

INTERNATIONAL STANDARD

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Preparation of steel substrates before application of paint and related products — Tests for the assessment of surface cleanliness —

Part 3:

Assessment of dust on steel surfaces prepared
for painting (pressure-sensitive tape method)

*Préparation des subjectiles d'acier avant application de peintures et de
produits assimilés — Essais pour apprécier la propreté d'une surface —*

*Partie 3: Évaluation de la poussière sur les surfaces d'acier préparées
pour la mise en peinture (méthode du ruban adhésif sensible à la
pression)*



Reference number
ISO 8502-3:1992(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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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.

International Standard ISO 8502-3 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Sub-Committee SC 12, *Preparation of steel substrates before application of paints and related products*.

ISO 8502 consists of the following parts, under the general title *Preparation of steel substrates before application of paint and related products — Tests for the assessment of surface cleanliness*:

- *Part 1: Field test for soluble iron corrosion products*
[Technical Report]
- *Part 2: Laboratory determination of chloride on cleaned surfaces*
- *Part 3: Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)*
- *Part 4: Guidance on the estimation of the probability of condensation prior to paint application*
- *Part 5: Measurement of chloride on steel surfaces prepared for painting — Ion detector tube method*
- *Part 6: Sampling of soluble impurities on surfaces to be painted — Bresle method*
- *Part 7: Analysis of soluble impurities on surfaces to be painted — Analysis methods for field use for oil and grease*

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- *Part 8: Analysis of soluble impurities on surfaces to be painted — Analysis methods for field use for moisture*

Users should note that the titles to future parts 5 to 8 are working titles only and that, while it is at present planned to publish all the parts listed above, one or more may nevertheless be deleted from the work programme before publication, which may, in turn, lead to renumbering of the remaining parts.

Annex A of this part of ISO 8502 is for information only.

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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 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.

This part of ISO 8502 describes a procedure for the assessment, using a pressure-sensitive tape method, of the quantity and the particle size of dust on steel surfaces prepared for painting.

In the painting schedule requirements of contractual documents giving details of surface preparation by blast-cleaning, it is normally specified that all surfaces shall be free from surface contamination including oil, grease, dirt, dust and water-soluble salts.

Dust on blast-cleaned steel surfaces may reduce the adhesion of subsequently applied organic coatings and, by absorbing moisture, may promote the corrosion of the blast-cleaned steel surfaces. Accumulation of dust more naturally occurs on horizontal surfaces, the interior of pipes, and in structural cavities. Special inspection should be carried out to ensure that such areas are adequately cleaned and adequately free from dust before painting.

Because of subjective factors involved in the test procedure, the test does not allow the precise determination of dust retained on blast-cleaned steel surfaces. Nevertheless, when carried out by experienced operators, and especially when used to compare the performance of surfaces under test with agreed standard specimens, it gives very useful information.

There are many possible variables in the conditions at sites where tests may be required to be carried out. Agreements made between interested parties where appropriate should include the number or frequency of tests, the test locations, and the dates and times when the tests are to be carried out.

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Preparation of steel substrates before application of paint and related products — Tests for the assessment of surface cleanliness —

Part 3:

Assessment of dust on steel surfaces prepared for painting (pressure-sensitive tape method)

1 Scope

1.1 This part of ISO 8502 describes a method for the assessment of dust remaining on cleaned steel surfaces prepared for painting. It provides pictorial ratings for the assessment of the average quantity of dust. It also provides descriptive classes for the assessment of the average size of the dust particles.

NOTE 1 The quantity ratings and size classes referred to in this part of ISO 8502 are derived from ISO 4628-1:1982, *Paints and varnishes — Evaluation of degradation of paint coatings — Designation of intensity, quantity and size of common types of defect — Part 1: General principles and rating schemes*.

1.2 The method may be carried out

either

a) as a “pass/fail” test by assessing the quantity of dust present on a test surface, and the average dust particle size, in comparison with specific limits;

or

b) to provide a permanent record of the dust present on a surface by mounting the tapes used to carry out the tests on tiles, cards or paper, of an appropriate contrasting colour.

1.3 This method is suitable for the assessment of dust retained, after cleaning, on a steel surface which corresponded before cleaning to rust grade A, B or C as defined in ISO 8501-1. Because

of the limited elasticity of adhesive tape, it is not possible for the tape to penetrate into the deep pits present in cleaned steel that originally corresponded to rust grade D.

1.4 While a test procedure in which pressure is applied to a tape using the thumb is subjective, it is usually adequate, especially for use in situations where surfaces free from dust are required. In cases of dispute, except when rust grade C or D is involved, pressure may be applied to the back of the adhesive tape using a spring-loaded roller.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8502. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8502 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8501-1:1988, *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 coatings*.

