

# SURFACE PREPARATION

## == The Need

There are two main factors which govern the performance of a protective paint system, mainly the nature of the paint coating and the degree of cleanliness of the surface to which it is applied.

THE OPTIMUM PERFORMANCE OF ANY PAINT COATING IS DIRECTLY DEPENDENT UPON THE CORRECT AND THOROUGH PREPARATION OF THE SURFACE PRIOR TO COATING.

THE MOST EXPENSIVE AND TECHNOLOGICALLY ADVANCED COATING SYSTEM WILL FAIL IF THE SURFACE PRE-TREATMENT IS INCORRECT OR INCOMPLETE.

## == Common Surface Contaminants

- 1 Oil & Grease - Deposited from the working environment.
- 2 Millscale - Oxide formation from the hot rolling process at the steel mill.
- 3 Corrosion products - Rust and scale formed on unprotected steel.
- 4 Soluble salts - Deposited from the atmosphere.
- 5 Laitance - On concrete.
- 6 Zinc Salts - On galvanised surface and weathered Zinc Rich Epoxy/Zinc Silicate Coating. The removal of such contaminants is essential for optimum performance and Mechanical means like emery scuff or wire brush the surface followed by thorough washing with fresh water.

The following notes cover methods of removal of above contaminants.

## == A. For Steel

Some of the various methods of surface preparation of steel are briefly described below for more explicit details and recommendations please refer to full specifications, such as :

- 1 Indian Standard-IS: 1477 (Part I & II) 1963.
- 2 Steel Structures Painting Council (SSPC), Pittsburgh, PA, USA.
- 3 British Standards Code of Practice BS 5493 and DIN 55928 for Protective Coating of Iron and Steel structures against Corrosion.
- 4 ISO 8501-1:1988 (Swedish Standard SIS 05 5900) - Pictorial Surface Preparation Standards for Painting Steel Structures). GP refer ISO 8501-1:1988 standard. Shipbuilding Research Association of Japan-Standard for the preparation of Steel Surfaces Prior to Painting ("SPSS" Standard).

### 1. OIL & GREASE

1. Degreasing : All Oil, Grease, Drilling and Cutting Compounds and other Surface Contaminants if present even in trace quantities this may impair the adhesion of protective paint systems and lead to premature failure. Removal by solvent swabbing is common; however, it is essential that the deposits are removed and not simply spread over the surface. A number of washes using clean solvent and swabs is essential. GP's Thinner may be used as per recommendation given in individual Data Sheet.

Degreasing procedures are described in SSPC-SP1

### 2. MILLSCALE

- : This layer of Oxides although initially intact readily embrittles and flakes off bringing with it the paint system.

Numerous methods of scale removal have been used.

1. Natural Weathering : This is an unreliable practice as the surface will remain contaminated with soluble salts and corrosion products.



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2. Hand Tool Cleaning : The degree of cleanliness achieved is largely dependent upon the amount of weathering to which the steel has been subjected, and the efforts of the operators who have difficulty maintaining a constant satisfactory standard.

It is impossible to remove all rust and millscale by this method. Generally this method would be adopted for the following :

- A. Maintenance Painting.
- B. Easily Accessible Steelwork in Rural Areas.
- C. Steelwork inside Building where conditions are Non-corrosive.
- D. Steelwork which is to be encased in brickwork, concrete, etc.
- E. Internal Surfaces of enclosed spaces that require Painting.

Methods for Hand Tool Cleaning are described in SSPC -SP 2 and should be to Swedish Standard St.2 -B, C or D.

3. Power Tool Cleaning : Although impact tools such as chipping hammers and needle guns are reasonably effective in removing rust and scale the time and effort required is excessive.

Power rotary wire brushes and grinding tools wear away the unwanted surface layer. This method tends to burnish the surface especially where firmly bonded scale exists. The burnished surface effectively reduces the adhesion properties of the primer.

Other unfavorable factors are excessive noise levels and dust hazard. Generally this method would be adopted on maintenance painting where areas require remedial treatment.

Methods are described in IS: 1477 (Part-I)-1963, in SSPC -SP 3 and in ISO 8501-I : 1988 should be to Swedish Standard St 3 -B, C or D.

4. Flame Cleaning : In flame cleaning method, a high temperature oxyacetylene flame is passed over the surface. Scale and rust are dislodged partly by differential expansion of the steel and scale and partly by evolution on steam from moisture within the rust. Scraping and wire brushing is necessary to remove the burnt residues. The methods for flame cleaning are outlined in IS : 1477 (Part-I)-1963 / ISO 8501-I : 1988.

The main disadvantages of this method are :

- A. Fire and Health Hazard.
- B. Possible damage to adjacent areas.
- C. Steel must be atleast 16 gauge thick to avoid buckling.
- D. Steel temperature must not exceed 300° C.
- E. Use prohibited on high strength friction grip joints and adjacent areas.

5. Acid Pickling : Millscale and rust can be removed by immersion in acid solution such as sulphuric or hydrochloric.

The pickling carries out its function in two different ways. First, the acid serves to dissolve both scale and rust. Secondly, as the acid creeps into the breaks of the millscale a reaction between the innermost layers of millscale and the acid evolves hydrogen gas.

This gassing results in the millscale popping off. Following a hot water rinse the steel is often depend in a bath containing a solution of phosphoric acid. The phosphoric acid reacts with the steel to form a thin film of iron phosphate which acts as a rust inhibitor.



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