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Steel structures — Execution of structural steelwork —

Part 2: Steels

Structures en acier – Exécution des charpentes et ossatures en acier —

Partie 2: Aciers

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Contents

Page

Foreword ..... **iv**

Introduction ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms and definitions **2**

4 Execution specification and quality requirements **2**
4.1 General 2
4.2 Execution specification 2

5 Constituent products **2**
5.1 Identification, inspection documents and traceability 2
5.2 Structural steels 3
5.3 Structural steel products 3
5.3.1 General 3
5.3.2 Thickness tolerances for plates 4
5.3.3 Surface conditions 5
5.3.4 Special properties 5
5.4 Steel castings 5
5.5 High strength cables and sockets 5
5.6 Structural bearings 6

6 Documents required to claim conformity to this document **6**
6.1 General 6
6.2 Declaration of conformity 6

Annex A (normative) **Additional information, list of options and requirements related to the execution levels** **7**

Annex B (informative) **National standards for structural steels and steel products** **9**

Bibliography **33**

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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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 167, *Steel and aluminium structures*.

This first edition cancels and replaces ISO 10721-2:1999, which has been technically revised.

A list of all parts in the ISO 17607 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

Specific requirements for the achievement of structures that are optimal with respect to safety, the state of the economy, development and general values of a nation are given in the appropriate regional or national standards, if they exist.

Many nations do not have their own standards for structural steelwork. Some reference other national or regional standards. Some permit the project's standard to be selected by the owner, designer or constructor of the structure. Some do not require any standards to be followed.

The ISO 17607 series of standards on the execution of structural steelwork was developed to serve as a means to provide a set of requirements and guidance for projects that are constructed without a governing regional or national standard. The ISO 17607 series can also serve to reduce trade barriers.

Additional requirements to be addressed in the execution of structural steelwork, as structures or as fabricated components, can be found in the other parts of the series:

— ISO 17607-1 (General requirements and terms and definitions);

— ISO 17607-3 (Fabrication);

— ISO 17607-4 (Erection);

— ISO 17607-5 (Welding);

— ISO 17607-6 (Bolting).

Steel structures — Execution of structural steelwork —

Part 2: Steels

1 Scope

This document defines the general requirements for the constituent products of steels and steel products used in the execution of structural steelwork as structures or as fabricated components in conjunction with ISO 17607-1.

Additional requirements to be addressed in the execution of structural steelwork, as structures or as fabricated components, can be found in other parts of the ISO 17607 series.

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 630-1, *Structural steels — Part 1: General technical delivery conditions for hot-rolled products*

ISO 630-2, *Structural steels — Part 2: Technical delivery conditions for structural steels for general purposes*

ISO 630-3, *Structural steels — Part 3: Technical delivery conditions for fine-grain structural steels*

ISO 630-4, *Structural steels — Part 4: Technical delivery conditions for high yield strength quenched and tempered structural steel plates and wide flats*

ISO 630-5, *Structural steels — Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance*

ISO 630-6, *Structural steels — Part 6: Technical delivery conditions for seismic-improved structural steels for building*

ISO 4990, *Steel castings — General technical delivery requirements*

ISO 7778, *Through-thickness characteristics for steel products*

ISO 9477, *High strength cast steels for general engineering and structural purposes*

ISO 10474, *Steel and steel products — Inspection documents*

ISO 10799-1, *Cold-formed welded structural hollow sections of non-alloy and fine grain steels — Part 1: Technical delivery conditions*

ISO 10799-2, *Cold-formed welded structural hollow sections of non-alloy and fine grain steels — Part 2: Dimensions and sectional properties*

ISO 12633-1, *Hot-finished structural hollow sections of non-alloy and fine grain steels — Part 1: Technical delivery conditions*

ISO 12633-2, *Hot-finished structural hollow sections of non-alloy and fine grain steels — Part 2: Dimensions and sectional properties*

ISO 17607-1, *Steel structures — Execution of structural steelwork— Part 1: General requirements and vocabulary*

ISO/TR 20172, *Welding — Grouping systems for materials — European materials*

ISO/TR 20173, *Welding — Grouping systems for materials — American materials*

ISO/TR 20174, *Welding — Grouping systems for materials — Japanese materials*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17607-1 apply.