IEC 454-2:1974, *Specifications for pressure-sensitive adhesive tapes for electrical purposes — Part 2: Methods of test*.

3 Definition

For the purposes of this part of ISO 8502, the following definition applies.

3.1 dust: Loose particulate matter present on a steel surface prepared for painting, arising from blast-cleaning or other surface preparation processes, or resulting from the action of the environment.

4 Principle

A pressure-sensitive adhesive tape is pressed on to the steel surface prepared for painting. The tape, with the dust adhering to it, is then removed and placed on a display board of a colour which contrasts to that of the dust, and is examined visually. The quantity of dust adhering to the tape and the dust particle size are then estimated.

5 Apparatus and materials

5.1 Adhesive tape, consisting of rolls of virtually colourless, transparent, self-adhesive, pressure-sensitive tape of width 25 mm, having an adhesion peel strength of at least 190 N per metre width when measured in accordance with the 180° peel test in IEC 454-2.

NOTE 2 This peel test calls for a 180° peel from steel backing at a peel rate of (300 ± 30) mm/min.

5.2 Display board, of colour contrasting to that of the dust, for use as a background, e.g. of glass or black or white glazed tiles, cards or paper.

5.3 Spring-loaded roller, so designed that it is capable of applying a load of 39,2 N or 49,0 N or an intermediate load. (See annex A.)

NOTE 3 The roller is calibrated using weightpieces of mass 4 kg and 5 kg. At the 4 kg calibration point, the force exerted by the roller is 39,2 N, and at the 5 kg calibration point it is 49,0 N.

5.4 Hand lens, capable of magnification $\times 10$.

6 Procedure

6.1 At the beginning of each series of tests, remove and discard the first three turns of tape from the roll and then remove a piece about 200 mm long.

6.2 Touching the adhesive side of the tape only at the ends, press about 150 mm of the freshly exposed tape firmly on to the surface under test. With due regard to subclause 1.4, adopt one of the following alternative methods given in a) and b).

- a) Place the thumb across one end of the tape and move the thumb, while maintaining a firm pressure, at a constant speed along the tape three times in each direction, so that each stroke takes between 5 and 6 seconds. Remove the tape from the test surface, place it on an appropriate display board (5.2) and cause it to adhere to the board by rubbing with the thumb.
- b) Apply the calibrated spring-loaded roller (5.3) centrally across one end of the tape and move the roller, while maintaining a downward load between 39,2 N and 49,0 N (see note 3), at a constant speed along the tape three times in each direction, so that each stroke takes between 5 and 6 seconds. Remove the tape from the test surface, place it on an appropriate display board (5.2) and cause it to adhere to the board by rubbing with the thumb.

6.3 Assess the quantity of dust on the tape by comparing visually an area of the tape with equivalent-sized areas of the pictorial references shown in figure 1. Record the rating corresponding to the reference that is the closest match.

NOTE 4 The use of intermediate half-steps is permissible if required to give a more detailed report.

Report any overall discoloration as quantity rating 5, size class 1.

NOTE 5 It is not unusual, after carrying out this test, to find that the tape displays an overall discoloration, usually reddish-brown or black, sometimes with the presence of discrete visible particles, depending on the type of abrasive used. The discoloration is caused by microscopic dust from the test surface that can cause serious interference with paint adhesion.

6.4 Assess the predominating dust particle size on the adhesive tape by reference to table 1 which defines six dust particle size classes, designated 0, 1, 2, 3, 4 and 5.

NOTE 6 The use of intermediate half-steps is permissible if required to give a more detailed report.

Report any overall discoloration as size class 1 (see note 5).

NOTE 7 Microscopic dust discoloration usually consists of particles less than 50 μm in diameter.

