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

Part 8:

**Development of specifications for new work
and maintenance**

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

*Partie 8: Développement de spécifications pour les travaux neufs et
l'entretien*



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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.

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 12944-8 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 14, *Protective paint systems for steel structures*.

ISO 12944 consists of the following parts, under the general title *Paints and varnishes - Corrosion protection of steel structures by protective paint systems*:

- Part 1: General introduction*
- Part 2: Classification of environments*
- Part 3: Design considerations*
- Part 4: Types of surface and surface preparation*
- Part 5: Protective paint systems*
- Part 6: Laboratory performance test methods*
- Part 7: Execution and supervision of paint work*
- Part 8: Development of specifications for new work and maintenance*

Annexes A to K are for information only.

Introduction

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

There are different ways of protecting steel structures from corrosion. ISO 12944 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, it is necessary for owners of such structures, planners, consultants, companies carrying out corrosion protection work, inspectors of protective coatings and manufacturers of coating materials to have at their disposal state-of-the-art information in concise form on corrosion protection by paint systems. Such information has to be as complete as possible, unambiguous and easily understandable to avoid difficulties and misunderstandings between the parties concerned with the practical implementation of protection work.

This International Standard – ISO 12944 – 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 is familiar with other relevant International Standards, in particular those dealing with surface preparation, as well as relevant national regulations.

Although ISO 12944 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 this standard may result in serious financial consequences.

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 part of ISO 12944 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 part of ISO 12944 deals with 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 part of ISO 12944 concerns 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, for example due 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 part of ISO 12944.

In annex B, reference areas for assessing the quality of the corrosion protection work and the performance of the protective paint systems used are dealt with. Annexes C and D provide detailed flow charts for planning new work and maintenance, which should be taken into account when writing a specification.

If extreme corrosion stresses or high temperatures occur, or the protective paint systems are to be used on other substrates such as non-ferrous metals or concrete, the specifications will have to take this into account. This part of ISO 12944 may also be used as a guide in such cases.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 12944. 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 12944 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 2409:1992, *Paints and varnishes - Cross-cut test*.

ISO 2808:1997, *Paints and varnishes - Determination of film thickness*.

ISO 4623:1984, *Paints and varnishes - Filiform corrosion test on steel*.

ISO 4624:1978, *Paints and varnishes - Pull-off test for adhesion*.

ISO 4628-2:1982, *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 2: Designation of degree of blistering.*

ISO 4628-3:1982, *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 3: Designation of degree of rusting.*

ISO 4628-4:1982, *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 4: Designation of degree of cracking.*

ISO 4628-5:1982, *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 5: Designation of degree of flaking.*

ISO 4628-6:1990, *Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 6: Rating of degree of chalking by tape method.*

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 8501-2:1994, *Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part 2: Preparation grades of previously coated steel substrates after localized 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 8503-3:1988, *Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates - Part 3: Method for the calibration of ISO surface profile comparators and for the determination of surface profile - Focusing microscope procedure.*

ISO 8503-4:1988, *Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast-cleaned steel substrates - Part 4: Method for the calibration of ISO surface profile comparators and for the determination of surface profile - Stylus instrument procedure.*

ISO 11124-1:1993, *Preparation of steel substrates before application of paints and related products - Specifications for metallic blast-cleaning abrasives - Part 1: General introduction and classification.*

ISO 11124-2:1993, *Preparation of steel substrates before application of paints and related products - Specifications for metallic blast-cleaning abrasives - Part 2: Chilled-iron grit.*

ISO 11124-3:1993, *Preparation of steel substrates before application of paints and related products - Specifications for metallic blast-cleaning abrasives - Part 3: High-carbon cast-steel shot and grit.*

ISO 11124-4:1993, *Preparation of steel substrates before application of paints and related products - Specifications for metallic blast-cleaning abrasives - Part 4: Low-carbon cast-steel shot.*

ISO 11126-1:1993, *Preparation of steel substrates before application of paints and related products - Specifications for non-metallic blast-cleaning abrasives - Part 1: General introduction and classification.*

ISO 11126-3:1993, *Preparation of steel substrates before application of paints and related products - Specifications for non-metallic blast-cleaning abrasives - Part 3: Copper refinery slag.*

ISO 11126-4:1993, *Preparation of steel substrates before application of paints and related products - Specifications for non-metallic blast-cleaning abrasives - Part 4: Coal furnace slag.*

