INTERNATIONAL STANDARD

ISO 8502-6

Third edition
2020-04

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

Part 6: Extraction of water soluble contaminants for analysis (Bresle method)

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

Partie 6: Extraction des contaminants solubles en vue de l'analyse (Méthode de Bresle)

Reference number
ISO 8502-6:2020(E)

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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document 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*, . in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 139, *Paints and varnishes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 8502-6:2006), which has been technically revised.

The main changes compared to the previous edition are as follows:

— inclusion of the sleeve type extraction cells to be used with water extraction;

— specification that only water is used as a solvent for this method.

A list of all parts in the ISO 8502 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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.

The ISO 8501 series, ISO 8502 series and ISO 8503 series have been prepared to provide methods of assessing these factors, while ISO 8504 series 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 series of 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. Users of these International Standards should 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 series of International Standards referred to above deal with the following aspects of preparation of steel substrates:

— ISO 8501 covers the visual assessment of surface cleanliness;

— ISO 8502 covers the tests for the assessment of surface cleanliness;

— ISO 8503 covers the surface roughness characteristics of blast-cleaned steel substrates;

— ISO 8504 covers the surface preparation methods.

This document is one of many parts of ISO 8502 that specify tests for the assessment of surface cleanliness. In relation to such tests, there are several methods for the extraction, for analysis, of soluble contaminants on surfaces to be painted. One of these methods is based on the swabbing of comparatively large test surfaces. This technique provides average values of the contamination present, but it might conceal localized concentrations of contaminants. Also, swabbing might not ensure sufficient penetration to dissolve all the deep-seated contamination such as ferrous salts.

There are other methods, however, which use small cells for the liquid used to remove and collect the surface contaminants. The cells are attached to test surfaces where soluble contaminants could be expected, e.g. where pitting has occurred and prevent loss of extraction solution from evaporate. This closed cell technique usually provides more accurate, point values of the contamination present.

This document describes a simple, inexpensive field test using flexible cells in the form of adhesive cells designed to be filled with water. The method was originally developed by a Swedish scientist, Dr. A. Bresle, using one of the cell types included in this document.

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

Part 6: Extraction of water soluble contaminants for analysis (Bresle method)

1 Scope

This document specifies a method of extracting, for analysis, water soluble contaminants from a surface by use of flexible cells in the form of adhesive patches or sleeves which can be attached to any surface, regardless of its shape (flat or curved) and its orientation (facing in any direction, including downwards).

The method described is suitable for use in the field to determine the presence of water soluble contaminants before painting or a similar treatment.

This document does not cover the subsequent analysis of the contaminants that have been dissolved. Methods of analysis suitable for field use are described in other parts of ISO 8502.

NOTE The extraction method might give a false negative or not take all the water-soluble material off the surface because of: a) Soluble materials hiding in the crevices or under folds of metal; b) Soluble materials under corrosion layers, passivation layers produced by corrosion inhibitors, oil, grease, or other non-visible thin films.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

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 8502-9, *Preparation of steel substrates before application of paints and related products — Tests for the assessment of surface cleanliness — Part 9: Field method for the conductometric determination of water soluble salts*

ISO 8503-2, *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*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Principle

This document covers two types of cells: adhesive patch and flexible sleeve.

With the first type, an adhesive patch with a central compartment designed to hold a solvent (in this case water) is attached to the surface from which water-soluble contaminants are to be removed. The water is injected into the compartment by means of a syringe, and then sucked back into the syringe. This operation is repeated, and the water is left to dissolve salts on the surface.

With the second type of cell, a sleeve containing water is attached to the surface and the water is left, under some agitation, to dissolve the salts. The water (now containing contaminants dissolved off the test surface) is then transferred to a suitable vessel for analysis.

5 Apparatus and materials

5.1 Adhesive cell

An adhesive cell has a body which is made of ageing-resistant, flexible material with closed pores, (e.g. polyethylene foam, and with a hole punched in the centre. For the adhesive patch, the punched-out material is kept in the hole as reinforcement until the patch is used. With the adhesive sleeve, there is no punched-out material in the hole. The flexibility of the cell shall be sufficient to attach to rough surfaces and to areas with some angularity. For the flexible sleeve, it is essential that the foam adhesive ring maintains an exposed area of known size, 1 000 mm^2 for the standard S-1000 sleeve. One side of the cell is coated with a thin elastomer film or an extraction sleeve. The other side is coated with adhesive and covered by a removable protective sheet. The hole and the outer edge of the patch may be any shape, e.g. circular, rectangular, elliptical.

The thickness of the adhesive rim shall be 1,5 mm ± 0,3 mm and the width of the adhesive rim between the hole and the outer edge of the patch shall be at least 5 mm. The thickness of the adhesive rim of adhesive sleeves of size S-1000 (see Table 1) shall be 3 mm ± 0,3 mm and the width at least 7 mm.

Cells with one of the standard compartment sizes specified in Table 1 are called standard cells.

It is essential that the adhesive cell is leak tight. An easily performed leak test for type testing shall be performed according to Annex A. . Twelve cells of the same size shall be tested, and at least eight of them shall pass the test. The leak test shall be carried out by an accredited laboratory and the result stated in a test report. For terms and definitions in this context, see ISO/IEC 17000.

The cell should not cause any noticeable variation in the contamination of the extraction liquid. To confirm accuracy, an initial cell blank test shall be required as described in 6.2

Table 1 — Standard cells

Patch size	Compartment area mm^2
A-0155	155 ± 2
A-0310	310 ± 3
A-0625	625 ± 6
A-1250	1 250 ± 13
A-2500	2 500 ± 25

Table 1 *(continued)*

Sleeve size	Compartment area mm^2
S-1000	1 000 ± 10

5.2 Reusable syringe

max. cylinder volume: 10 ml

max. needle diameter: 1 mm

max. needle length: 50 mm

5.3 Solvent (water), of at least grade 3 purity in accordance with ISO 3696.

NOTE 1 Usually, distilled or de-ionized water of conductivity less than 0,5 mS/m (5 µS/cm) meets this requirement.

NOTE 2 Only water is used in this method. Other acidic solvents are covered in ISO 8502-15.

5.4 Contact thermometer, accurate to 0,5 °C and graduated at 0,5 °C intervals.

5.5 Container, suitable for the analysis to be performed.

6 Procedure

6.1 Selection of test surface

It is important to select test areas where metal loss or pitting is observed, and on or around metal welds, as these are the areas where salts are most prevalently concentrated. Otherwise, choose test areas which are representative of the entire surface.

In case measurements before surface preparation are to be performed, it is recommended to scrape the surface with a metal spatula or knife until bright metal is exposed over at least 50 % of the test area, or replicates the surface condition specified immediately prior to coating.

6.2 Blank test

To check cleanliness of the cells, blank tests shall be performed in advance for each batch.

For the blank test, a piece of clean glass, to which the adhesive patch will adhere, shall be used and water of the same type as to be used for testing. The same procedure as above, 6.3 or 6.4, shall be followed. In case the background interference is significant, the cause shall be investigated and, if possible, eliminated.

In case the background interference introduced by the adhesive cell is significant, reproducible and cannot be eliminated, a blank test shall be performed in parallel to each test and the background subtracted from the field quantitative measurements in order to report a net surface contamination value. If this procedure is followed, it shall be stated in the report.

NOTE For the blank test, 2 patches can be stacked together.

6.3 Extraction by patch or sleeve by injection

6.3.1 Take an adhesive patch, "Bresle patch", or sleeve (5.1) of a suitable size (see Table 1). Remove the protective paper for the patch remove the punched-out material (see Figure 1).

