
**Paints and varnishes — Performance
requirements for protective paint
systems for offshore and related
structures**

*Peintures et vernis — Exigences de performance relatives aux
systèmes de peinture pour la protection des structures offshore et
structures associées*

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ISO 20340:2003

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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 20340 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 14, *Protective paint systems for steel structures*.

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Introduction

Offshore and related structures, e.g. oil and gas facilities, require specific attention in order to be able to withstand the severe corrosion stresses to which they are exposed during their service life and to minimize the risk of failures that would impact safety, operating costs or capital cost.

In order to establish sufficient corrosion protection and ensure optimum performance of the coating, it is necessary to specify the requirements for the protection paint system(s) along with the relevant laboratory performance tests to assess its (their) likely durability.

In order to achieve the same performance as indicated by testing, proper application of the paint is essential. Close attention needs to be given to the execution of the work.

In ISO 12944, relevant requirements are given for the following:

- corrosivity categories for the atmosphere, water and soil (Part 2);
- suitable design measures (Part 3);
- the surface and its preparation (Part 4);
- application of the paint and the execution and supervision of the paint work during the construction and installation of the structure (Part 7);
- development of a specification (Part 8).

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Paints and varnishes — Performance requirements for protective paint systems for offshore and related structures

1 Scope

1.1 This International Standard specifies the performance requirements for the protection, by protective paint systems, of new offshore and related structures exposed to the offshore atmosphere, as well as those immersed in sea or brackish water. Such structures are exposed to environments of corrosivity category C5-M and immersion category Im2 as defined in ISO 12944-2:1998, with special stresses as given in 4.3 and Annex B of ISO 12944-2:1998. It can also be used for other structures, provided that the selected paints or protective paint systems comply with this International Standard. Only new work and any repairs necessary before start-up are included.

This International Standard places emphasis on high-durability paint systems, with the aim of minimizing maintenance, and hence reducing safety considerations and environmental impact.

1.2 This International Standard includes the following:

- the test methods to be used to determine the composition of the separate components of the protective paint system;
- the laboratory performance test methods for the assessment of the likely durability of the protective paint system; <https://standards.iteh.ai/catalog/standards/sist/53ea2135-08e2-4c19-8e1d-29cfid7fe2fa8/iso-20340-2003>
- the criteria to be used to evaluate the results of performance tests.

The fields of application are specified in Clause 4. For reference purposes, some typical examples of protective paint systems which have been used successfully offshore are included in Table 3.

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 1461:1999, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods*

ISO 1514:1993, *Paints and varnishes — Standard panels for testing*

ISO 1517:1973, *Paints and varnishes — Surface-drying test — Ballotini method*

ISO 2063:1991, *Metallic and other inorganic coatings — Thermal spraying — Zinc, aluminium and their alloys*

ISO 2409:1992, *Paints and varnishes — Cross-cut test*

ISO 2811 (all parts):1997, *Paints and varnishes — Determination of density*

ISO 2812-2:1993, *Paints and varnishes — Determination of resistance to liquids — Part 2: Water immersion method*

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ISO 3233:1998, *Paints and varnishes — Determination of percentage volume of non-volatile matter by measuring the density of a dried coating*

ISO 3251:2003, *Paints, varnishes and plastics — Determination of non-volatile-matter content*

ISO 3270:1984, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing*

ISO 3679:1983, *Paints, varnishes, petroleum and related products — Determination of flashpoint — Rapid equilibrium method*

ISO 4624:2002, *Paints and varnishes — Pull-off test for adhesion*

ISO 4628 (parts 2 to 6), *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance*

ISO 7253:1996, *Paints and varnishes — Determination of resistance to neutral salt spray (fog)*

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*

ISO 8503-1:1988, *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 8503-2:1988, *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*

ISO 11014-1:1994, *Safety data sheet for chemical products — Part 1: Content and order of sections*

ISO 11507:1997, *Paints and varnishes — Exposure of coatings to artificial weathering — Exposure to fluorescent UV and water*

ISO 12944 (all parts):1998, *Paint and varnishes — Corrosion protection of steel structures by protective paint systems*

ISO 15711:2003, *Paints and varnishes — Determination of resistance to cathodic disbonding of coatings exposed to sea water*

ISO 19840:—¹⁾, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Measurement of, and acceptance criteria for, the dry film thickness of coatings on rough surfaces*

3 Terms and definitions

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

NOTE Some of the definitions have been taken from ISO 8044:1999^[1], ISO 12944-1:1998 or EN 971-1:1996^[2], as indicated.

3.1 offshore and related structures

permanently installed or moored structures with high requirements for long-term integrity

NOTE Typical examples are oil and gas production facilities.

1) To be published.

3.2**coat**

a continuous layer of a coating material resulting from a single application

[EN 971-1]

3.3**corrosion**

physicochemical interaction between a metal and its environment that results in changes in the properties of the metal and that may often lead to impairment of the function of the metal, the environment or the technical system of which these form a part

[ISO 8044]

3.4**durability**

the expected life of a protective paint system to the first major maintenance painting

[ISO 12944-1]

3.5**paint**

a pigmented coating material in liquid, in paste or powder form that, when applied to a substrate, forms an opaque film having protective, decorative or specific technical properties

[EN 971-1]

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3.6**protective coating system**

the sum total of the coats of metal materials and/or paints or related products that are to be applied or which have been applied to a substrate to provide corrosion protection

[ISO 12944-1]

3.7**protective paint system**

the sum total of the coats of paints or related products that are to be applied or have been applied to a substrate to provide corrosion protection

[ISO 12944-1]

3.8**substrate**

the surface to which the coating material is applied or is to be applied

[EN 971-1]

3.9**nominal dry film thickness****NDFT**

the dry film thickness specified for each coat and the whole paint system to achieve the required durability

[ISO 12944-5]

3.10**dry film thickness****DFT**

the thickness of a coating remaining on the surface when the coating has hardened

3.11
product data sheet
PDS

a document designed to provide information on a specific paint product

NOTE 1 The type of information includes product uses, features, service properties, application properties, application instructions, packaging information, and information on storage and handling.