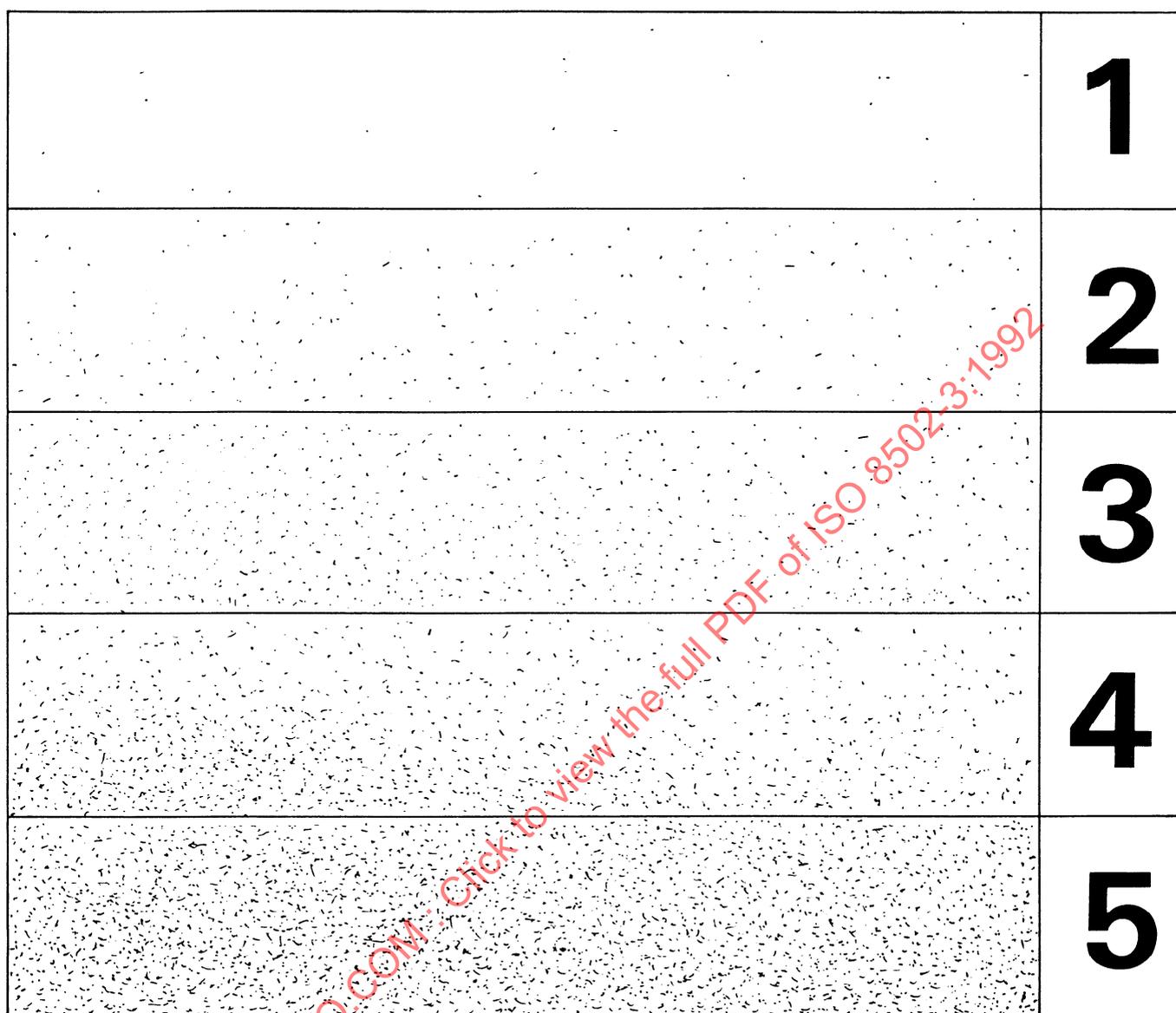


Figure 1 — Pictorial references corresponding to dust quantity ratings 1, 2, 3, 4 and 5

Table 1 — Dust size classes

Class	Description of dust particles
0	Particles not visible under $\times 10$ magnification
1	Particles visible under $\times 10$ magnification but not with normal or corrected vision (usually particles less than $50 \mu\text{m}$ in diameter)
2	Particles just visible with normal or corrected vision (usually particles between $50 \mu\text{m}$ and $100 \mu\text{m}$ in diameter)
3	Particles clearly visible with normal or corrected vision (particles up to $0,5 \text{ mm}$ in diameter)
4	Particles between $0,5 \text{ mm}$ and $2,5 \text{ mm}$ in diameter
5	Particles larger than $2,5 \text{ mm}$ in diameter

6.5 Carry out a sufficient number of tests to characterize the surface under test.

For every surface of one particular type and aspect, carry out not less than three separate tests. If the results do not have a spread of one or less quantity rating, carry out at least two additional tests to establish the mean.

6.6 After completing the test and before painting the steel surface, remove any tape or adhesive left on the test surface.

