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中国钢结构协会标准

CSCS

T/CSCSxxx-2025

钢结构建造质量控制标准
第 1 部分：基本要求和术语

Steel structures — Execution of structural
steelwork
• Part 1: General requirements and
vocabulary

2025-0X-XX 发布

2025-0X-XX 实施

中国钢结构协会 发布

前 言

本标准参照 GB/T 1.2—2020 给出的规则起草。

本标准参考了 ISO 17607:2023 Execution of Structural Steelworks 的技术内容。

T/CSCS xxx —2025 《钢结构建造质量控制标准》分为如下七个部分：

- 第 1 部分：基本要求和术语；
- 第 2 部分：钢材；
- 第 3 部分：制造；
- 第 4 部分：安装；
- 第 5 部分：焊接；
- 第 6 部分：螺栓连接；
- 第 7 部分：涂装。

本部分为 T/CSCS xxx —2025 的第 1 部分。

在采用 ISO 17607:2023 时，本部分增加了有关“第 7 部分：涂装”的内容。

对应于 ISO 17607:2023，本部分还做了下列编辑性修改：

- “ISO 17607 的本部分”修改为“**T/CSCS xxx** 的本部分”；
- 用小数点“.”代替作为小数点的逗号“,”；
- 删除国际标准的前言和引言。

本部分的附录 A 为规范性附录，附录 B、C、D、E 为资料性附录。

本标准由中国钢结构协会管理。

本部分起草单位：xxx

本部分主要起草人：xxx

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1 范围

1 Scope

本标准规定了下列钢结构工程建造的总体要求：

This document defines general requirements for the execution of structural steelwork for:

- 钢结构建筑；
- structural steel buildings;

- 设计、制造及安装方式与建筑结构类似，并采用类似建筑承重构件的通用型钢结构，如设备、储罐、容器和管道的支承框架；
- general structures, designed, fabricated, and erected in a manner similar to buildings, with building-like load-resisting elements, e.g. support framing for equipment, tanks, vessels, and pipelines;

- 起重机支承结构；
- crane-supporting structures;

- 典型的公路桥和人行桥，包括采用轧制型材、焊接板梁或桁架（格构式）建造的桥梁。
- typical roadway and pedestrian bridges including those constructed using rolled sections, welded plate girders, or trusses (lattices).

本标准适用于由以下材料制成的结构或部件：

This document applies to structures or fabricated components that are produced from:

- 名义屈服强度不超过 700MPa 且厚度不小于 3mm 的热轧和冷成型结构钢；
- hot-rolled and cold-formed structural steel products up to and including a nominal yield strength of 700 MPa with a thickness of 3 mm and above;

- 名义屈服强度不超过 700MPa 的热加工及冷成型结构用闭口型钢，包括标准范围和定制的轧制产品以及焊接制造的结构用闭口型钢。
- hot-finished and cold-formed structural steel hollow sections, up to and including a nominal yield strength of 700 MPa, including standard range and custom-made rolled products and hollow sections manufactured by welding.

本标准也适用于钢与混凝土组合结构及钢与其他材料组合结构中的钢部件。

This document also applies to steel components in composite steel and concrete structures, and in structures combining steel with other materials.

本标准规定了与钢结构的类型及形状无关的技术要求，包括承受疲劳荷载或地震作用的结构，相关技术要求以建造级别表示。

This document defines requirements independent of the type and shape of the steel structure, including structures subjected to fatigue or seismic loading. The requirements are expressed in terms of execution levels.

本标准未规定其他类型钢结构建造的总体要求（如铁路桥、采用焊接箱形截面或拱形箱的公路桥和人行桥、跨度超过 100 米的缆索支承桥梁、可移动桥梁、单轨、钢塔、桅杆、烟囱、筒仓、储罐、管道、天线、海上平台等）。本标准提供了关于钢结构制造和安装的通用技术指南，可与适用的相关国际标准化组织（ISO）、区域或国家设计标准配合使用。

This document does not define all requirements for other types of fabricated steel structures (e.g. railway bridges, roadway and pedestrian bridges using welded box sections or arch boxes, cable-supported bridges over 100 m span, moving bridges, monorails, steel towers, masts, chimneys, silos, tanks, pipelines, antennae, offshore platforms). However, this document provides general guidance regarding fabrication and erection practices that may be used together with the appropriate ISO, regional or national design standards for such structures.

本标准未对以下方面进行规定：

This document does not cover requirements for the following:

- 板材;
- sheeting;

- 不锈钢制造。
- fabrication of stainless steels.

本标准不适用于钢结构设计。

This document does not apply to design of steel structures.

注：设计是“设计—制造—安装”流程中不可分割的一部分，包括允许偏差的应用，不能单独考虑。

NOTE: Design is inextricably a part of the design-fabrication-erection sequence, including the application of tolerances, and cannot be considered in isolation.

本标准旨在结合具体情况与国家标准及其他标准配合使用，并遵循本标准中关于此类使用的规定。

This document is intended to be used, as appropriate, together with national standards and other documents, observing the provisions in this document concerning such use.

2 引用标准

2 Normative references

本标准引用了以下技术文件，其部分或全部内容构成本标准的相关规定和要求。对于有注明日期的引用文件，仅所引用的版本适用。对于未注明日期的引用文件，适用所引用文件的最新版本（包括修订版）。

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 6707-1, Buildings and civil engineering works — Vocabulary — Part 1: General terms

ISO 6707-2, Buildings and civil engineering works — Vocabulary — Part 2: Contract and communication terms

ISO 7976-1, Tolerances for building — Methods of measurement of buildings and building products — Part 1: Methods and instruments

ISO 7976-2, Tolerances for building — Methods of measurement of building and building products — Part 2: Position of measuring points

ISO/TR 25901-1, Welding and allied processes — Vocabulary — Part 1: General terms

3 术语和定义

3 Terms and definitions

标准 ISO 6707-1、标准 ISO 6707-2、标准 ISO/TR 25901-1 和下列文件中的术语和定义适用于本标准。

For the purposes of this document, the terms and definitions given in and ISO 6707-1, 6707-2, ISO/TR 25901-1 and the following apply.

国际标准化组织（ISO）和国际电工委员会（IEC）用于维护标准化术语的数据库可通过以下链接访问：

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

- ISO 在线浏览平台: <https://www.iso.org/obp>
- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC 电子百科: <https://www.electropedia.org/>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1 总体要求术语

3.1 Terms related to general requirements

3.1.1

结构（structure）

structure

由各部件连接组合而成，用于承担荷载并提供刚度、冗余度及保持结构稳定性。

organized combination of connected parts designed to carry loads and provide rigidity, redundancy, and structural stability

3.1.2

钢结构构件（部件）（structural steelwork）

structural steelwork

用于建设工程（3.1.4）的钢结构或钢构件（部件）。

steel structures or fabricated steel components used in construction works (3.1.4)

3.1.3

建筑裸露钢结构（architecturally exposed structural steel, AEES）

architecturally exposed structural steel

AEES

外露的钢结构构件（部件）（3.1.2），需满足额外要求以达到指定的美学效果。

structural steelwork (3.1.2) exposed to view with additional requirements specified to achieve designated aesthetic qualities

3.1.4

建设工程（construction works）

construction works

由建造作业建成的一切相关事物。

everything that is constructed or results from construction operations

条文说明 1：此术语涵盖了建筑工程和土木工程，它指的是由结构构件（部件）和非结构构件（部件）组成的整体结构。

Note 1 to entry: This term covers both building and civil engineering works. It refers to the complete construction comprising both structural and non-structural components.