ISO 11126-5:1993, *Preparation of steel substrates before application of paints and related products - Specifications for non-metallic blast-cleaning abrasives - Part 5: Nickel refinery slag.*

ISO 11126-6:1993, *Preparation of steel substrates before application of paints and related products - Specifications for non-metallic blast-cleaning abrasives - Part 6: Iron furnace slag.*

ISO 11126-7:1995, *Preparation of steel substrates before application of paints and related products - Specifications for non-metallic blast-cleaning abrasives - Part 7: Fused aluminium oxide.*

ISO 11126-8:1993, *Preparation of steel substrates before application of paints and related products - Specifications for non-metallic blast-cleaning abrasives - Part 8: Olivine sand.*

ISO 12944-1:1998, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 1: General introduction.*

ISO 12944-2:1998, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 2: Classification of environments.*

ISO 12944-3:1998, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 3: Design considerations.*

ISO 12944-4:1998, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 4: Types of surface and surface preparation.*

ISO 12944-5:1998, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 5: Protective paint systems.*

ISO 12944-6:1998, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 6: Laboratory performance test methods.*

ISO 12944-7:1998, *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 7: Execution and supervision of paint work.*

3 Definitions

For the purposes of this part of ISO 12944, the following definitions apply in addition to those given in ISO 12944-1.

3.1 constituent element: A part of a structure (3.10) that is exposed to a particular environment and which will therefore require a specific protective paint system specification.

NOTE 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): The thickness of a coating remaining on the surface when the coating has hardened.

NOTE For details, see ISO 12944-5:1998, subclause 5.4.

3.3 durability: The expected life of a protective paint system to the first major maintenance painting.

NOTE 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 (3.8.1 to 3.8.4).

3.5 maintenance: The sum of all measures, as covered by ISO 12944, which ensure that the function of the protection of the steel structure against corrosion is maintained.

NOTE 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): The dry film thickness specified for each coat or for the whole paint system to achieve the required durability.

NOTE For details see ISO 12944-5:1998, subclause 5.4.

3.7 project: The whole of the work for which the specification (3.8) is being developed. The project may include one or more structures.

3.8 specification: A technical document describing all the requirements that are to be observed when a steel structure is to be protected against corrosion by using protective paint systems. Such a document consists of several individual specifications - project specification, protective paint system specification, paint work specification, inspection and assessment specification - as defined in 3.8.1 to 3.8.4.

3.8.1 project specification: The specification that describes the project and the requirements relating specifically to it.

NOTE The specifier of a project specification may, for example, be the owner of the structure to be protected or the prime contractor.

3.8.2 protective paint system specification: The specification that describes the preparation of the surface of the structure and the protective paint system(s) for the structure, in conformity with the project specification (3.8.1).

NOTE The specifier of a protective paint system specification may, for example, be a paint manufacturer.

3.8.3 paint work specification: The specification that describes the way the paint 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).

NOTE The specifier of a paint work specification may, for example, be a paint application company.

3.8.4 inspection and assessment specification: The specification that describes how inspection and assessment are to be carried out.

3.9 specifier: Anyone responsible for the development of a specification.

3.10 structure: A steel construction (for example a bridge, a factory building, a storage tank or an offshore construction) consisting of more than one constituent element (3.1). There may be one or more structures in any given project (3.7).

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 the annexes.

When writing a specification for new work or maintenance, it is important to choose the most suitable protective paint system. 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. In this part of ISO 12944, only such information is given which is considered to be particularly important to the specifier.

In the drafting of a specification for maintenance work on a structure or constituent element, a decision has to be taken between

- complete renewal and
- partial removal of the protective paint system involved.

When complete renewal has been decided, the specification should preferably be developed in accordance with a specification for new work, e.g. using the form given in annex G.

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.

Because national requirements concerning health and safety at work, pollution control etc. vary significantly, it may not be possible to include detailed information covering such requirements in a specification. However, the specification shall draw attention to the need to comply with current local, regional, national and international legislation and regulations.

5 Contents of a specification

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 (table 1);
- Contents of a protective paint system specification (table 2);
- Contents of a paint work specification (table 3);
- Contents of an inspection and assessment specification (table 4).

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

An example of a specification based on table 1 is given as annex F.

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 owner" and "name of specifier" are repeated. In practice, such information should only be given once in the complete specification.