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Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Measurement of, and acceptance criteria for, the thickness of dry films on rough surfaces

Peintures et vernis — Anticorrosion des structures en acier par systèmes de peinture — Mesure et critères d'acceptation de l'épaisseur d'un feuil sec sur des surfaces rugueuses

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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 19840 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 14, *Protective paint systems for steel structures*.

This second edition cancels and replaces the first edition (ISO 19840:2004), which has been technically and editorially revised as follows:

a) the descriptions in 4.2 of the principle of the measurement methods have been improved;

b) a description of eddy current measurement equipment has been introduced (see 5.2.4);

c) Figure 1 has been made language-independent;

d) in line A8 in Annex E, the references to lines A7 and A8 have been corrected to A6 and A7;

e) in line B1 in Annex E, the reference to ISO 8503-1 has been corrected to “the relevant part of ISO 8501”;

f) a Bibliography has been added for the informative references ISO 8501-1 to ISO 8501-4.

Introduction

This International Standard supplements the ISO 12944 series with regard to the measurement and acceptance criteria for the thickness of a dry film. If specified or agreed, the standard can also be used for other applications.

The objective of this International Standard is to achieve uniformity of practice for measuring the dry-film thickness of a coating on a roughened surface. The chosen methods entail the measurement of dry-film thickness using measurement instruments based on the permanent magnet principle and the inductive magnet principle. Instruments using the eddy current principle can be used but their use is normally on non-ferrous metal surfaces.

If a coating is applied to a roughened steel substrate, the measurement of its dry-film thickness is more complicated than for smooth surfaces. Roughened steel substrates include those prepared by abrasive blast-cleaning or abrading.

The effect of surface roughness on the measurement result increases with profile depth, but the result will also depend on the design of the measurement probe and the thickness of the coating.

Annex A, which is informative, is a method based on adjusting the instrument to known thicknesses on a rough surface. In this method, no correction value is used. In this standard, individual readings are used. Annex B describes a method for multiple readings. The methods in Annexes A and B are intended to be used only if specified or agreed.

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1 Scope

This International Standard specifies a procedure for the verification of dry-film thickness against nominal dry-film thickness on rough surfaces, including the adjustment of the instruments used, the definition of inspection areas, sampling plans, measurement methods and acceptance/rejection criteria.

For the purposes of this standard, any specified thickness is taken to be nominal as defined in ISO 12944-5, and the dry-film thickness is the typical thickness above the peaks of the surface profile.

The procedure described in this International Standard is based on the use of instruments of the permanent magnet, electromagnet and eddy current type. Instrument accuracy is verified both at zero and at a known thickness on a smooth surface and adjusted if necessary.

Measurements taken on a coating on a roughened steel substrate will therefore be higher than the actual value above the peaks of the profile. The thickness of the dry film above the peaks of the profile is defined as the instrument reading minus an appropriate correction value.

The dry-film thickness is obtained by using the appropriate correction value applied to readings based on adjustment on a smooth, flat steel surface.

Where individual readings, based on adjustment on a smooth, flat steel surface without the use of correction values, are specified or agreed, it is important to recognize that this method does not conform with this International Standard.

This standard is applicable if the nominal dry-film thickness is 40 µm or greater.

NOTE If the nominal thickness is less than the surface roughness of the substrate, the uncertainty of the measurement will increase.

2 Normative references

The following referenced documents are indispensable for the application 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 2808, *Paints and varnishes — Determination of film thickness*

ISO 8503-1, *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*

ISO 12944-1, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 1: General introduction*

ISO 12944-2, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 2: Classification of environments*

ISO 12944-3, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 3: Design considerations*

ISO 12944-4, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 4: Types of surface and surface preparation*

ISO 12944-5, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 5: Protective paint systems*

ISO 12944-6, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 6: Laboratory performance test methods*

ISO 12944-7, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 7: Execution and supervision of paint work*

ISO 12944-8, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 8: Development of specifications for new work and maintenance*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
dry-film thickness
DFT
thickness of a coating remaining over the peaks of a rough surface when the coating has hardened

3.2
individual reading
figure displayed by the film thickness instrument

3.3
correction value
allowance for the influence of the abrasive blast-cleaned or otherwise roughened surface on the reading of the film thickness instrument

3.4
individual dry-film thickness
individual reading minus a correction value

3.5
mean dry-film thickness
arithmetic mean of all the individual dry-film thicknesses in the inspection area

3.6
nominal dry-film thickness
NDFT
dry-film thickness specified for each coat or for the whole paint system to achieve the required durability

3.7
inspection area
designated area for which a sampling plan is established and which can be the whole structure or sections of the whole structure

3.8
sampling plan
plan which defines the number of measurements to be taken on an inspection area

3.9
adjustment
process of aligning the readings of a dry-film thickness gauge to known thickness values in order to improve the accuracy of the gauge on a specific surface or within a specific portion of its measurement range