3.1.5

建造商（constructor）

constructor

执行钢结构构件（部件）（3.1.2）建造的人员或机构（组织）。

person or organization executing the structural steelwork (3.1.2)

条文说明 1：一个项目中可能涉及多个建造商。

Note 1 to entry: Multiple constructors may be involved in a project.

条文说明 2：建造商包括制造方和安装方。

Note 2 to entry: The term constructor includes fabricator and erector.

条文说明 3：标准 ISO 9000 使用了“供应商”（3.1.7）这一术语。

Note 3 to entry: In ISO 9000, the term "supplier" (3.1.7) is used.

3.1.6

制造商（**manufacturer**）

manufacturer

根据订单要求、参考产品规范或建造技术规格书（3.1.10）中规定的性能，制造相应产品的组织。

organization that manufactures the respective products according to the requirements of the order and to properties specified in the referenced product specification or execution specification (3.1.10)

条文说明 1：在本标准中，“制造商”这一术语不包括执行制造（3.1.9）的组织，该组织被称为建造商（3.1.5）。

Note 1 to entry: As used in this document, the term manufacturer does not include the organization performing fabrication (3.1.9), which is termed the constructor (3.1.5).

[来源：标准 ISO 10474: 2013, 3.4, 已修改—补充了建造技术规格书的引用。]

[SOURCE: ISO 10474:2013, 3.4, modified, — Added reference to execution specification.]

3.1.7

供应商（**supplier**）

supplier

转售由制造商提供的产品，且未进一步加工，或在加工后不改变采购订单、产品规范或建造技术规格书（3.1.10）的组织。

organization that is supplied with products by the manufacturers (3.1.6) and that then, in turn, supplies them without further processing or after processing without changing the properties specified in the purchase order, the referenced product specification or execution specification (3.1.10)

条文说明 1：供应商可以是钢材分销商和库存商。

Note 1 to entry: Examples of suppliers can be steel service centres and stockists.

[来源: 标准 ISO 10474:2013, 3.5, 已修改—将中间商这一术语更改为供应商, 并补充了建造技术规格书的引用。]

[SOURCE: ISO 10474:2013, 3.5, modified — Changed term from intermediary to supplier, added reference to execution specification.]

3.1.8

建造 (execution)

execution

为建造钢结构构件 (部件) (3.1.2) 所进行的所有活动, 如采购、制造 (3.1.9)、焊接、螺栓连接、运输、安装, 以及相关的检查和文件记录。

all activities performed for the physical completion of the structural steelwork (3.1.2), i.e. procurement, fabrication (3.1.9), welding, bolting, transportation, erection, and the inspection and documentation thereof

3.1.9

制造 (fabrication)

fabrication

DEPRECATED: manufacturing

废止: manufacturing

生产和交付部件需要开展的所有活动。

all activities required to produce and deliver a component

条文说明 1: 相关活动如采购、准备工作 (3.3.9) 和组装、焊接、螺栓连接、运输及相关的检查和文件记录。

Note 1 to entry: As relevant, this comprises e.g. procurement, preparation (3.3.9) and assembly, welding, bolting, transportation, and the inspection and documentation thereof.

3.1.10

建造技术规格书 (execution specification)

execution specification

涵盖特定钢结构技术资料和相关要求的文件, 包括为补充和细化本标准而规定的相关内容。

set of documents covering technical data and requirements for a particular steel structure, including those specified to supplement and qualify the rules of this document

条文说明 1：建造技术规格书应包括本标准中指定事项的相关要求。

Note 1 to entry: Execution specification includes requirements where this document identifies items to be specified.

3.1.11

规范编制者 (specifier)

specifier

负责编制和维护建造技术规格书 (3.1.10) 的组织、公司、机构或个人。

organization, firm, agency, or individual responsible for development and maintenance of the execution specification (3.1.10)

3.1.12

建造等级 (execution level)

execution level

针对钢结构构件 (部件) (3.1.2) 整体、单个部件或细部建造而划分的建造等级要求。

classified set of requirements specified for the execution of the structural steelwork (3.1.2) as a whole, of an individual component or a detail of a component.

条文说明 1：建造等级与其他标准中的建造等级 (execution class) 类似，但不一定完全相同。

Note 1 to entry: Execution level is similar to, but not necessarily identical to, execution classes in other standards.

条文说明 2：建造等级的具体描述见附录 A 及附录 C 中的表 C.1 和表 C.2。

Note 2 to entry: Execution levels are described in Annex A and in Annex C, Table C.1 and Table C.2.

3.1.13

组成产品（constituent product）

constituent product

用于制造子部件（3.1.18）或部件（3.1.16）并作为其组成部分的材料和产品。

material and product used for fabricating a sub-component (3.1.18) or component (3.1.16) and which remains as part of it

例如：钢材制品（3.1.14）、螺栓连接产品、焊接耗材。

EXAMPLE: Steel product (3.1.4), bolting product, welding consumable.

3.1.14

钢材制品（steel product）

steel product

以热轧或冷成型的型钢、钢板或棒材，或以热加工或冷成型的结构用闭口型钢的形式供应的组成产品（3.1.13）。

constituent product (3.1.13) supplied as hot-rolled or cold-formed steel shapes, plates or bars, or as hot-finished or cold-formed steel hollow sections

3.1.15

检查文件（inspection document）

inspection document

由制造商（3.1.6）或供应商（3.1.7）（如适用）出具并提供给采购方的文件，包含了组成产品（3.1.13）的特性，以便与标准要求进行比对。

document, issued by the manufacturer (3.1.6), or supplier (3.1.7) if applicable, and supplied to the purchaser, of the constituent product (3.1.13) that describes properties of supplied constituent product in a way that enables it to be compared to the specified properties

条文说明 1：更多相关信息见标准 ISO 10474 中关于钢材和钢材制品（3.1.14）及标准 ISO 16228 中关于螺栓和紧固件产品的内容。

Note 1 to entry: For further information, see ISO 10474 for steels and steel products (3.1.14) and ISO 16228 for bolting and fastener products.

示例 1：制造商的合格证明、制造商的测试报告、材料测试报告。

EXAMPLE 1: Manufacturer's certificate of compliance, manufacturer's test report, material test report.

