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**Paints and varnishes — Corrosion  
protection of steel structures by  
protective paint systems —**

**Part 8:  
Development of specifications for new  
work and maintenance**

iTeh STANDARD PREVIEW

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*Peintures et vernis — Anticorrosion des structures en acier par  
systèmes de peinture —*

*Partie 8: Développement de spécifications pour les travaux neufs et de  
maintenance*

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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](http://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](http://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 on 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 14, *Protective paint systems for steel structures*. [ISO 12944-8:2017](https://standards.iteh.ai/catalog/standards/sist/e94341dc-64f4-4538-84a4-4e51e55f830c/iso-12944-8-2017)

This second edition cancels and replaces the first edition (ISO 12944-8:1998), which has been technically revised.

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

- the normative references have been updated;
- the terms and definitions have been updated;
- water soluble contaminants and dust have been added in [Table 1](#) as particular constraints with respect to surfaces and surface preparation;
- [Annex E](#) has been updated with regard to corrosivity classes;
- [Annex I](#) has been updated with regard to surface preparations;
- the bibliography has been updated;
- the text has been editorially revised.

A list of all parts in the ISO 12944 series can be found on the ISO website.

## Introduction

Unprotected steel in the atmosphere, in water and in soil is subjected to corrosion that can lead to damage. Therefore, to avoid corrosion damage, steel structures are normally protected to withstand the corrosion stresses to which they will be subjected during the service life required of the structure.

There are different ways of protecting steel structures from corrosion. ISO 12944 (all parts) deals with protection by paint systems and covers, in the various parts, all features that are important in achieving adequate corrosion protection. Additional or other measures are possible but require particular agreement between the interested parties.

In order to ensure effective corrosion protection of steel structures, owners of such structures, planners, consultants, companies carrying out corrosion protection work, inspectors of protective coatings and manufacturers of coating materials need to have at their disposal state-of-the-art information in concise form on corrosion protection by paint systems. It is vital that such information is as complete as possible, unambiguous and easily understandable to avoid difficulties and misunderstandings between the parties concerned with the practical implementation of protection work.

ISO 12944 (all parts) is intended to give this information in the form of a series of instructions. It is written for those who have some technical knowledge. It is also assumed that the user of ISO 12944 (all parts) is familiar with other relevant International Standards, in particular those dealing with surface preparation.

Although ISO 12944 (all parts) does not deal with financial and contractual questions, attention is drawn to the fact that, because of the considerable implications of inadequate corrosion protection, non-compliance with requirements and recommendations given in ISO 12944 (all parts) can result in serious financial consequences. (standards.iteh.ai)

ISO 12944-1 defines the overall scope of all parts of ISO 12944. It gives some basic terms and definitions and a general introduction to the other parts of ISO 12944. Furthermore, it includes a general statement on health, safety and environmental protection, and guidelines for using ISO 12944 for a given project.

This document is intended as an aid when a corrosion protection specification is to be drawn up.

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# Paints and varnishes — Corrosion protection of steel structures by protective paint systems —

## Part 8: Development of specifications for new work and maintenance

### 1 Scope

This document covers the development of specifications for corrosion protection of steel structures using protective paint systems. It relates to new work and maintenance in the workshop or on site and is also applicable to the corrosion protection of individual components. This document covers the corrosion protection of steel structures exposed to different corrosion stresses by environments such as indoors, open-air and immersion in water or burial in soil, as well as special stresses, due for example, to medium or high temperatures. The need for different durability ranges is considered.

Steel surfaces that have been hot-dip-galvanized, metal-sprayed, zinc-electroplated or sherardized, and previously painted steel surfaces, are also covered by this document.

In this document, reference areas for assessing the quality of the corrosion protection work and the performance of the protective paint systems used are dealt with. This document provides detailed flow charts for planning new work and maintenance, which are taken into account when writing a specification.

This document can also be used as a guide if extreme corrosion stresses or high temperatures occur, or if the protective paint systems are to be used on other substrates, such as non-ferrous metals or concrete, to define suitable specifications.

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

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12944-1 and the following apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

**3.1**  
**constituent element**

part of a structure that is exposed to a particular environment and which will therefore require a specific *protective paint system specification* (3.8.2)

Note 1 to entry: For example, a storage tank will have more than one constituent element as it comprises internal and external surfaces and possibly also support steelwork.

**3.2**  
**dry film thickness**  
**DFT**

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

Note 1 to entry: For details, see ISO 12944-5:—<sup>1)</sup>, 5.4.