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

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

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

4 Execution specification and quality requirements

4.1 General

See ISO 17607-1.

4.2 Execution specification

National standards and documents that provide technically equivalent conditions may be used, in whole or in part, in place of referenced ISO standards or requirements of this document. In these cases, the technically equivalent national standards and documents, and deviations from the requirements of this document, shall be referenced in the execution specification.

The necessary information and technical requirements for structural steel and steel products shall be agreed upon and completed before commencement.

The execution specification shall include the following items from Annex A as relevant:

a) additional information, see A.1;

b) options, see A.2;

c) requirements related to execution levels, see A.3.

There shall be procedures for making alterations to a previously agreed execution specification.

If constituent products of steels and steel products not covered by national standards or documents are to be used, their relevant properties shall be specified.

For national standards and documents for structural steels and steel products, see Annex B (informative).

5 Constituent products

5.1 Identification, inspection documents and traceability

For steels, the inspection documents according to ISO 10474 shall be as listed in Table 1.

Type 3.2 inspection documents are also suitable if Type 3.1 documents are listed in Table 1.

Table 1 — Inspection documents for constituent products

Constituent product	Inspection documents
Structural steels Structural steel grade ≤ 275MPa Structural steel grade > 275MPa	 2.2 [a, b, c] 3.1 [b, c]
Steel castings	3.1 [d]
High strength cables	3.1
Structural bearings	3.1

[a] Inspection document 3.1 if specified minimum yield strength 275 MPa and specified impact energy tested at a temperature less than 0 °C.

[b] Elements included in the carbon equivalent value (CEV) shall be reported in the inspection document.

[c] Intentionally added elements, including Al, Nb, Ti, and B, shall be reported in the inspection document.

[d] Inspection document 2.2 may be provided if specified minimum yield strength ≤ 355 MPa and specified impact energy tested at a temperature of 20 °C.

5.2 Structural steels

For execution levels 2 to 4, designated EXL2, EXL3 and EXL4, if different grades and qualities of steel products are in circulation together, each item shall be designated with a mark that identifies its grade and quality.

NOTE 1 Within the context of this clause, see the respective part in the ISO 630 series, the ISO 10799 series or the ISO 12633 series for definitions of grades and qualities of steel.

5.3 Structural steel products

5.3.1 General

The steel grade and quality, with additional characteristics and any required options permitted by the product standard, shall be specified in the execution specification.

Structural steels shall be in accordance with Table 2, or, if applicable, the requirements of the national standard or documents.

Table 2 — Standards for structural steels

Structural steels	Product standard
Hot-rolled products	ISO 630-1
Structural steels for general purposes	ISO 630-2
Fine grain structural steels	ISO 630-3
High yield strength quenched and tempered structural steel plates	ISO 630-4
Structural steels with improved atmospheric corrosion resistance	ISO 630-5
Seismic-improved structural steels for building	ISO 630-6

Structural hollow sections shall be in accordance with Table 3, or, if applicable, the requirements of the national standard or documents.

Table 3 — Standards for structural hollow sections

Structural steels	Product standard
Cold-formed welded structural hollow sections of non-alloy and fine grain steels	ISO 10799-1 ISO 10799-2
Hot-finished structural hollow sections of non-alloy and fine grain steels	ISO 12633-1 ISO 12633-2

See Annex B for selection of national standards and documents for structural steels and structural hollow sections.

For steel materials or constituent products, information regarding the following characteristics shall be available:

— strength (yield and tensile);

— elongation;

— reduction of area requirements, if required by the execution specification;

— tolerances on dimensions and shape;

— impact strength or toughness, if required by the execution specification;

— thermal heat treatment delivery condition;

— through thickness requirements (Z), in accordance with ISO 7778, if required by the execution specification;

— limits on internal discontinuities or cracks in zones to be welded, if required by the execution specification.