示例 2：材料的合格证明 2.1、测试报告 2.2 或检查证书 3.1 和 3.2。

EXAMPLE 2: Declaration of compliance 2.1, test report 2.2, or inspection certificates 3.1 and 3.2 for the material.

3.1.16

部件 (component)

component

运输单元

shipping piece

运输构件

shipping member

用于现场安装的钢结构部件，可由若干子部件（3.1.18）组装而成。

erectable part of a steel structure, which can itself be an assembly of several sub-components (3.1.18)

3.1.17

主部件 (main component)

main component

承担荷载的主要钢部件。

primary load-carrying steel component

条文说明 1：主部件可在建造技术规格书（3.1.10）中确定。

Note 1 to entry: Main components can be identified in the execution specification (3.1.10).

条文说明 2：主部件不包括子部件。

Note 2 to entry: This excludes sub-components.

例如：次梁、主梁、柱、支撑、桁架。

EXAMPLE: Beam, girder, column, bracing, truss.

3.1.18

子部件 (sub-component)

sub-component

经过加工或制造，用于制造部件或直接安装的钢结构的组成产品（3.1.13）。

constituent product (3.1.13) that is transformed or fabricated to be incorporated into a fabricated component or into the erected steel structure

例如：连接（3.5.14）细部、加劲肋、护边角钢。

EXAMPLE: Connection (3.5.14) detail, stiffener, curb angle

3.1.19

标识 (identification)

identification

通过粘贴标签、追溯、标记或其他方式，识别特定物品、产品、工艺、程序或人员的能力。

ability of recognizing, by way of suitable tagging, tracking, marking or other means, the identity of a specific piece or pieces, products, processes, procedures or personnel

3.1.20

标识方法 (identification means)

identification means

通过标签、文字、详细说明、商标、品牌名称、图案、符号或其他方式，对组成产品（3.1.13）、工艺或相关人员进行描述的各类内容。此类信息可通过书写、印刷、模板喷涂、标记、压花、压印等方式直接附着于零部件或部件表面，且需在建造商（3.1.5）文件中明确引用。

descriptive matter, including tags, words, particulars, trademarks, brand name, pictorial matter, symbols, or other methods referring to constituent product (3.1.13), process, or personnel, written, printed, stencilled, marked, embossed or impressed on, or attached to a piece or component and referenced in the constructor's (3.1.5) documentation

3.1.21

标识文件（identification document）

identification document

用于确认组成产品（3.1.13）、工艺或人员身份的成组数据文件。

set of data enabling the identity of constituent product (3.1.13), process, or personnel

例如：检查文件（3.1.15）、材料测试报告、热处理工艺文件、焊接工艺规范、焊工和焊接操作员证书。

EXAMPLE: Inspection documents (3.1.15), material test reports, heat treatment documents, welding procedure specifications, welder and welding operator certificates.

3.1.22

可追溯性（traceability）

traceability

将产品、工艺、程序或人员与相应系列产品或制造（3.1.9）过程（或两者）的非特定数据进行关联的过程和能力，如检查文件（3.1.15）或标识标记。

process and ability of associating product, process, procedure, or personnel back to non-specific data related to the respective family of either products or relevant fabrication (3.1.9) processes, or both, e.g. inspection documents (3.1.15) or identification marks

条文说明 1：可追溯性附加信息和级别见附录 C.3。

Note 1 to entry: Additional information and levels of traceability are given in C.3.

3.1.23

批次可追溯性（lot traceability）

lot traceability

将产品、工艺、程序或人员与特定批次的产品或个别制造（3.1.9）工艺（或两者）相关的特定数据进行关联的过程和能力，如特定的检查文件（3.1.15）或个别批次标识标记。

process and ability of associating product, process, procedure, or personnel back to specific data related to an individual lot of either products or individual fabrication (3.1.9) processes, or both, e.g. specific inspection documents (3.1.15) or individual lot identification marks

3.1.24

质量计划（quality plan）

quality plan

描述与特定产品、服务或项目相关的标准、质量措施、资源和流程的文件或文件集。

document or set of documents that describe the standards, quality practices, resources and processes pertinent to a specific product, service or project

3.1.25

检查和测试计划（inspection and test plan ITP）

inspection and test plan

ITP

提供检查和测试类型及顺序的文件，包括相应的资源、程序和其他相关信息。

document providing the type and sequence of inspections and tests, including appropriate resources, procedures, and other relevant information

条文说明 1：检查和测试计划可由单一文件呈现，也可由一系列相互关联或相互支持的文件组成。

Note 1 to entry: Inspection and test plans may be presented as a single document or as a series of interdependent or supporting documents.

3.1.26

检查人员（inspector）

inspector

负责确保建造商（3.1.5）满足建造技术规格书（3.1.10）规定要求的人员。

party responsible to ensure that the constructor (3.1.5) has satisfied the requirements stated in the execution specification (3.1.10) in the work

3.1.27

检查报告（inspection report）

inspection report

由检查人员（3.1.26）根据检查和测试计划（3.1.25）编制，描述材料、制造（3.1.9）、安装、焊接或螺栓连接等项目是否符合规定要求的文件。

document prepared by an inspector (3.1.26) of materials, fabrication (3.1.9), erection, welding, or bolting, according to an inspection and test plan (3.1.25) that describes conformance or nonconformance with specified requirements

3.1.28

不合格项 (nonconformity)

nonconformity

不符合规定要求的事项。

non-fulfilment of a requirement

[来源：标准 ISO 9000:2015, 3.6.9, 已修改——删除了条文说明 1。]

[SOURCE: ISO 9000:2015, 3.6.9, modified — Deleted Note 1 to entry.]

3.2 钢材术语

3.2 Terms related to steels

3.2.1

轧制钢 (as-rolled steel)

as-rolled steel

未经任何特殊轧制和/或热处理的钢材。

steel without any special rolling and/or heat treatment condition

条文说明 1：改编自标准 ISO 630-6: 2014, 3.1。

Note 1 to entry: Adapted from ISO 630-6: 2014, 3.1.

3.2.2

正火钢 (normalized steel)

normalized steel

加热至高于相变温度范围的适当温度后，在空气中温度冷却至远低于相变温度范围制成的钢材。

steel produced by heating to a suitable temperature above the transformation range and then cooling in air to a temperature substantially below the transformation range

条文说明 1：对于结构用闭口型钢，可使用标准 ISO 4885 中正火的定义。

Note 1 to entry: For structural steel hollow sections, the definition for normalizing in ISO 4885 may be used.

条文说明 2：改编自标准 ISO 630-6:2014, 3.2。

Note 2 to entry: Adapted from ISO 630-6:2014, 3.2.

