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INTERNATIONAL STANDARD

ISO 8501-1

NORME INTERNATIONALE

Second edition
Deuxième édition
2007-05-01

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 coatings

Préparation des subjectiles d'acier avant application de peintures et de produits assimilés — Évaluation visuelle de la propreté d'un subjectile

Partie 1:

Degrés de rouille et degrés de préparation des subjectiles d'acier non recouverts et des subjectiles d'acier après décapage sur toute la surface des revêtements précédents



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 8501-1 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 12, *Preparation of steel substrates before application of paints and related products*.

This second edition cancels and replaces the first edition (ISO 8501-1:1988). The main change is that the Informative Supplement ISO 8501-1:1988/Suppl.1994 has been included as Annex A.

ISO 8501 consists of the following parts, under the general title *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 coatings*
- *Part 2: Preparation grades of previously coated steel substrates after localized removal of previous coatings*
- *Part 3: Preparation grades of welds, edges and other areas with surface imperfections*
- *Part 4: Initial surface conditions, preparation grades and flash rust grades in connection with high-pressure water jetting*

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Introduction

The performance of protective coatings of paint and related products 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

- a) the presence of rust and mill scale;
- b) the presence of surface contaminants, including salts, dust, oils and greases;
- c) the surface profile.

International Standards ISO 8501, ISO 8502 and ISO 8503 have been prepared to provide methods of assessing these factors, while ISO 8504 provides guidance on the preparation methods that are available for cleaning steel substrates, indicating the capabilities of each in attaining specified levels of cleanliness.

These International Standards do not contain recommendations for the protective coating systems to be applied to the steel surface. Neither do they contain recommendations for the surface quality requirements for specific situations even though surface quality can have a direct influence on the choice of protective coating to be applied and on its performance. Such recommendations are given in other documents such as national standards and codes of practice. It will be necessary for the users of these International Standards to ensure that the qualities specified are

- compatible and appropriate both for the environmental conditions to which the steel will be exposed and for the protective coating system to be used;
- within the capability of the cleaning procedure specified.

The four 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 8504 — *Surface preparation methods*.

Each of these International Standards is in turn divided into separate parts.

This part of ISO 8501 identifies four levels (designated as “rust grades”) of mill scale and rust that are commonly found on surfaces of uncoated erected steel and steel held in stock. It also identifies certain degrees of visual cleanliness (designated as “preparation grades”) after surface preparation of uncoated steel surfaces and of steel surfaces after overall removal of any previous coating. These levels of visual cleanliness are related to the common methods of surface cleaning that are used prior to painting.

This part of ISO 8501 is intended to be a tool for visual assessment of rust grades and of preparation grades. It includes 28 representative photographic examples.

Fourteen of these photographic examples show steel surfaces that have been subjected to dry blast-cleaning using quartz sand as the abrasive. The use of other abrasives may affect the appearance of the surface. Colour changes caused by different abrasives are shown in Annex A.

NOTE Twenty-four of the photographs originated from the Swedish standard SIS 05 59 00-1967, *Pictorial surface preparation standards for painting steel surfaces*. The other four photographs originated from the German standard DIN 55 928, Part 4, Supplement 1 (August 1978), *Protection of steel structures from corrosion by organic and metallic coatings; preparation and testing of surfaces; photographic standards*.

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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 coatings

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1 Scope

This part of ISO 8501 specifies a series of rust grades and preparation grades of steel surfaces (see Clauses 2 and 3, respectively). The various grades are defined by written descriptions together with photographs that are representative examples within the tolerance for each grade as described in words.

It is applicable to hot-rolled steel surfaces prepared for painting by methods such as blast-cleaning, hand and power tool cleaning and flame cleaning, although these methods rarely lead to comparable results. Essentially, these methods are intended for hot-rolled steel, but blast-cleaning methods, in particular, could also be used on cold-rolled steel of sufficient thickness to withstand any deformation caused by the impact of the abrasive or the effects of power tool cleaning.

This part of ISO 8501 is applicable also to steel substrates that show residues of firmly adhering paint and other foreign matter (see Note 2 to 3.1) in addition to residual mill scale.

ISO 8501-1:2007(E)

NOTE 1 The preparation grades of previously painted steel surfaces after only localized removal of paint coatings form the subject of ISO 8501-2 [1].

This part of ISO 8501 relates the cleanliness of the surface to its visual appearance. In many instances, this is sufficient for the purpose but for coatings likely to be exposed to severe environments, such as water immersion and continuous condensation conditions, consideration should be given to testing for soluble salts and other invisible contaminants on the visually clean surface by the physical and chemical methods which form the subjects of the various parts of ISO 8502 [2]. The roughness characteristics of the surface should also be considered by reference to the various parts of ISO 8503 [3].

NOTE 2 This part of ISO 8501 contains the text in two of the three official languages of ISO, English and French. It also contains the text in German, published under the responsibility of DIN, and the text in Swedish, published under the responsibility of SIS.

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2 Rust grades

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Four rust grades, designated A, B, C and D respectively, are specified. The rust grades are defined by written descriptions.

- A** Steel surface largely covered with adhering mill scale but little, if any, rust.
- B** Steel surface which has begun to rust and from which the mill scale has begun to flake.
- 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.
- D** Steel surface on which the mill scale has rusted away and on which general pitting is visible under normal vision.

Representative photographic examples of these rust grades are appended to this part of ISO 8501 (see Clause 5 for details).

3 Preparation grades

3.1 General

A number of preparation grades, indicating the method of surface preparation and the degree of cleaning, are specified. The preparation grades are defined in 3.2, 3.3 and 3.4 by written descriptions of the surface appearance after the cleaning operation. Representative photographic examples of these preparation grades are appended to this part of ISO 8501 (see Clause 5 for details).

Each preparation grade is designated by the appropriate letters “Sa”, “St” or “FI” to indicate the type of cleaning method used. The number following, if any, indicates the degree of cleaning from mill scale, rust and previous coatings.

The photographs are designated by the original rust grade before cleaning and the designation of the preparation grade, for example B Sa 2½.

NOTE 1 The term “foreign matter” used in 3.2, 3.3 and 3.4 may include water-soluble salts and welding residues. These contaminants cannot be completely removed from the surface by dry blast-cleaning, hand and power tool cleaning or flame cleaning; wet blast-cleaning or water jetting should be used.

NOTE 2 Mill scale, rust or a paint coating is considered to be poorly adhering if it can be removed by lifting with a blunt putty knife.

3.2 Blast-cleaning, Sa

Surface preparation by blast-cleaning is designated by the letters “Sa”. Descriptions of the blast-cleaning grades are given in Table 1.

Prior to blast-cleaning, any heavy layers of rust shall be removed by chipping. Visible oil, grease and dirt shall also be removed.

After blast-cleaning, the surface shall be cleaned from loose dust and debris.