**3.3**  
**durability**

expected life of a protective paint system to the first major *maintenance* (3.5) painting

Note 1 to entry: For further important information on durability and durability ranges, see ISO 12944-1.

**3.4**  
**inspector**

anyone responsible for ensuring conformity with one or more of the individual *specifications* (3.8)

**3.5**  
**maintenance**

sum of all measures, as covered by ISO 12944 (all parts), which ensure that the steel structure is protected from corrosion

Note 1 to entry: Maintenance includes, but is not limited to, paint work. Such paint work can be patch painting (repair of degraded spots/areas of the coating system), patch painting followed by overpainting of the structure, or total repainting.

**3.6**  
**nominal dry film thickness**  
**NDFT**

*dry film thickness* (3.2) specified for each coat or for the whole paint system to achieve the required *durability* (3.3)

Note 1 to entry: For details, see ISO 12944-5: —<sup>1)</sup>, 5.4.

**3.7**  
**project**

whole of the work for which a *specification* (3.8) is being developed and which can include one or more structures

**3.8**  
**specification**

technical document describing all the requirements to be observed when a steel structure is to be protected against corrosion by using protective coating systems and which consists of several individual specifications

Note 1 to entry: Individual specifications, i.e. *project specification* (3.8.1), *protective paint system specification* (3.8.2), *paint work specification* (3.8.3), *inspection and assessment specification* (3.8.4), are defined.

**3.8.1**  
**project specification**

*specification* (3.8) that describes the *project* (3.7) and the requirements relating specifically to it

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1) Under preparation.



**3.8.2****protective paint system specification**

*specification* (3.8) that describes the preparation of the surface of the structure and the protective coating system(s) for the structure, in conformity with the *project specification* (3.8.1)

**3.8.3****paint work specification**

*specification* (3.8) that describes the way the coating work is to be carried out, in conformity with the *project specification* (3.8.1) and the *protective paint system specification* (3.8.2), as well as with the *inspection and assessment specification* (3.8.4)

**3.8.4****inspection and assessment specification**

*specification* (3.8) that describes how inspection and assessment are to be carried out

**3.9****specifier**

anyone responsible for the development of a *specification* (3.8)

**3.10****sample area**

area on which the properties of a newly applied coating are tested

**3.11****touch-up**

application of coating material on a small area

**4 How to develop a specification for new work or maintenance**

It is recommended that the specifier considers the information given in [Clause 5](#) and establishes which specification(s) apply/applies to the project or constituent element to be protected. Then, the specifier should check in the respective table, item by item, which of the items listed are to be taken into account in the specification. The various items are supported by detailed information given in the "Remarks" column in [Tables 1 to 4](#) and in [Annexes A to J](#).

When writing a specification for new work or maintenance, it is important to choose the most suitable protective paint system. Prior to refurbishment, it can be helpful to create sample areas, e.g. to assess the coating suitability and appearance. To achieve this, all relevant parameters shall be taken into consideration, for example:

- required durability;
- environmental conditions and special stresses;
- surface preparation;
- different generic types of paint;
- number and types of coats [priming coat(s), intermediate coat(s) and top coat(s)];
- methods of application and application requirements;
- place of application (shop or site);
- scaffolding requirements;
- requirements regarding (future) maintenance (if any);
- health and safety requirements;
- environmental protection requirements.

These parameters are described in detail in ISO 12944-1 to ISO 12944-7 and ISO 12944-9. In this document, only information which is considered to be particularly important to the specifier is given.

In the drafting of a specification for maintenance work on a structure or constituent element, a decision needs to be made to choose between

- repair,
- partial renewal, or
- complete renewal.

When complete renewal has been decided on, the specification should preferably be developed in accordance with a specification for new work, e.g. using the form given in [Annex G](#).

In [Annex D](#), it is shown how to define the work for different types of maintenance work. The exact definition of which kind of work is necessary shall be decided in dependence of the structure. Test areas can be useful to find a sufficient solution.

At an early stage in the drafting of a project specification, a final decision will have to be taken by the specifier on essential planning parameters, such as protection of slip-resistant connections using high-tensile bolts, the inside surfaces of hollow sections and other hidden steel surfaces (see ISO 12944-3 for details of design).

Exclusions, i.e. items not to be painted, shall be indicated in the specification(s).

The choice of protective paint systems shall be based on practical experience and/or the results of laboratory performance tests, particularly when new coating technology is involved. The protective paint systems shall be tested for compatibility with existing coatings on previously coated surfaces.