3.2.3

淬火钢 (quenched steel)

quenched steel

从高于 A_{c1} 的温度开始，以超过静止空气冷却速率进行冷却的钢材。

steel subjected to cooling more rapidly than in still air from a high temperature above A_{c1}

条文说明 1： A_{c1} 指加热过程中奥氏体开始形成的温度。

Note 1 to entry: A_{c1} is the temperature at which austenite begins to form during heating.

条文说明 2：改编自标准 ISO 630-6:2014, 3.3。

Note 2 to entry: Adapted from ISO 630-6:2014, 3.3.

3.2.4

回火钢 (tempered steel)

tempered steel

过淬火硬化或其他热处理工艺使材料性能达到规定要求的钢材。该热处理流程为加热至特定温度（低于 A_{c1} ）并保温适当时间，然后以适当速度冷却。

steel subjected to heat treatment, generally after quench hardening or another heat treatment to bring the properties to the required level, and consisting of heating to specific temperatures ($< A_{c1}$) and soaking for an appropriate duration followed by cooling at an appropriate rate

条文说明 1：还可采用直接淬火加回火工艺。

Note 1 to entry: Additionally, the following may apply: processes of direct quenching plus tempering.

条文说明 2：改编自标准 ISO 630-6:2014, 3.4。

Note 2 to entry: Adapted from ISO 630-6:2014, 3.4.

3.2.5

热机械轧制钢 (thermomechanical processed steel)

thermomechanical processed steel

在一定温度范围内进行最终变形的轧钢工艺，其材料状态具有某些特性，而这些特性仅通过热处理是无法实现或重复的。

steel rolled with a process in which the final deformation is carried out in a certain temperature range leading to a material condition with certain properties which cannot be achieved or repeated by heat treatment alone

条文说明 1：热成型或高于 580°C 的焊后热处理可能降低钢材强度值，不应采用此类处理方法，可以根据相关技术建议进行火焰矫正。

Note 1 to entry: Hot forming or post-weld heat treatment above 580 °C can lower the strength values and should not be performed. Flame straightening may be applied in accordance with relevant technical recommendations.

条文说明 2：热机械轧制可包括有回火或无回火的冷却速率递增的工艺，包括自回火，但不包括直接淬火和淬火加回火。

Note 2 to entry: Thermomechanical rolling can include processes with an increasing cooling rate with or without tempering, including self-tempering but excluding direct quenching and quenching and tempering.

条文说明 3：在某些文献中，也使用“热机械控制工艺”这一术语。

Note 3 to entry: In some publications, the term “Thermomechanical Control Process” is also used.

条文说明 4：改编自标准 ISO 630-6:2014, 3.5。

Note 4 to entry: Adapted from ISO 630-6:2014, 3.5.

3.2.6

耐候钢 (atmospheric corrosion resistant steel)

atmospheric corrosion resistant steel

与周围大气发生化学反应过程中，能够抵御自身材料性能退化或改变的钢材。

steel with the ability to resist degradation or alteration of material through chemical reaction with the surrounding atmosphere

条文说明 1：改编自标准 ASTM A941:2017, 3，耐大气腐蚀性。

Note 1 to entry: Adapted from ASTM A941:2017, 3, atmospheric corrosion resistance.

3.2.7

冷成型部件 (cold formed component)

cold formed component

冷成型长材制品或压型钢板，由有涂层或无涂层的热轧或冷轧板材制成，其具有开口、闭口等截面形状，沿长度方向截面形状保持不变，厚度在冷成型过程（如压制成型、拉拔成型、冲压成型、翻边成型等）中仅产生轻微改变。

cold formed long products or profiled sheet having various cross-section shapes, either open or with edges abutting, constant along their length, made from coated or uncoated hot or cold rolled flat products whose thicknesses are only slightly modified by the cold forming process (e.g. profiling, drawing, press forming, flanging)

[来源：标准 EN 1090-2:2018, 3.9.1]

[SOURCE: EN 1090-2:2018, 3.9.1]

3.3 制造和安装术语

3.3 Terms related to fabrication and erection

3.3.1

允许偏差 (tolerance)

tolerance

尺寸上限与下限之间的差值（即最大极限尺寸与最小极限尺寸之差）。

difference between the upper limit of size and the lower limit of size

条文说明 1：允许偏差是一个无符号的绝对值。

Note 1 to entry: Tolerance is an absolute value without sign.

条文说明 2：在建筑建造中，允许偏差通常用“±允许偏差”表示，公差值通过正负偏差范围隐式表达。

Note 2 to entry: In building construction, tolerance is commonly expressed by “±permitted deviation” so that the value of the tolerance is implicit.

[来源：标准 EN 1090-2:2018, 3.15, 已修改—补充了条文说明 2。]

[SOURCE: EN 1090-2:2018, 3.15, modified — Note 2 to entry was added]

3.3.2

制造允许偏差（**fabrication tolerance**）

fabrication tolerance

制造允许偏差

manufacturing tolerance

由部件加工制造导致的部件的尺寸允许变动范围。

permitted range in the size or dimensions of a component resulting from component fabrication

3.3.3

安装允许偏差（**erection tolerance**）

erection tolerance

已安装部件位置允许变动范围。

permitted range in the position of an erected component

3.3.4

基本允许偏差（**essential tolerance**）

essential tolerance

为满足结构在抗力和稳定性方面设计假定所必需的几何允许偏差基本限值。

basic limits for a geometrical tolerance necessary to satisfy the design assumptions for structures in terms of mechanical resistance and stability

[来源: 标准 EN 1090-2:2018, 3.15.1]

[SOURCE: EN 1090-2:2018, 3.15.1]

3.3.5

功能允许偏差 (functional tolerance)

functional tolerance

除满足抗力和稳定性以外的功能(如外观或组装要求等)而规定的几何允许偏差。

geometrical tolerance which may be specified to meet a function other than mechanical resistance and stability, e.g. appearance or fit up

[来源: 标准 EN 1090-2:2018, 3.15.2]

[SOURCE: EN 1090-2:2018, 3.15.2]

3.3.6

特殊允许偏差 (special tolerance)

special tolerance

本标准数据表格或允许偏差类型中未涵盖的几何允许偏差, 在特定情况下需另行规定。

geometrical tolerance which is not covered by the tabulated types or values of tolerances given in this document, and which needs to be specified in a particular case

[来源: 标准 EN 1090-2:2018, 3.15.3, 已修改 — 删除对欧洲标准的引用。]

[SOURCE: EN 1090-2:2018, 3,15,3, modified — Remove reference to European standard.]

3.3.7

限值允许偏差 (limit tolerance)

limit tolerance

验收标准不允许超出的最大或最小值。

maximum or minimum value for the acceptance criteria that shall not be exceeded

[来源: JASS 6, 附录 6]^[40]

[SOURCE: JASS 6, Appendix 6]^[40]

3.3.8

控制允许偏差（control tolerance）

control tolerance

作为制造或安装标准的目标值，以确保 95% 及以上的产品能在尺寸精度检查中合格。

target value used as a criterion for fabrication or erection so that 95% or more of the products can be accepted based on receiving inspection for dimensional accuracy

条文说明 1：用于判断接受或拒绝检查批次的标准值。

Note 1 to entry: An accepted value used to judge whether the inspection lot can be accepted or rejected.