7 Test report

The test report shall contain at least the following information:

- a) all details necessary to identify the surface(s) tested;
- b) a reference to this part of ISO 8502 (i.e. ISO 8502-3);

- c) all details necessary to identify the adhesive tape used;
- d) all details necessary to identify the substrate used as a display background for the tape;
- e) the nature of the area(s) of each surface tested, with reference to specific features, e.g. ledges, beams, web or flange faces, pockets formed from fabricated units and the attitude of the test area, e.g. vertical, horizontal upward-facing or horizontal downward-facing;
- f) the dust quantity rating(s) and dust size class(es) for each surface examined (alternatively, for general steel construction work, the test tapes themselves may, if agreed between the interested parties, be kept as a record of the tests);
- g) any deviation from the procedure described;
- h) the date and, if applicable, the time of each test.

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Annex A
(informative)

Spring-loaded roller

This annex shows, by way of example only, the design of a roller that has been found suitable in use. For detailed sectional views, see figures A.1, A.2 and A.3. Instructions for calibration are given in figure A.4.

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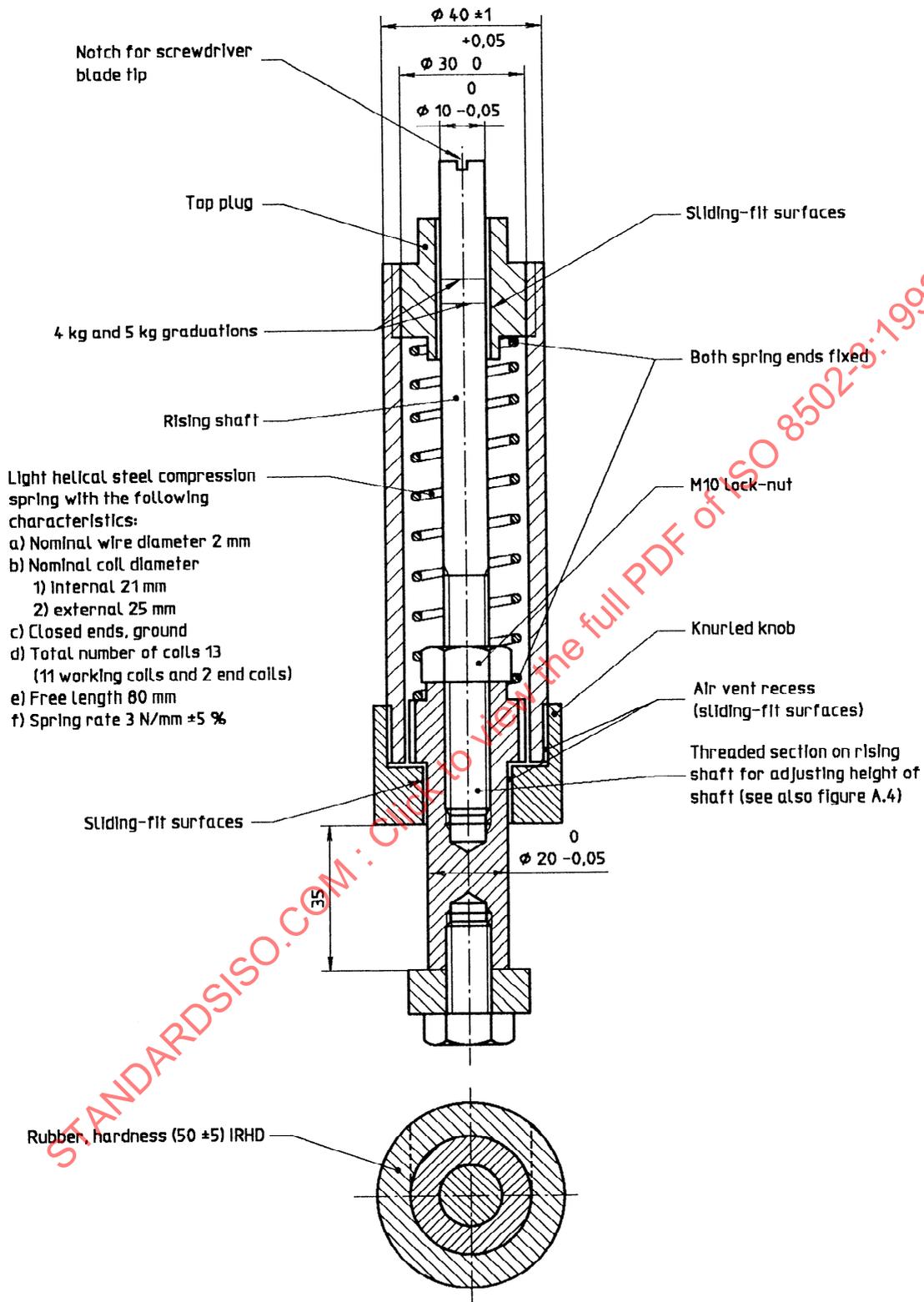


Figure A.1 — Sectional side view of roller