The specifier shall further take into account regulations and/or requirements relating to environmental protection, health and safety, and working conditions in the shop or on site.

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## 5 Contents of a specification

### 5.1 Supply

The items which are preferably to be covered by a specification are listed in [Tables 1](#) to [4](#), under the following headings:

- contents of a project specification (see [Table 1](#));
- contents of a protective paint system specification (see [Table 2](#));
- contents of a paint work specification (see [Table 3](#));
- contents of an inspection and assessment specification (see [Table 4](#)).

For small structures, or those whose protection is not subject to any particular requirements, only certain items shall be taken into account.

NOTE Each table contains sufficient information to enable the specifier to write a specification for any one of the subjects listed above without having to make frequent references to the other tables. This has led to some expressions being repeated in each of the tables: for example, under 1.1, 2.1, 3.1 and 4.1, the items “name of project”, “name of customer” and “name of specifier” are repeated. In practice, such information is to be given only once in the complete specification.

Table 1 — Contents of a project specification

No.	Main item/sub-item <sup>a</sup>	Remarks
<b>1.1</b>	<b>GENERAL INFORMATION</b>	
1.1.1	Name of project	
1.1.2	Name of customer	
1.1.3	Location(s) of structure(s)	
1.1.4	Name of specifier	State organization and person.
1.1.5	Environmental conditions at location(s) of structure(s)	See <a href="#">Annex E</a> and ISO 12944-2.
1.1.6	References to standards and regulations	
<b>1.2</b>	<b>TYPE OF PROJECT</b>	For definitions of project, structure and constituent element, see <a href="#">Clause 3</a> .
1.2.1	New construction without protection	
1.2.2	New construction blast-cleaned and coated	
1.2.3	Touch-up and final paint work	
1.2.4	Maintenance	See <a href="#">Annexes H, I and J</a> .
1.2.5	New construction and maintenance combined	
1.2.6	Items not to be coated	
<b>1.3</b>	<b>DESCRIPTION OF EACH CONSTITUENT ELEMENT</b>	Each structure should preferably be divided into constituent elements on the basis of the protective paint system(s) to be used and the corrosion stresses associated with each constituent element.
1.3.1	Substrate(s)	Metallic coatings, e.g. zinc, are part of the coating system.
1.3.2	Existing paint system and its condition	See ISO 12944-5.
1.3.3	Areas (m <sup>2</sup> )	
<b>1.4</b>	<b>DESCRIPTION OF ENVIRONMENT OF EACH CONSTITUENT ELEMENT</b>	Descriptions are given in ISO 12944-2. See also <a href="#">Annex E</a> .
1.4.1	Atmospheric environmental conditions	See <a href="#">E.1.1</a> .
1.4.2	Immersed categories	See <a href="#">E.2</a> .
1.4.3	Special situations	See <a href="#">E.4.1</a> .
1.4.4	Special stresses	See <a href="#">E.4.2</a> .
<b>1.5</b>	<b>DURABILITY</b>	
1.5.1	Durability range	See ISO 12944-1.
<sup>a</sup> These items are recommended. If, however, a particular sub-item is included in the specification, any instructions in the remarks column shall be followed.		

Table 1 (continued)