[来源：JASS 6，附录 6]^[40]

[SOURCE: JASS 6, Appendix 6]^[40]

3.3.9

准备工作（preparation）

preparation

对组成钢材制品（3.1.14）所进行的活动，以生产提供用于组装在部件中的零件。

all activities performed on the constituent steel products (3.1.14) to produce the parts ready for assembly and inclusion in components

条文说明 1：相关活动如标识、搬运与储存、切割、成型和钻孔等。

Note 1 to entry: As relevant, this comprises, e.g. identification, handling and storage, cutting, shaping and holing.

条文说明 2：不适用于钢材表面涂覆前的准备工作。

Note 2 to entry: Not as applied to preparation of steel substrates for the application of coatings.

3.3.10

基于设计的安装工艺（design basis procedure for erection）

design basis procedure for erection

设计安装顺序

design erection sequence

结构设计所依据的安装程序概述。

outline of a procedure for erection upon which the design of the structure is based

3.3.11

安装程序（erection procedure）

erection procedure

结构安装程序说明。

documentation describing the procedures to be used to erect a structure

3.3.12

预拼装（trial assembly）

trial assembly

将构成整体结构的各个部件组装起来，以检验其是否匹配。

putting together sufficient components of a whole structure to check that they fit

3.4 焊接术语

3.4 Terms related to welding

3.4.1

预涂底漆（prefabrication primer）

prefabrication primer

车间底漆

shop primer

在进行任何制造活动（如切割、焊接等）之前涂覆在材料上的底漆，可以选择是否将其去除。

primer that is applied to materials and may or may not be removed prior to any fabrication activities (e.g. cutting, welding) being performed

3.4.2

附加无损检测要求（supplementary non-destructive testing, NDT）

supplementary non-destructive testing

附加 NDT

supplementary NDT

目视检测（VT）以外的无损检测（NDT）技术。

non-destructive testing (NDT) technique which is other than visual inspection (VT)

例如：磁粉探伤检测（MT）、渗透检测（PT）、涡流探伤检测（ET）、超声波检测（UT）或射线探伤检测（RT）等

EXAMPLE: Magnetic particle (MT), penetrant (PT), eddy current (ET), ultrasonic (UT) or radiographic (RT) testing

条文说明 1：VT、MT、PT、ET、UT、RT 的定义见标准 ISO 17635。

Note 1 to entry: VT, MT, PT, ET, UT, RT are defined in ISO 17635.

3.5 结构螺栓连接术语

3.5 Terms related to structural bolting

3.5.1

高强度螺栓（high-strength bolt）

high-strength bolt

性能等级为 8.8 级及以上或抗拉强度为 830MPa 及以上的结构用螺栓。

bolt with a property class of 8.8 or higher, or with a tensile strength of 830 MPa or higher, used for structural purposes

3.5.2

垫圈（washer）

washer

螺栓连接副（3.5.4）的部件，螺栓穿过其中心孔。

component of a bolting assembly (3.5.4) that accepts a bolt through its center hole

条文说明 1：垫圈通常有平垫圈或倒角垫圈。

Note 1 to entry: A washer is typically plain or chamfered.

条文说明 2：垫圈的坚硬表面分散压应力，并在紧固螺栓时使螺母或螺栓头顺利旋转。

Note 2 to entry: A washer provides a surface to distribute bearing stress, and provides a hardened surface for head or nut rotation during tightening.

条文说明 3: 改编自标准 ASTM F1789-17a, 2017, 3, 平垫圈。

Note 3 to entry: Adapted from ASTM F1789-17a, 2017, 3, plain washer.

3.5.3

销轴 (pin)

pin

无螺纹的紧固件。

unthreaded fastener

3.5.4

螺栓连接副 (bolting assembly)

bolting assembly

由螺栓和与之配套的螺母及垫圈组成的连接紧固件。

bolt, nut and washer(s) as necessary, that is installed as a unit

条文说明 1: 螺栓、螺母和垫圈可由不同制造商 (3.1.6) 生产。

Note 1 to entry: The bolt, nut and washer(s) may be sourced from different manufacturers (3.1.6).

3.5.5

成套螺栓连接副 (matched bolting assembly)

matched bolting assembly

成套供应、测试和安装的螺栓、螺母及垫圈组成的连接紧固件。

matching bolt, nut and washer(s) as necessary, that is supplied, tested and installed as a unit

条文说明 1: 螺栓、螺母和垫圈可由不同制造商 (3.1.6) 生产。

Note 1 to entry: The bolt, nut and washer(s) may be sourced from different manufacturers (3.1.6).

3.5.6

制造批次 (manufacturing lot)

manufacturing lot

具有单一规格标识 (含产品等级、性能等级及尺寸) 的结构螺栓组件, 由同一炉次的钢条、线材、棒材或板材加工而成, 并采用相同或类似的工艺步骤在相同时间或连续时间段内加工, 且经过相同的热处理或涂层处理 (若涉及)。

quantity of structural bolting components of a single designation including product grade, property class and size, manufactured from bar, wire, rod or flat product from a single cast, processed through the same or similar steps at the same time or over a continuous time period, and through the same heat treatment or coating process, if any

3.5.7

连接副批次 (assembly lot)

assembly lot

成套供应的螺栓连接副, 包括:

bolting assemblies supplied together as a set comprising:

- 同一制造批次 (3.5.6) 的螺栓;
- bolts from a single manufacturing lot (3.5.6);
- 同一制造批次的螺母;
- nuts from a single manufacturing lot;
- 同一制造批次的垫圈。
- washers from a single manufacturing lot.

3.5.8

扩展连接副批次 (extended assembly lot)

extended assembly lot

对适配性测试结果起主要影响作用的部件, 取自同一制造批次 (3.5.6), 其他部件可取自多个制造批次。

assembly lot containing the component with the main influence on the result of the

suitability test from a single manufacturing lot (3.5.6), and the other components from several manufacturing lots

条文说明 1：根据测试结果确定对适配性测试起主要影响作用的部件（螺母或直接张力指示器）。

Note 1 to entry: The component having the main influence (either nut or direct tension indicator) is determined on the basis of test results.

条文说明 2：同批次的扩展螺栓连接副包括螺栓、螺母和垫圈，以及相关的直接张力指示器、螺母面垫圈或螺栓面垫圈（若有）。

Note 2 to entry: An extended bolting assembly lot contains bolts, nuts and washers and, if relevant, direct tension indicators and nut face washers or bolt face washers.

