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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Preparation of steel substrates before application of paints and related products — Surface roughness characteristics of blast-cleaned steel substrates —

Part 2 : Method for the grading of surface profile of abrasive blast-cleaned steel — Comparator procedure

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Préparation des subjectiles d'acier avant application de peintures et de produits assimilés — Caractéristiques de rugosité des subjectiles d'acier décapés —

Partie 2 : Méthode pour caractériser un profil de surface en acier décapée par projection d'abrasif — Utilisation d'échantillons de comparaison viso-tactile ISO

Reference number
ISO 8503-2 : 1988 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

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International Standard ISO 8503-2 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes.*

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Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Part 2 :
Method for the grading of surface profile of abrasive blast-cleaned steel — Comparator procedure

0 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.

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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 found 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.

Irrespective of the procedures and the type of abrasive that are used for the preparation of steel substrates, the surface after blast-cleaning consists of random irregularities with peaks and valleys that are not easily characterized. Consequently, it was concluded that, because of this random nature, no method is capable of giving a precise value for the profile. Thus, it has been recommended that the profile should be identified as either dimpled (where shot abrasives have been used) or angular (where grit abrasives have been used) and that it should be graded as "fine", "medium" or "coarse", each grade being defined by the limits specified in ISO 8503-1. These surface characteristics are considered to give sufficient distinguishing features for most painting requirements.

Particular attention, however, is drawn to the fact that the grades "fine", "medium" and "coarse" represent different ranges in terms of roughness parameters, dependent upon whether these grades are applied to shot abrasive or grit abrasive blast-cleaned surfaces. In consequence, the effect produced on a given coating by a given grade "fine", "medium" or "coarse" is determined not only by the specific surface character but also by the specific roughness value ($\overline{R_{y5}}$ or $\overline{h_y}$) belonging to that grade. Where surface profile is particularly important, both the grade of the surface profile ("fine", "medium" or "coarse") and the type of abrasive which is to be used should be specified.

This method of test requires the following supplementary information to be completed for any particular application. This information shall be derived from parts of ISO 8501, ISO 8503 and ISO 8504 or similar standards or, where appropriate, shall be the subject of agreement between the interested parties.

a) When and where the assessment of grading is to be carried out (i.e. the frequency of assessments as blast-cleaning proceeds and the nominal distance between individual assessments).

b) Wherever possible, whether shot or grit abrasive (or a mixture of shot and grit abrasives) is to be used for the blast-cleaning procedure(s).

c) The required grading (see the note below) of the blast-cleaned substrates in terms of "fine", "medium" or "coarse" and, where known, the rust grade (see ISO 8501-1) of the substrate prior to blast-cleaning.

d) If required, the type of comparator to be used, i.e. comparator G or comparator S.

NOTE — The rust grade of the steel is indicative of the "primary" profile of the surface and hence this will affect the profile of the cleaned substrate. The "secondary" profile is the profile resulting from the effect of the blast-cleaning process on the primary profile and it is this "secondary" profile which is to be assessed by use of a reference comparator.

Sharp edges due to mechanical or flame cutting, boring, etc., are not considered part of the primary profile and should be removed by grinding prior to abrasive blast-cleaning.

1 Scope and field of application

1.1 This part of ISO 8503 describes a visual and tactile method for assessing the grade of the profile that has been produced by one of the abrasive blast-cleaning procedures described in ISO 8504-2.

The method uses ISO surface profile comparators for assessing, on site, the roughness of surfaces before the application of paint or other protective treatments.

NOTE — Where appropriate, ISO surface profile comparators may be used for assessing the roughness profile of other abrasive blast-cleaned substrates and, in addition, their use is not restricted solely to surfaces that are to be painted.

1.2 The method is applicable to steel surfaces that have been blast-cleaned by use of either shot abrasives or grit abrasives but is only applicable for grades Sa 2 $^{1}/_{2}$ and Sa 3 of ISO 8501-1 when the entire surface under test shows an overall blast-cleaned appearance.

It is applicable to surfaces that have been cleaned with either metallic or non-metallic abrasives.

2 References

ISO 4618, *Paints and varnishes — Vocabulary.*

ISO 8501-1, *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.*

ISO 8503, *Preparation of steel substrates before application of paints and related products — Surface roughness characteristics of blast-cleaned steel substrates*

— *Part 1 : Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast-cleaned surfaces.*

— *Part 3 : Method for the calibration of ISO surface profile comparators and for the determination of surface profile — Focusing microscope procedure.*

— *Part 4 : Method for the calibration of ISO surface profile comparators and for the determination of surface profile — Stylus instrument procedure.*

ISO 8504-2, *Preparation of steel substrates before application of paints and related products — Surface preparation methods — Part 2 : Abrasive blast-cleaning.* [1)]

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3 Definitions

For the purpose of this part of ISO 8503, the definitions given in ISO 4618 and ISO 8503-1 apply.