No.	Main item/sub-item <sup>a</sup>	Remarks
<b>1.6</b>	<b>PROTECTIVE PAINT SYSTEMS — PARTICULAR CONSTRAINTS WITH RESPECT TO SURFACES AND SURFACE PREPARATION</b>	Details of types of surface, surface preparation grades, surface profiles and surface preparation methods can be found in ISO 12944-4. In the specification, the required surface preparation grade shall be given for each individual protective paint system to be used.
1.6.1	Types of surface and surface preparation grade(s) for new work and maintenance	Besides the surface preparation grade, the specification shall give details of the surface preparation work required. See also <a href="#">Annexes G and H</a> and <a href="#">Table 3</a> .
1.6.2	Surface preparation method(s)	See ISO 12944-4.
1.6.3	Water-soluble contaminants	See ISO 8502-6 and ISO 8502-9.
1.6.4	Dust	See ISO 8502-3.
<b>1.7</b>	<b>PROTECTIVE PAINT SYSTEMS — PARTICULAR CONSTRAINTS WITH RESPECT TO PAINT MATERIALS</b>	
1.7.1	Choice of the coating system	
1.7.1.1	Protective paint systems for initial protection and complete renewal	See ISO 12944-5, ISO 12944-7, ISO 12944-9 and <a href="#">Annexes G and H</a> , and <a href="#">Table 2</a> .
1.7.1.2	Protective paint systems for repair and partial renewal	Systems according to ISO 12944-5 and ISO 12944-9. Corrosion protection may be assessed using sample areas.
1.7.2	Particular constraints relating to coatings and paint work	For example: compatibility with existing coatings, edge protection (see ISO 12944-5 and ISO 12944-7), non-skid coatings or spraying with airless rather than conventional equipment.
1.7.3	Special requirements regarding, in particular: — health and safety — environmental protection	For example: low level of harmful substances, protection against pollution by such substances, waste disposal.
<b>1.8</b>	<b>PROTECTIVE PAINT SYSTEMS — PARTICULAR CONSTRAINTS WITH RESPECT TO PAINT WORK</b>	
1.8.1	Location of paint work: workshop and/or on site	See ISO 12944-7.
1.8.2	Conditions for paint work	For example: timetable and climatic conditions (to be taken into account by the operator). See also ISO 12944-7.
1.8.3	Method of application of protective paint systems for new, touch-up and maintenance work	See ISO 12944-7. Any particular requirements shall be given. Special methods of application shall be described in full detail.
1.8.4	Constraints relating to paint work	For example: compatibility with existing coatings, masking of areas to be welded (see ISO 12944-7), edge protection (see ISO 12944-5 and ISO 12944-7).
1.8.5	Special requirements regarding, in particular: — health and safety — environmental protection	For example: low level of harmful substances, protection against pollution by such substances, waste disposal.
<sup>a</sup> These items are recommended. If, however, a particular sub-item is included in the specification, any instructions in the remarks column shall be followed.		

Table 1 (continued)

No.	Main item/sub-item <sup>a</sup>	Remarks
<b>1.9</b>	<b>PROPERTIES (OTHER THAN ANTI-CORROSIVE) OF PROTECTIVE PAINT SYSTEMS</b>	
1.9.1	Colours	Colour should preferably be based on colour designations such as those of the Munsell Colour System, RAL 840-HR, NF X 08-002, BS 4800, NS 4054, UNE 48103, JPMA Standard Paint Colours or NCS, in accordance with the relevant national standard where applicable. The colours of all coats of a paint system should normally be different from each other. The last but one coat should normally be of such a colour that the top coat fully hides it.
1.9.2	Stability of top-coat colour	See also No. 1.4.4, this table.
<b>1.10</b>	<b>QUALITY MANAGEMENT</b>	
1.10.1	Quality control, quality assurance and records	
<b>1.11</b>	<b>INSPECTION AND ASSESSMENT</b>	See <a href="#">Table 4</a> .
1.11.1	Inspection by internal bodies	
1.11.2	Inspection by external (e.g. independent) bodies	
1.11.3	Names of external inspection bodies and/or the inspectors themselves	Such bodies and/or inspectors, if any, shall be nominated by the specifier. The level of qualification of the inspector should be specified.
1.11.4	Methods of inspection	The specifier shall indicate the methods and types of instrument required, using International Standards, wherever possible. The specifier shall also indicate the recording and reporting procedures to be used.
1.11.5	Inspection steps	Details of inspection steps, if any, shall be described.
<b>1.12</b>	<b>REFERENCE AREAS</b>	
1.12.1	Records	The specifier should normally specify for which constituent element(s) of each structure of the project reference areas are to be provided. If not specified, any of the interested parties may also request the preparation of reference areas (conditions to be agreed). Reference areas shall normally be prepared in the presence of all parties concerned, e.g. owner, paint manufacturer, sub-contractors and main contractor. See ISO 12944-7 and <a href="#">Annex B</a> .
1.12.2	Responsibility for records	
1.12.3	Location and number of reference area(s)	
1.12.4	Size of reference area(s)	
1.12.5	Marking of reference area(s)	
<b>1.13</b>	<b>HEALTH AND SAFETY; ENVIRONMENTAL PROTECTION</b>	
1.13.1	Applicable regulations	The regulations applicable on site shall be observed. If appropriate, these shall be described by the specifier. See ISO 12944-7.
<b>1.14</b>	<b>SPECIAL REQUIREMENTS</b>	
1.14.1	Procedure for dealing with deviations from the specification, limits of inspection and assessment	Shall be specified by the specifier.
1.14.2	Special factors related to execution and supervision of paint work	Shall be specified by the specifier.
1.14.3	Any further requirements	Requirements concerning transport, loading and unloading, and storage shall be indicated, if any.
<sup>a</sup> These items are recommended. If, however, a particular sub-item is included in the specification, any instructions in the remarks column shall be followed.		