3.5.9

螺栓组（bolt group）

bolt group

在相似连接（3.5.14）中同源、同规格的螺栓连接副。

bolting assemblies of the same origin in similar connections (3.5.14) with the bolting assemblies of the same size and property class

条文说明 1：此术语用于检查目的。

Note 1 to entry: This term is used for purposes of inspection.

3.5.10

特殊紧固件（special fastener）

special fastener

国际或国家标准未涵盖的紧固件。

fastener that is not covered by international or national standards

3.5.11

防滑紧固件（non-slip fastener）

non-slip fastener

在正常使用极限状态下，使连接板或构件之间不发生滑移的紧固件（即使没有预紧力，仍能保持初始对中状态和相对位置）。

fastener that does not allow slip to occur between connected plates or members at the serviceability limit state so that the original alignment and relative positions are maintained, even without pretension

例如：销轴（3.5.3）、配套螺栓。

EXAMPLE: Pins (3.5.3), fit bolts.

3.5.12

k 系数（k-factor）

k-factor

紧固扭矩 M 与预紧力 F 之间的关系。

relationship between the applied tightening torque, M , and the achieved pretension, F

$$k = M / (F \times d)$$

其中， d 为螺栓连接副（3.5.4）的公称直径。

where d is the nominal diameter of the bolting assembly (3.5.4)

3.5.13

k 级（k-class）

k-class

通过施加特定扭矩紧固法实现螺栓连接副预紧力的表征系数。

value used to express the ability of a bolting assembly to be pretensioned by a method that relies upon the application of a specific torque

条文说明 1：k 级由标准 EN 14399-1 中的第 4 部分、第 5 部分及表 1 所规定。

Note 1 to entry: k-class is as specified in EN 14399-1, 4, 5, and Table 1.

条文说明 2：K0 级：对 k 系数（3.5.12）无要求；K1 级：单个测试值在 0.10 到 0.16 之间（含 0.10 和 0.16）；K2 级：平均测试值在 0.10 到 0.23 之间（含 0.10 和 0.23），且 k 系数（3.5.12）的变异系数不大于 0.06。

Note 2 to entry: k-class K0 indicates no requirements for k-factor(3.5.12); K1 indicates individual test value between 0.10 and 0.16, inclusive; K2 indicates mean test value between 0.10 and 0.23, inclusive, and coefficient of variation of k-factor (3.5.12) less than or equal to 0.06.

3.5.14

连接 (connection)

connection

节点

joint

子部件 (3.1.18) 和部件连接处。

location where sub-components (3.1.18) and components are joined

条文说明 1: 术语“节点”更常用于描述连接的类型或性能。

Note 1 to entry: The term joint is more commonly used to describe the type or behaviour of a connection.

3.5.15

承压型连接 (bearing-type joint)

bearing-type joint

剪切/承压连接

shear/bearing joint

采用非预紧螺栓或拧紧至规定最小预紧力的高强度螺栓 (3.5.1) 构成的连接, 在承载力极限状态下, 设计荷载以螺栓受剪和连接部件承压传递。

joint using either non-pretensioned bolts, or high-strength bolts (3.5.1) tightened to induce a specified minimum bolt pretension, in which the design action is transferred by shear in the bolts and bearing on the connected parts at the strength limit state

3.5.16

施加预紧力连接 (pretensioned joint)

pretensioned joint

传递剪力或拉力 (或两者兼有) 的连接, 并通过安装螺栓提供规定的预紧力。

joint that transmits shear or tensile loads, or both, in which the bolts have been installed to provide a specified pretension in the installed bolt

3.5.17

非施加预紧力连接 (non-pretensioned joint)

non-pretensioned joint

初拧紧固连接

snug-tight joint

在承载力极限状态下,通过螺栓的剪力和连接部件的承压力传递设计荷载的连接,其中螺栓安装至密贴状态,无需提供指定的预紧力。

joint in which the bolts have been installed to achieve the snug-tight condition, without requirements to provide a specified pretension in the bolt, in which the design action is transferred by shear in the bolts and bearing on the connected parts at the strength limit state

3.5.18

初拧紧固状态 (snug-tight condition)

snug-tight condition

连接(3.5.14)中螺栓紧固到所有板层间紧密接触(3.5.26),且需使用扳手才能拆卸的状态。

condition that exists when all of the plies in a connection (3.5.14) have been pulled into firm contact (3.5.26) by the bolts in the joint and all of the bolts in the joint have been tightened sufficiently to prevent the removal of the nuts without the use of a wrench

条文说明 1: 施加预紧力连接(3.5.16)和抗滑移连接(3.5.19)中螺栓的紧固是使用冲击扳手进行多次冲击或使用套筒扳手(3.5.37)全力拧紧。

Note 1 to entry: For pretensioned (3.5.16) and slip-resistant joints (3.5.19), it is additionally the tightness of a bolt achieved by a few impacts of an impact wrench or by the full effort of a person using a standard podger spanner (3.5.37)

3.5.19

抗滑移连接 (slip-resistant joint)

slip-resistant joint

滑动临界连接

slip-critical joint

摩擦型连接

friction-type joint

摩擦锁紧连接

friction-grip joint

使用高强度螺栓（3.5.1）并施加规定的最小预紧力的连接（3.5.14），从而通过接触面之间产生的摩擦力将设计剪力传递到接触面内。

connection (3.5.14) using high-strength bolts (3.5.1) tightened to induce a specified minimum bolt pretension so that the resultant clamping action transfers the design shear forces acting in the plane of the common contact surfaces by the friction developed between the contact surfaces

3.5.20

接触面（faying surface）

faying surface

螺栓连接的两个板层之间的接触面。

plane of contact between two plies of a bolted joint

3.5.21

无涂层接触面（uncoated faying surface）

uncoated faying surface

未涂覆底漆、面漆及未镀锌处理的接触面（3.5.20），且表面无松散的锈层、污垢和其他杂质。

faying surface (3.5.20) that has neither been primed, painted, nor galvanized and is free of loose scale, dirt and other foreign material

3.5.22

涂层接触面（coated faying surface）

coated faying surface

涂覆底漆、面漆或以其他方式防腐处理的接触面（3.5.20），但热浸镀锌处理除外。

faying surface (3.5.20) that has been primed, primed and painted or protected against corrosion, except by hot-dip galvanizing

3.5.23

热浸镀锌涂层接触面（galvanized faying surface）

galvanized faying surface

经过热浸镀锌处理的接触面（3.5.20）。

faying surface (3.5.20) that has been hot-dip galvanized

3.5.24

摩擦面（friction surface）

friction surface

抗滑移连接（3.5.19）中具有具体抗滑移能力的接触面（3.5.20）。

faying surface (3.5.20) that provides a specific slip resistance in a slip-resistant joint (3.5.19)

3.5.25

抗滑移系数（slip factor）

slip factor

在滑移发生时，接触面（3.5.20）上的摩擦剪力与法向压力的比值。

ratio of the frictional shear load at the faying surface (3.5.20) to the total normal force when slip occurs

