DRY ABRASIVE BLASTING

Fitz's Atlas of coating defects

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The images within this section are courtesy of Clemco Industries Corp. The images are for illustrative purposes only and may not reflect actual surface conditions or results.

SURFACE PREPARATION

The performance of protective coatings applied to steel is significantly affected by the state of the steel surface immediately prior to painting.The principal factors that are known to influence this performance are:

- **the presence of rust, millscale and previous coatings;**
- **the presence of surface contaminants, including salts, dust, oils, acid and greases;**
- **the surface profile.**

International Standards ISO 8501, ISO 8502 and ISO 8503 provide methods of assessing these factors, while ISO 4628-3 provides guidance on evaluating the degradation of paint coatings by degree of rusting and ISO 4627 covers the evaluation of the compatibility of a product with a surface to be painted. Other national standards and codes of practice contain recommendations for the various protective coating systems to be applied to the steel surface and these should be referred to for guidance on such items as:

- **suitability of the cleaning procedure and standard specified;**
- **suitability of the coating system for the environmental conditions to which the steel will be exposed;**
- **compatibility with any remaining paint coatings.**

The International Standards referred to above deal with the following aspects of preparation of steel substrates:

ISO 8501 - Visual assessment of surface cleanliness.

ISO 8502 - Tests for the assessment of surface cleanliness.

ISO 8503 - Surface roughness characteristics of blast-cleaned steel substrates.

ISO 4627 - Paints and varnishes - Evaluation of the compatibility of a product with a surface to be painted-Methods of test.

ISO 4628-3 - Evaluation of degradation of paint coatings.

In the following sections include guidelines on the preparation of steel substrates before the application of paints and related products and include reproductions of visual assessment guides of surface finish and cleanliness by water jetting.

Other considerations

Apart from cleanliness of the steel, consideration needs to be given to the etch or profile roughness created by the impact of the abrasive on the steel surface.The substrate profile is regulated by:

- **Shape, type and grading of the abrasive.**
- **Blasting method and velocity of abrasive impaction.**
- **Steel condition prior to abrasive blast cleaning.**

The etched profile of the surface enables adhesion of the protective paint coatings. Of great importance is the level at which this is achieved as too severe a profile will cause a waste of paint and time in application,whilst too light a profile could result in lack of adhesion.

Profile of the surface can be measured by various items of test equipment but still the best method of obtaining a profile specification is by ensuring the correct blasting equipment/method coupled with type and size of abrasive to be used in the operation.

Once abrasive blast cleaning needs have been decided, selection of method, type of equipment and training of personnel should follow. Equipment used for surface preparation needs to be extremely reliable and simple to use. Operation and training information should be up-to-date and accurate.

The various rust grades and cleaning standards are now illustrated.

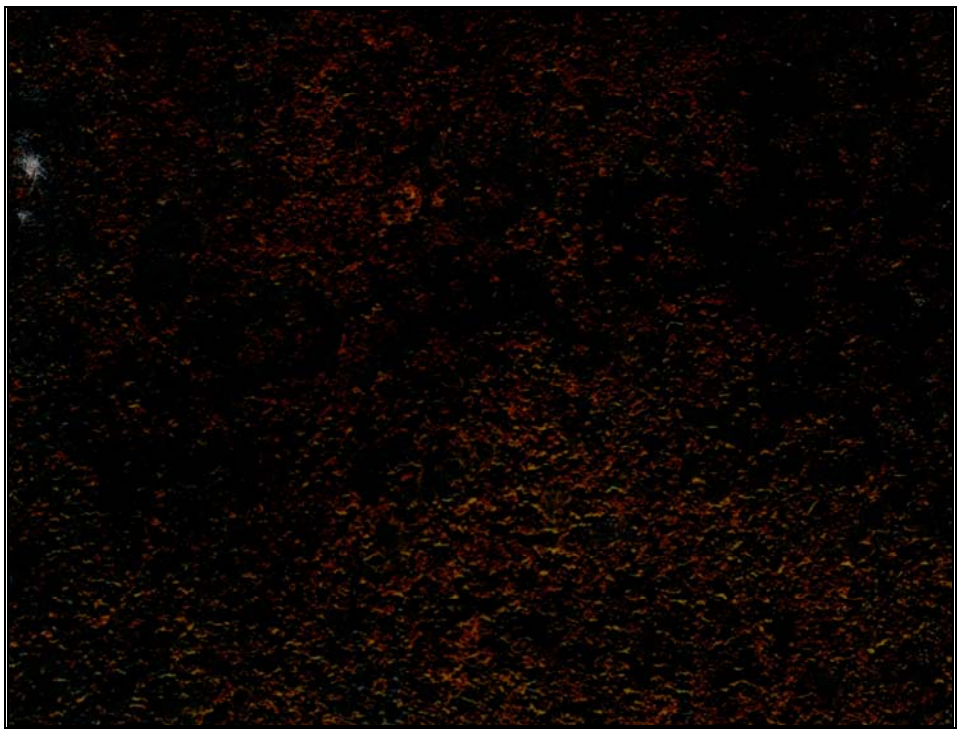
RUST GRADES

GRADE "A"



Steel surface largely covered with adhering mill scale but little, if any rust.