NOTE 2 See 5.4 for required minimum information.

3.12
material safety data sheet
MSDS

a document designed to provide information regarding the health and safety aspects of a paint product or thinner

NOTE The MSDS typically includes information concerning generic material identification, hazardous ingredients, physical data, fire and explosion data, health hazards, reactivity data, spill or leak procedures, special protection requirements and other special precautions.

3.13
qualification

a process for the evaluation of protective paint systems using test criteria which allow the selection of suitable paint systems for distinct environmental exposure conditions

NOTE The process comprises:

- description of the paint systems (for an example, see Table 2);
- application testing (see Clause 7);
- laboratory performance testing and assessment of results (see Clause 8);
- full identification of the paints (see 5.5.2 and Annex B).

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3.14
shelf life

the period from the date of manufacture during which the paint can be transported and/or stored in undamaged and unopened packaging without any influence on its application or performance providing the ambient conditions are within the limits recommended by the paint manufacturer, or otherwise agreed

NOTE 1 After exceeding this period, the paint is subject to re-inspection.

NOTE 2 Water-borne products have to be protected from freezing at all times during transportation and or storage.

3.15
VOC
volatile organic compound

organic compound which has a vapour pressure of 0,01 MPa or more at 0 °C

4 Field of application

4.1 General

The field of application for which this International Standard has been developed is characterized by the following:

- the type of structure;
- the type of environment;

- the type of surface and surface preparation;
- the type of paint.

4.2 Type of structure

This International Standard deals with structures made of carbon or low-alloy steel of not less than 3 mm thickness, which are designed using an approved strength calculation.

Not covered by this International Standard are the following:

- structures built of stainless steel;
- steel cables;
- buried structures;
- pipelines;
- the interiors of storage tanks.

4.3 Type of environment

This International Standard deals with the atmospheric corrosivity category C5-M and the immersion category Im2 as defined in ISO 12944-2.

The structure may be divided into four zones based on the type of environment each zone is exposed to:

- One zone corresponds to the area exposed to atmospheric category C5-M.
<https://standards.iteh.ai/catalog/standards/sist/53ea2135-08e2-4c19-8e1d-4120919140-2003>
- Three zones correspond to immersion category Im2:
 - the underwater zone is the area that is permanently immersed in sea water;
 - the tidal zone is the area in which the water level changes because of natural or artificial effects, thus giving rise to increased corrosion due to the combined effect of water and the atmosphere;
 - the splash zone is the area wetted by wave and spray action which can give rise to exceptionally high corrosion stresses, especially with sea water.

4.4 Type of surface and surface preparation

This International Standard deals with the following types of carbon or low-alloy steel surface (more information is given in the ISO 12944 series):

- uncoated surfaces;
- metal-coated surfaces (thermally sprayed or hot-dip galvanized);
- surfaces painted with a prefabrication primer.

4.5 Type of paint

The generic types of paint widely used in paint systems for the protection of steel structures against corrosion are described in ISO 12944-5, but are not limited to those in ISO 12944-5.

5 Paints

5.1 General

The performance of the protective paint system shall be tested in accordance with Clause 8 and the separate components of the system (the paints) shall be identified in accordance with 5.5.

Should third-party certification be requested, an independent laboratory shall be agreed on between the interested parties.

For each paint in the paint system, the manufacturer shall provide a product data sheet, PDS (see 5.4) and a material safety data sheet (MSDS).

Under normal circumstances, neither the chemical composition of the individual paints in the paint system (see 5.5.2 and 5.5.3) nor the description of the paint system (see 6.1) shall be changed after qualification. If changed, the paint system is subject to re-qualification as agreed between the interested parties.

5.2 Quality assurance

The paint manufacturer shall set up and maintain a quality assurance system such as is necessary to ensure that the goods or services supplied comply in all respects with the requirements of this International Standard (see ISO 12944-8).

5.3 Packaging and labelling

All coating materials, solvents and thinners shall be stored in their original container bearing the manufacturer's label and instructions. At least the following information shall be shown on the label:

- the name of the coating material; [ISO 20340:2003](https://standards.iteh.ai/catalog/standards/sist/53ea2135-08e2-4c19-8e1d-29cfd7fe2fa8/iso-20340-2003)
- the curing component; <https://standards.iteh.ai/catalog/standards/sist/53ea2135-08e2-4c19-8e1d-29cfd7fe2fa8/iso-20340-2003>
- the name of the paint manufacturer;
- the colour of the coating material;
- the batch number;
- the date of manufacture;
- instructions and warnings regarding health, safety and environmental protection in accordance with applicable regulations;
- a reference to the relevant product data sheet.

5.4 Required product information

At least the following information, in addition to that in the MSDS, shall be provided with each product submitted to qualification testing:

- the date of issue;
- the name of the product;
- the name of the manufacturer;
- the generic name for the paint;