In addition, if the steel is to be welded, information shall be available regarding as follows:

— classification in accordance with the grouping system defined in ISO/TR 20172, ISO/TR 20173 or ISO/TR 20174; or

— a maximum limit for the carbon equivalent of the steel; or

— its chemical composition in sufficient detail for its carbon equivalent to be calculated.

With respect to the properties listed above that are declared, the basis for the declarations shall be provided, e.g. reference standards for test methods used to establish values for declared properties; whether properties are specific to an identified lot, cast or heat; whether chemical properties are based on ladle or product analysis.

Unless otherwise stated in the execution specification, the CEV shall be based on the CE_{IIW} formula:

$$CE_{IIW} = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15}$$

NOTE 1 ISO/TR 17844 provides additional information on the CE_{IIW} formula.

5.3.2 Thickness tolerances for plates

Thickness tolerances for structural steel plates shall be in accordance with the applicable product standard.

For product standards where more than one thickness tolerance class is given, the least restrictive class shall be used unless specified in the execution specification.

5.3.3 Surface conditions

Surface conditions for structural steel shall be in accordance with the applicable product standard.

For product standards where more than one surface condition is given, the least restrictive condition shall be used unless specified in the execution specification.

The inspection of the surface of product for defects revealed during surface preparation shall be included in the inspection and test plans.

If surface imperfections or internal imperfections in steel products revealed during surface preparation are repaired using methods that are in accordance with this document, the repaired product may be used provided that it conforms with the nominal properties specified for the original product.

5.3.4 Special properties

Special properties for structural steels, including those affected by processing prior to delivery, shall be specified in the execution specification, in accordance with the applicable product standard.

NOTE Cambering and bending are examples of processes that can affect steel properties.

5.4 Steel castings

Steel castings shall conform to the requirements ISO 4990 or ISO 9477. The technical delivery conditions (e.g. grades, qualities and, if appropriate, finishes) shall be specified in the execution specification together with any required options that are permitted in the product standards that are required.

Unless specified in the execution specification, the properties of delivered castings shall be evaluated by testing.

Unless specified in the execution specification, the testing shall include:

a) 100 % visual testing (VT),

b) the following destructive tests on items taken at random during production:

— tensile and elongation tests (one unit per melt);

— impact tests (three units per melt);

— reduction of area test (one unit per melt, if appropriate):

— chemical analysis (one unit per melt);

— microscopic examination of cross-sections (one unit per melt).

c) the following non-destructive tests on items taken at random from each manufacturing lot:

— magnetic particle testing (MT) or penetrant testing (PT) on 10 % of each manufacturing lot to detect surface-breaking discontinuities;

— ultrasonic testing (UT) or radiographic testing (RT) on 10 % of each manufacturing lot to detect sub-surface discontinuities.

5.5 High strength cables and sockets

Wires for high strength cables shall be cold-drawn or cold-rolled steel wires. The tensile strength grade and, if appropriate, coating class shall be specified.

Strands for high strength cables shall conform to the requirements of the execution specification. The designation and class of the strand shall be specified.

The minimum breaking load and diameter of the steel wire rope and, if appropriate, requirements related to corrosion protection shall be specified.

The filling material for the sockets shall be selected, taking into account service temperature and actions such that continued creeping of the loaded strand through the socket is prevented.

5.6 Structural bearings

Requirements for structural bearings shall be specified in the execution specification.

6 Documents required to claim conformity to this document

6.1 General

Constructors may claim conformity with the requirements of this document either by:

— adoption of the ISO standards referenced in Clause 2;

or

— adoption of other standards to those listed in Clause 2 that provide technically equivalent conditions (see examples in Annex B);

or

— adoption of other documents that provide technically equivalent conditions.

Unless otherwise listed in the execution specification, it is the responsibility of the constructor to demonstrate that the standards or documents selected provide technically equivalent conditions to those in the corresponding ISO standards referenced in Clause 2.

Prior to execution, adoption of other standards or documents shall be verified and approved by specifier and shall be incorporated into the execution specifications.

NOTE The contents of Annex B do not establish that the standards or documents listed are technically equivalent, which remains the responsibility of the constructor.

6.2 Declaration of conformity

A constructor claiming conformity with these requirements shall list the applicable supporting standards or documents.