GRADE "B"



Steel surface wich has begun to rust and from which the mill scale has begun to take

GRADE “C”



Steel surface on which the mill scale has rusted away or from which it can be scraped, but with slight pitting visible under normal vision.

GRADE “D”



Steel surface on which the mill scale has rusted away and on which general pitting visible under normal vision.

LIGHT BLAST CLEANING OR BRUSH-OFF

BLAST CLEANING (Sa 1)

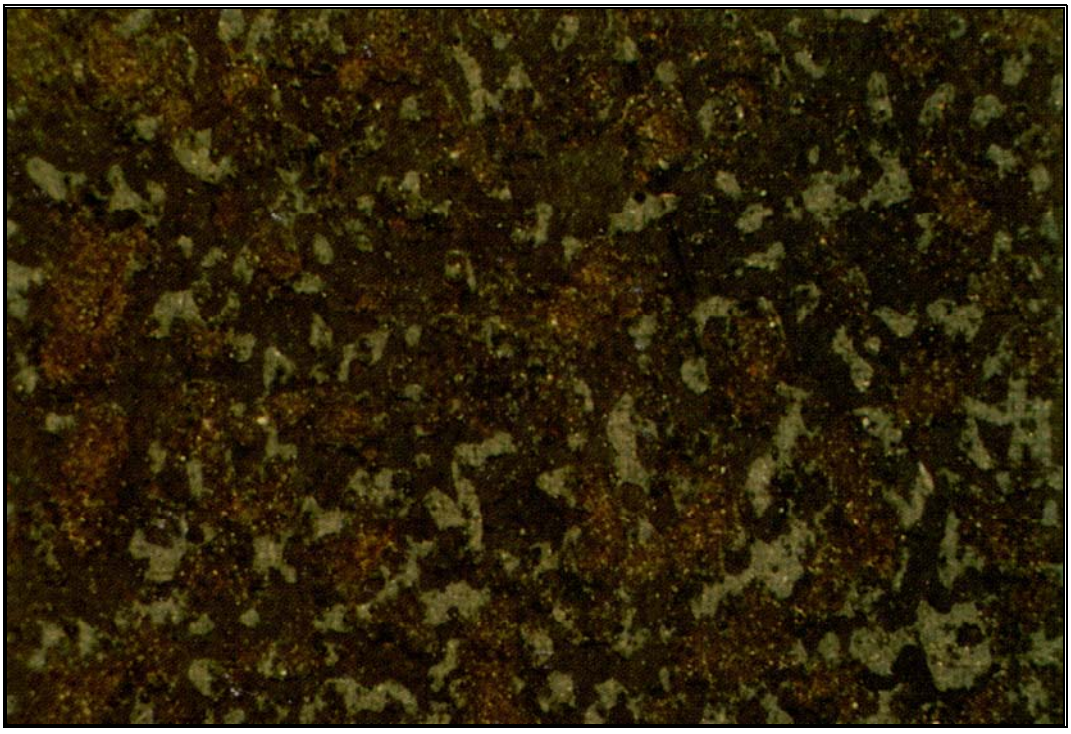
Removal of loose mill scale.loose rust.and loose paint, to the degree hereafter specified, by the impact of abrasives propelled through nozzles or by centrifugal wheels. It is not intended that the surface shall be free of all mill scale, rust, and paint.The remaining mill scale, rust,and paint should be firmly adhered and the surface should be sufficiently abraded to provide good adhesion and bonding of paint.

A brush-off blast cleaned surface finish is defined as one from which all oil, grease, dirt, rust scale, loose mill scale, loose rust and loose paint or coatings are removed completely but tight mill scale and firmly adhered rust, paint and coatings are permitted to remain provided that all mill scale and rust have been exposed to the abrasive blast pattern sufficiently to expose numerous flecks of the underlying metal fairly uniformly distributed over the entire surface.