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4 Principle

Visual and/or tactile comparison of the surface profile of the test surface with the profile of each of the segments of a calibrated ISO surface profile comparator. Identification of the two segments between whose profiles the test surface lies, and conversion to the appropriate grading : "fine", "medium" or "coarse".

5 Apparatus

5.1 Surface profile comparator, calibrated, complying with the requriements of ISO 8503-1.

NOTES

1 In ISO 8503-1, two comparators are specified : one with surface profiles corresponding to surfaces that have been blast-cleaned using grit abrasives (reference comparator G) and one with surface profiles corresponding to surfaces that have been blast-cleaned using metallic shot abrasives (reference comparator S). The nominal values for these profiles, which identify the limits of the three grades "fine", "medium" and "coarse", are given in ISO 8503-1.

When a mixture of shot and grit abrasives is used to blast-clean a substrate, the grit-abrasive reference comparator G should be used.

1) At present at the stage of draft.

Some abrasives (for example, cast steel and cut wire) will change their shape during use so that "new" abrasive will give an angular profile but a "working mix" will give a rounded profile. Hence, the relevant comparator should be selected for these abrasives (see ISO 8504-2).

2 Other comparator designs and configurations may be used, provided that four segments are included that comply with the profiles specified in ISO 8503-1.

5.2 Hand lens, with magnification not exceeding X 7.

6 Maintenance and re-calibration of comparators

Comparators require careful handling. If any noticeable wear is detected, the comparator shall be discarded or, if appropriate, re-calibrated (see the note to clause 7 in ISO 8503-1).

7 Procedure

7.1 Remove all loose dust and debris from the test surface.

7.2 Select the appropriate surface profile comparator (5.1) and place it against an area of the surface. Compare, in turn, the test surface with the four segments of the comparator, using the hand lens (5.2) if necessary (see the note). If the hand lens is used, place it so that the test surface is viewed simultaneously with a segment of the comparator.

Assess the profiles on the comparator that are nearest to the profile of the test surface and, from these, determine its grade (see the table).

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Table — Limits of profile grades

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Fine	Profiles equal to segment 1 and up to but excluding segment 2
Medium	Profiles equal to segment 2 and up to but excluding segment 3
Coarse	Profiles equal to segment 3 and up to but excluding segment 4

NOTE — If visual assessment proves difficult, tactile assessment may provide a useful guide. It is possible to assess the closest grading by passing either the back of the finger-nail or a wooden stylus held between thumb and forefinger alternately over the test surface and the segments of the comparator.

7.3 Repeat the test with the comparator adjacent to each of the areas of the test surface, as required [see clause 0, eighth paragraph, item a)].

7.4 Record the grades for all areas of the test surface.

If any profile is assessed as below the lower limit for the "fine" grading, report the grading as "finer than fine".

If any profile is assessed as above the upper limit for the "coarse" grading, report the grading as "coarser than coarse".

7.5 When the condition of the steel that has been blast-cleaned is such that the primary profile (see the note to clause 0) prevents assessment of the roughness of the secondary profile, carry out the assessment on a flat coupon of steel of equivalent specification that has been cleaned by the same procedure as the test surface, using the same abrasive, and state in the test report that

a) direct assessment of the secondary profile was not possible due to the condition of the surface prior to blast-cleaning and

b) the blast-cleaning process employed produced a secondary profile of Grade ...[1] as measured on a flat coupon of steel of equivalent specification to the test material.

NOTES

1 If the condition of the steel is such that it is necessary to adopt the procedure described in 7.5, it should be considered whether the contributory effect of the primary profile on the profile obtained after blast-cleaning is such that the original painting specification should be reviewed.

2 When surfaces are subject to re-blasting operations, the initial profile may override the secondary profile normally expected from the abrasive and conditions used in the re-blasting operations.

7.6 In cases of dispute, a representative sample of the surface shall be provided and measured as described in ISO 8503-3 or ISO 8503-4.

NOTE — In the absence of agreement, measurement by the method described in ISO 8503-3 is the referee procedure.

8 Test report

The test report shall contain at least the following information :

a) the identification of the steel substrate(s) tested;

b) a reference to this part of ISO 8503 (ISO 8503-2);

c) the items of supplementary information referred to in the introduction to this part of ISO 8503;

d) where possible, the rust grade(s) of the steel surface prior to abrasive blast-cleaning [see clause 0, eighth paragraph, item c)], the method of abrasive blast-cleaning used with reference to ISO 8504-2 and a description of the abrasive used;

e) the result of the test [including the number of assessments made (see clause 0, eighth paragraph, item a)], identification of the reference comparator used and, if direct assessment was not possible, a statement as detailed in 7.5;

f) in cases of dispute (see 7.6), the method of measurement used and the profile value determined;

g) any deviation, by agreement or otherwise, from the procedure described;

h) the name of the operator;

i) the date of the test.

1) Insert "fine", "medium" or "coarse" as appropriate.

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