lined items shall be based on the outside wall temperature.

3.5

All supports, including skirts, legs, saddle, etc., shall be coated with the paint system for uninsulated surfaces as appropriate to the metal of the equipment or piping being supported.

THIS DOCUMENT IS THE PROPERTY OF N.P.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF N.P.C.



4 GENERAL

- 4.1 No substitution or modification to materials and methods of application detailed in this standard is permissible, unless prior approval of client has been obtained.
- 4.2 Prior to the commencement of work, the 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. The contractor shall provide full details regarding the use of a lower tier subcontractor, location of work, choice of materials and any such further information.
- 4.3 Application of coatings other than inorganic Zinc primer shall be delayed until completion of all required shop pressure testing. Application of inorganic Zinc Silicate primer prior to pressure testing with consequent covering up of welds, shall only be permitted in specific cases agreed with client. In such cases application of the subsequent tie coat shall be delayed until completion of pressure testing.
- 4.4 The following surfaces and materials shall require painting.
- 4.4.1 All Steel structures, sheds, pipe racks, Steel supports, ladders, stairs, handrails, platforms, walkways, monorails, cranes and all other Steel members.
- 4.4.2 All uninsulated Carbon and low alloy piping, fittings and valves including painting of identification marks.
- 4.4.3 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.
- 4.4.4 All uninsulated portions of insulated equipment comprising vessel, nozzles, manway covers, valves, relief valves, etc., shall be painted to suit temperature condition involved.
- 4.5 The following surfaces and materials shall not require painting.

THIS DOCUMENT IS THE PROPERTY OF N.P.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF N.P.C.



THIS DOCUMENT IS THE PROPERTY OF NPC. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED, TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NPC.

- 4.5.1 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.
- 4.5.2 Galvanized surfaces, e.g. stair treads, are not to be painted, except in acid areas.
- 4.5.3 Friction grip bolted areas are not to be painted.
- 4.6 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.

5 SURFACE PREPARATION

- 5.1 Paint life depends primarily on surface preparation. Surface preparation should remove foreign bodies to allow the type of priming paint used to wet the surface thoroughly and develop adequate adhesion.
- 5.2 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.
- 5.3 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.
- 5.4 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.
- 5.5 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.

THIS DOCUMENT IS THE PROPERTY OF NPCC. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NPCC.