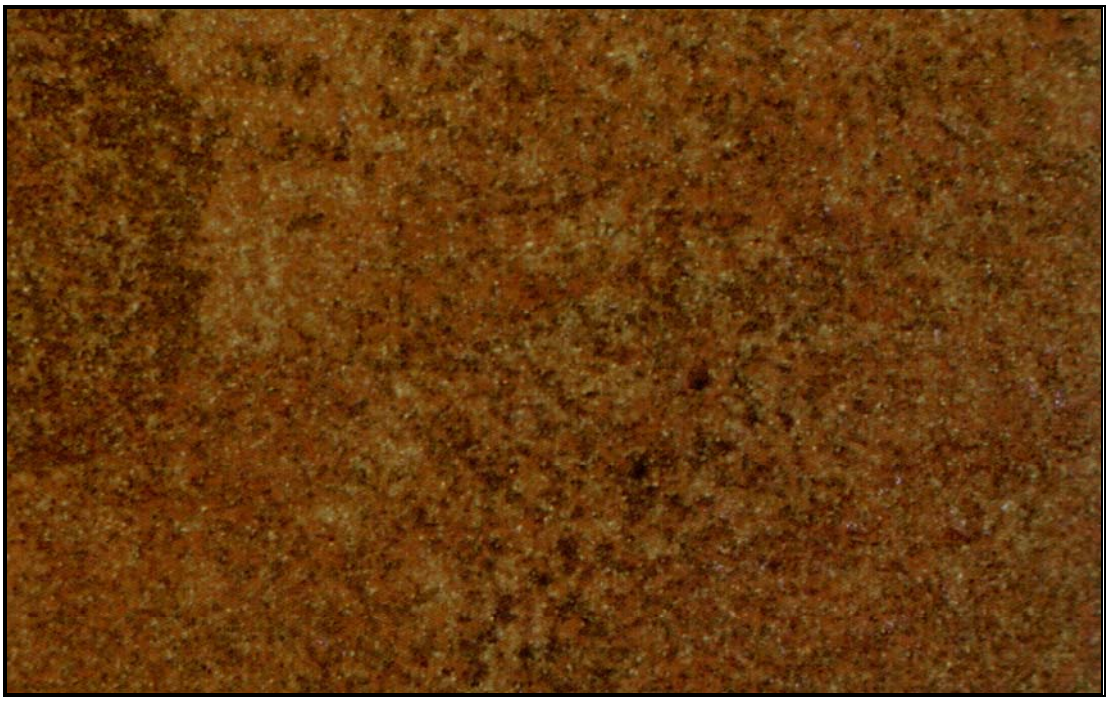
Sa 1 SIS 05 5900 Swedish Standards Organisation

Sa 1 ISO 8501-1

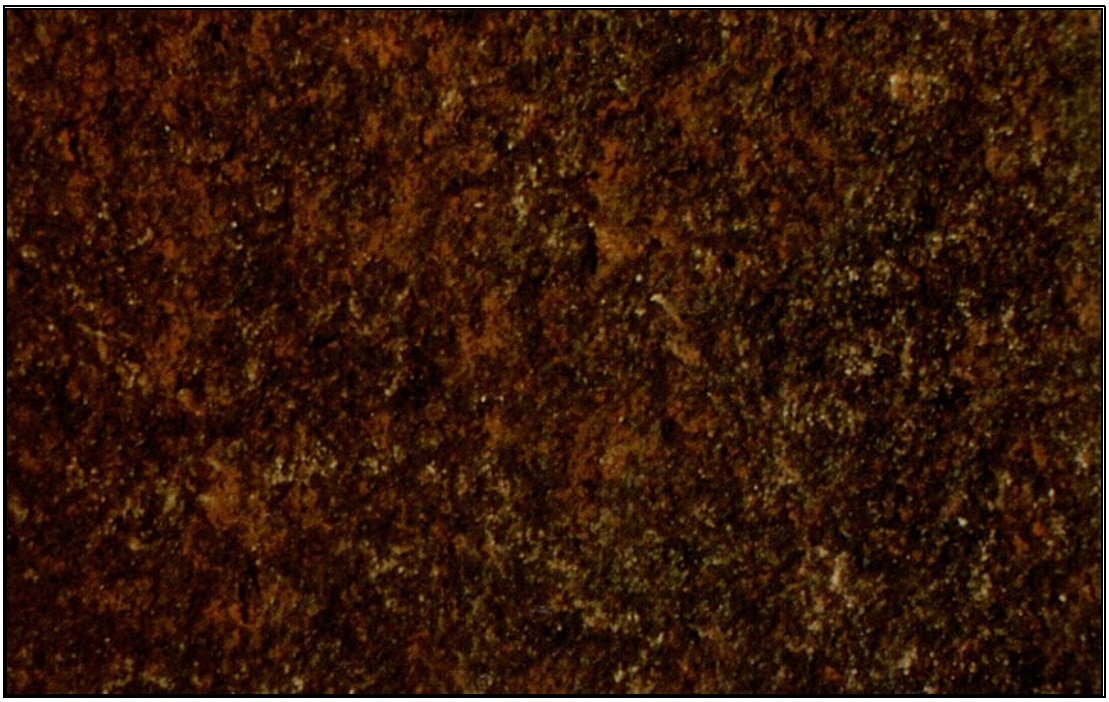
RUST GRADE “B” (Sa 1)