3.5.26

紧密接触（firm contact）

firm contact

接触面（3.5.20）上被连接板件紧密贴合在一起，但不一定连续接触的状态。

condition that exists on a faying surface (3.5.20) when the plies are solidly seated against each other, but not necessarily in continuous contact

3.5.27

垫板（packing）

packing

填充板

filler plate

用于增加部件厚度的板。

plate used to build up the thickness of one component

3.5.28

夹紧长度 (grip)

grip

螺栓穿过的连接板件总厚度，不包括垫圈或直接张力指示器。

plies of a joint through which the bolt passes, exclusive of washers or direct-tension indicators

3.5.29

保护性存储 (protected storage)

protected storage

在防护棚内对密闭容器中的结构螺栓连接部件进行持续保护。

continuous protection of structural bolting components in closed containers in a protected shelter

3.5.30

预紧 (pretensioning)

pretensioning

已废止: **preloading**

DEPRECATED: preloading

螺栓安装与施加规定的预紧力。

installing and applying a specified pretension in a bolt

条文说明 1: 预紧方法见标准 T/CSCS xxx-6。

Note 1 to entry: Methods for pretensioning are provided in ISO 17607-6.

3.5.31

螺栓预紧力测量设备 (bolt tension measurement device)

bolt tension measurement device

使用预紧力连接 (3.5.16) 或抗滑移连接 (3.5.19) 时，用于验证预紧 (3.5.30)

方法是否符合要求的经校正的预紧力测量仪器。

calibrated tension-indicating device that is used to verify the acceptability of the pretensioning (3.5.30) method when a pretensioned joint (3.5.16) or slip-critical joint (3.5.19) is specified

3.5.32

扭矩法（torque method）

torque method

将规定扭矩值施加在螺栓连接副（3.5.4）的指定部位的预紧（3.5.30）方法。

method of pretensioning (3.5.30) that relies upon the application of a specific torque to the designated part of the bolting assembly (3.5.4)

3.5.33

组合紧固法（combined method）

combined method

先对螺栓连接副（3.5.4）的指定部位施加规定扭矩值，再通过控制螺栓与螺母的相对转角完成最终紧固的预紧（3.5.30）方法。

method of pretensioning (3.5.30) that relies upon the application of a specific torque to the designated part of the bolting assembly (3.5.4), followed by the application of a specific relative rotation between bolt and nut

3.5.34

梅花头扭断法（spline-drive twist-off method）

spline-drive twist-off method

通过扭剪型扳手对螺栓连接副（3.5.4）的梅花头施加扭剪力，当预紧力达到设计值时使螺栓尾部梅花头拧断的预紧（3.5.30）方法。

method of pretensioning (3.5.30) that relies upon the application of a torque to the nut that causes, from the torsional shear applied to the spline by the wrench, the removal of the spline from the end of the bolt

3.5.35

直接张力指示器法（direct tension indicator method）

direct tension indicator method

通过直接张力指示器凸起部分的预设塑性变形量来验证螺栓是否达到规定预紧力的预紧（3.5.30）方法。

method of pretensioning (3.5.30) that relies upon specific deformation of the protrusions of the direct tension indicator

3.5.36

旋转螺母法（turn-of-nut method）

turn-of-nut method

从初拧紧固状态(3.5.18)开始采用控制螺栓和螺母相对转角值以实现预紧(3.5.30)的方法。

method of pretensioning (3.5.30) that relies upon application of a specific relative rotation between bolt and nut, starting from the snug-tight condition (3.5.18)

3.5.37

套筒扳手（podger spanner）

podger spanner

铆钉扳手

spud wrench

用于人工操作对准螺栓孔并紧固螺栓的手动工具。

hand tool for aligning bolt holes and tightening bolts using the manual effort of the installer

3.5.38

扭剪扳手（twist-off shear wrench）

twist-off shear wrench

配备两个共轴套筒的电动或手动工具，由扭矩相互作用使外套筒与螺母啮合并顺时针旋转，且内套筒与螺栓的梅花头（即双六角头）啮合并逆时针旋转。

electric or manual tool equipped with two co-axial sockets which react by torque one against the other, the outer socket which engages the nut rotating clockwise, the inner socket which engages the spline end of the bolt (i.e. bi-hexagonal) rotating anticlockwise

3.5.39

常规观测（routine observation）

routine observation

对正在进行的工作实施定期监测。

periodic monitoring of the work in progress

3.6 涂装术语

3.6 Terms related to coating

3.6.1

腐蚀性等级（corrosiveness classification）

corrosiveness classification

根据腐蚀性介质对建筑材料破坏的程度，通过外观变化、重量变化、强度损失以及腐蚀速度等因素综合评定腐蚀性等级。

Dependent on the extent of damage caused by corrosive media to building materials, the corrosive grade is evaluated by considering factors such as appearance changes, weight changes, strength loss, and corrosion rate

3.6.2

腐蚀裕量（corrosion allowance）

corrosion allowance

在材料使用寿命内，由于接触周围环境介质（如大气）的腐蚀作用，而在设计时预先增加的壁厚余量。

The additional wall thickness allowance that is pre-added during design to account for the corrosion effect due to contact with surrounding environmental media (such as the atmosphere) throughout the service life of material

3.6.3

底漆（primer）

primer

底漆是基材上的保护涂层，通常是防腐蚀涂层，对于现场涂装的膨胀型防火涂料，底漆通常在工厂内建造。

A protective coating, usually anti-corrosive, applied to the substrate prior to application

of the basecoat. For site applied intumescent coatings, the primer is the only part of the specification that would normally be applied in shop

3.6.4

封闭漆/面漆 (sealing/top coat)

sealing/top coat

涂覆在底漆上的一层保护涂层，用于防止底漆受到环境的侵蚀。

A coating applied over the basecoat to prevent the basecoat from environmental degradation

3.6.5

中间漆 (middle coat)

middle coat

涂覆在底漆之上的涂层，用于防止底漆受到环境的侵蚀。

A coating applied over the basecoat to prevent the basecoat from environmental degradation

3.6.6

涂层配套性 (coating compatibility)

coating compatibility

防火涂层与防腐涂层的相容性

Compatibility of intumescent coatings with existing paint layers

3.6.7

膨胀型防火材料 (intumescent fire resistive materials)

intumescent fire resistive materials

一种膨胀型涂层，遇热时会以可控方式膨胀至其原始厚度的数倍，形成碳质焦炭层，起到隔热层的作用，从而延缓基材升温。

An intumescent coating, which reacts to heat by swelling in a controlled manner to many times its original thickness to produce a carbonaceous char which acts as an insulating layer to delay the temperature increase in substrates