RUST GRADE “C” (Sa 1)



RUST GRADE “D” (Sa 1)



THOROUGH BLAST CLEANING OR COMMERCIAL BLAST CLEANING (Sa 2)

Removal of partial mill scale, rust, rust scale, paint or foreign matter by the use of abrasives propelled through nozzles or by centrifugal wheels, to the degree specified.

A commercial blast cleaned surface finish is defined as one from which all oil, grease, dirt, rust scale and foreign matter have been completely removed from the surface and all rust, mill scale and old paint have been completely removed except for slight shadows, streaks, or discoloration caused by rust stain, mill scale oxides or slight, firm residues of paint or coating that may remain if the surface is pitted,slight residues of rust or paint may by found in the bottom of pits. At least two-thirds of each square inch of surface area shall be free of all visible residues and the remainder shall be limited to the light discoloration, slight staining or firm residues mentioned above.

Sa 2 SIS 05 5900 Swedish Standards Organisation

Sa 2 ISO 8501-1

RUST GRADE “B” (Sa 2)



RUST GRADE “C” (Sa 2)



RUST GRADE “D” (Sa 2)



VERYTHOROUGH BLAST CLEANING OR NEAR WHITE METAL BLAST CLEANING (Sa 2 ½)

Removal of nearly all mill scale, rust, rust scale, paint/or foreign matter by the use of abrasives propelled through nozzles or by centrifugal wheels, to the degree hereafter specified.

A near-white metal blast cleaned surface finish is defined as one from which all oil, grease, dirt, mill scale, rust, corrosion products, oxides, paint or other foreign matter have been completely removed from the surface except for very light shadows, very slight streaks or slight discolouration caused by rust stain/mill scale oxides, or light, firm residues of paint or coating that may remain. At least 95 percent of each square inch of surface area shall be free of all visible residues.and the remainder shall be limited to the light discoloration mentioned above.

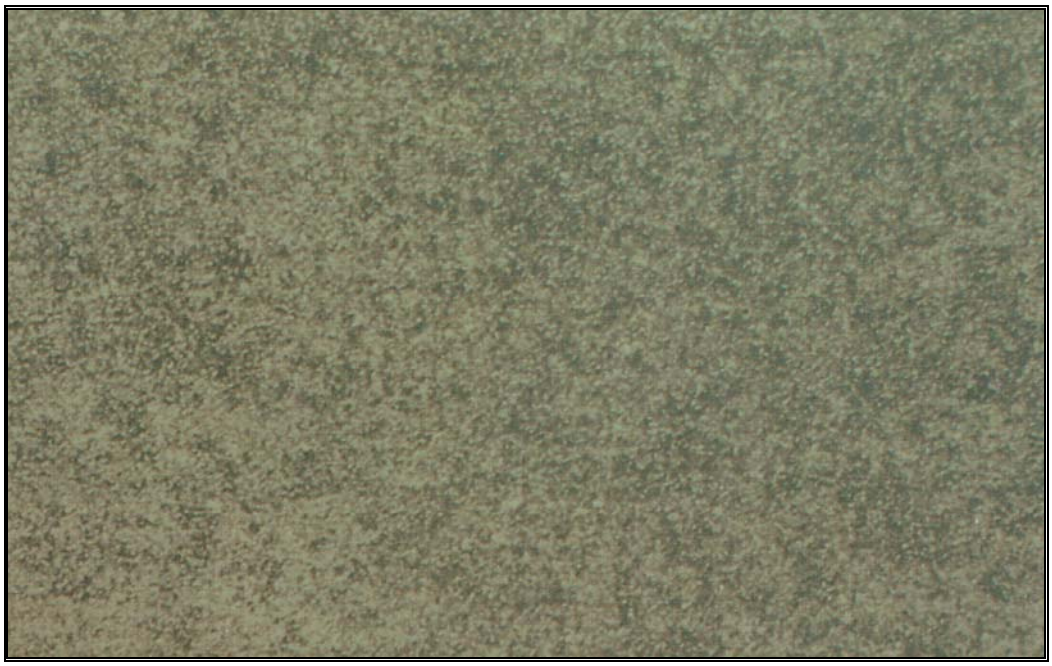
Sa 2 ½ SIS 05 5900 Swedish Standards Organisation

Sa 2 ½ ISO 8501-1

RUST GRADE “B” (Sa 2 ½)



RUST GRADE “C” (Sa 2 ½)



RUST GRADE “D” (Sa 2 ½)



BLAST CLEANING TO VISUALLY CLEAN STEEL OR WHITE METAL BLAST CLEANING (Sa 3)

Removal of all mill scale, rust, rust scale, paint or foreign matter by the use of abrasives propelled through nozzles or by centrifugal wheels.

A white metal blast cleaned surface finish is defined as a surface with a grey-white, uniform metallic colour, slightly roughened to form a suitable anchor pattern for coatings.The surface,when viewed without magnification, shall be free of all oil, grease, dirt, visible mill sea le, rust, corrosion products, oxides, paint, or any other foreign matter.

Sa 3 SIS 05 5900 Swedish Standards Organisation

Sa 3 ISO 8501-1

RUST GRADE “B” (Sa 3)



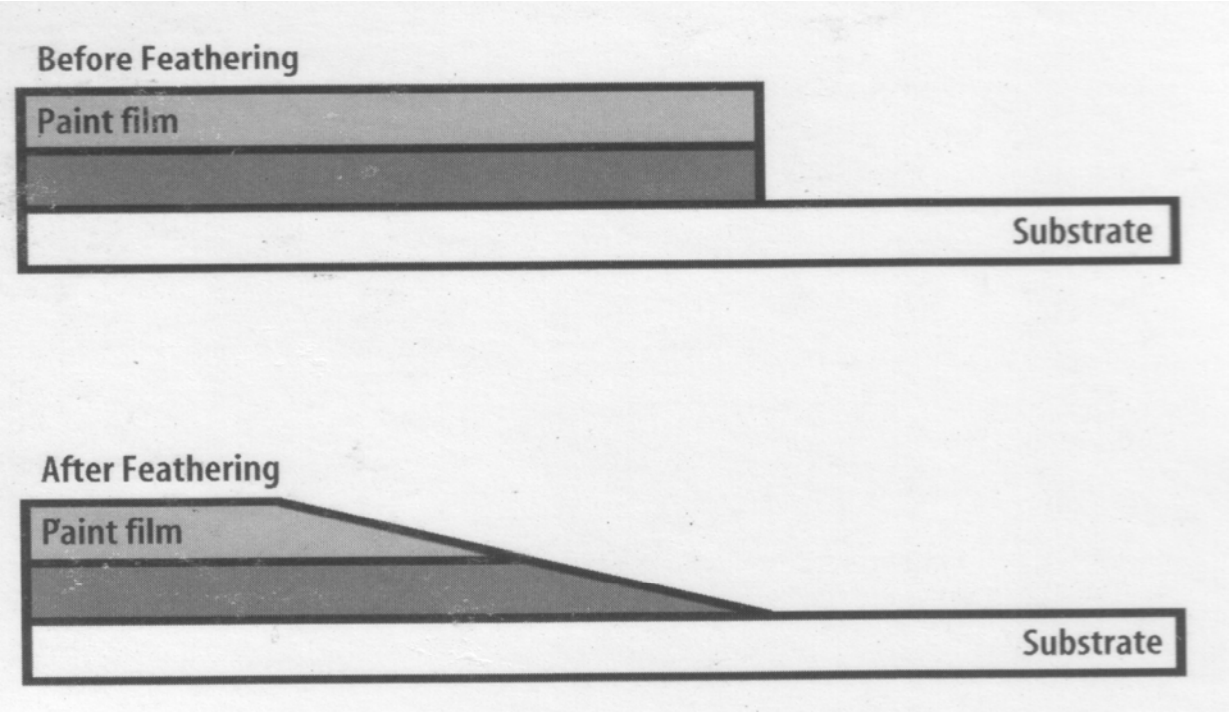
RUST GRADE "C" (Sa 3)



RUST GRADE "D" (Sa 3)



FEATHERING



Description: Where repairs are carried out to an already painted surface, the edge of the old paint should be feathered to a sound, well adhered thin edge using an appropriate means of abrasion, prior to overcoating.

Caution: 1) Check compatability of new paint over old paint.
2) Ensure new paint does not soften and lift old paint, particularly at the feathered edges,