3.6.8

干膜厚度（dry film thickness）

dry film thickness

完全干燥的涂层厚度，在报出干膜厚度时，应明确所报厚度是指底漆、中间漆或面漆的单独厚度，还是指整个涂层体系的厚度。

The thickness of a fully dried coating. When quoting dry film thickness, it should be made clear whether the quoted thickness refers individually to the primer, basecoat or topcoat, or to the system as a whole

3.6.9

湿膜厚度（wet film thickness）

wet film thickness

任何涂层刚涂覆后的厚度。

The thickness of any coat immediately after application

3.6.10

膨胀型防火涂层系统（intumescent coating system）

intumescent coating system

膨胀型防火涂层系统包括底漆、中间漆或封闭漆、面漆或装饰漆。在某些技术条件下，该系统可省去封闭漆。

A system comprising the primer, the basecoat and the sealer, top or decorative coat. In some environments, and with the approval of the intumescent manufacturer, the sealer may be omitted from the system

4 建造技术规格书和质量要求

4 Execution specification and quality requirements

4.1 建造技术规格书

4.1 Execution specification

4.1.1 概述

4.1.1 General

规范编制者应编制并维护钢结构工程的建造技术规格书。

The specifier shall develop and maintain an execution specification for the structural steelwork.

可以采用技术等效的国家标准或文件，全部或部分替代本标准中引用的 ISO 标准或要求。在技术等效替代的情况下，应在建造技术规格书中注明所使用的国家标准和文件，并说明其与本标准之间的差异。

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.

在钢结构工程的每一部分建造前，应就该部分建造所需的资料信息和技术要求达成一致并予以完善。

The necessary information and technical requirements for execution of each part of the structural steelwork shall be agreed and complete before commencement of execution of that part of the structural steelwork.

建造技术规格书应包含以下相关项目：

The execution specification shall include the following items as are relevant:

- a) 附加信息，见附录 A.1 节；
- a) additional information, see A.1;

- b) 选项，见附录 A.2 节；
b) options, see A.2;
- c) 建造等级，见第 4.1.2 条；
c) execution levels, see 4.1.2;
- d) 标识和可追溯性要求，见第 4.1.3 条；
d) identification and traceability requirements, see 4.1.3;
- e) 几何允许偏差，见第 4.1.4 条；
e) geometrical tolerances, see 4.1.4;
- f) 建筑裸露钢结构（AEISS）要求，见第 4.1.5 条；
f) requirements for architecturally exposed structural steel (AEISS), see 4.1.5;
- g) 质量计划要求，见第 4.2.3 条；
g) requirement for a quality plan, see 4.2.3;
- h) 需要进行的检查、测试和纠正，见第 6.1 节；
h) inspection, testing and corrections to be undertaken, see 6.1;
- i) 代表购买方/业主提出的要求。
i) requirements specified on behalf of the purchaser/client.

建造技术规格书中还可以包括其他项目，如指定哪些部件为主部件。

Other items may be included in the execution specification, e.g. which components are designated as main components.

应包括对已商定的建造技术规格书进行修改的相应程序。

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

建造技术规格书的编制指南见附录 B。

Guidance on the development of the execution specification is given in Annex B.

4.1.2 建造等级

4.1.2 Execution levels

建造分为四个等级，从 EXL1 至 EXL4，其要求的严格程度依次增加，对各等级要求的说明见表 1。

Four execution levels, denoted EXL1 to EXL4, are given, for which the required strictness increases from EXL1 to EXL4. A description of the requirements are given in Table 1.

建造技术规格书应包含制造和安装的建造等级。

Execution levels for fabrication and erection shall be included in the execution specification.

建造等级可应用于整体结构、部分结构或具体构造细节，同一结构可以包含多个建造等级。某一具体构造细节或一组构造细节通常建造等级相同，而建造等级的选择不一定适用于所有要求。

Execution levels may apply to the whole structure or to a part of the structure or to specific details. A structure can include several execution levels. A detail or group of details will normally be ascribed one execution level. However, the choice of an execution level does not necessarily have to be the same for all requirements.

建造等级相关质量要求见附录 A.3 节。

The list of quality requirements related to execution levels is given in A.3.

选择建造等级的建议见附录 C。

Recommendations concerning the choice of execution levels are given in Annex C.

4.1.3 标识和可追溯性

4.1.3 Identification and traceability

4.1.3.1 标识

4.1.3.1 Identification

标识要求应在建造技术规格书中明确规定。

The requirements for identification shall be specified in the execution specification.

钢材、铸件、高强度钢索和结构用支座的标识要求，见标准 T/CSCS xxx-2。

For identification requirements for steels, castings, high-strength cables, and structural bearings, see ISO 17607-2.

桥梁制造和伸缩缝的标识要求，见标准 T/CSCS xxx-3。

For identification requirements for fabrication and for expansion joints for bridges, see ISO 17607-3.

安装的标识要求，见标准 T/CSCS xxx-4。

For identification requirements for erection, see ISO 17607-4.

焊接耗材、保护气体和栓钉的标识要求，见标准 T/CSCS xxx-5。

For identification requirements for welding consumables, shielding gases, and studs, see ISO 17607-5.

螺栓连接产品及连接副的标识要求，见标准 T/CSCS xxx-6。

For identification requirements for bolting products and assemblies, see ISO 17607-6.

所有组成产品的标识文件应予以保留，并在建造技术规格书中明确规定保留期限。

Identification documents shall be retained for all constituent products. The retention period shall be specified in the execution specification.

使用钢印标记的要求，见标准 T/CSCS xxx-3。

For marking using steel stamps, see ISO 17607-3.

4.1.3.2 可追溯性

4.1.3.2 Traceability

可追溯性级别应符合表 1 中的要求，除非建造技术规格书中另有规定。必要时，建造技术规格书还应在已有规定基础上，明确规定工艺、程序、操作人员、焊工、设备、组成产品、检查记录或其他因素的附加可追溯性要求。

The level of traceability shall be as required in Table 1 unless otherwise specified in the execution specification. If required, the execution specification shall also identify and specify additional traceability requirements for processes, procedures, operators, welders, machines, constituent products, inspection records, or other factors in addition to those specified.

Table 1 — Traceability requirements

表 1 — 可追溯性要求

建造等级 Execution level	可追溯性级别 Traceability level	要求 Requirement
EXL1	T1	<p>钢材制品的检查文件无需可追溯性。</p> <p>Traceability to inspection documents for steel products is not required.</p> <p>主部件的钢材制品检查文件应具备批次可追溯性。</p>
EXL2	T2	<p>Lot traceability to the inspection documents for steel products shall be performed for main components.</p> <p>主部件及其子部件连接的钢材制品检查文件应具备批次可追溯性。</p>
EXL3	T3	<p>Lot traceability to the inspection documents for steel products shall be performed for main components and for steel sub-component connections between main components.</p> <p>所有组成产品的检查文件均应具备批次可追溯性。</p>
EXL4	T4	<p>Lot traceability to the inspection documents for all constituent products is required.</p>

4.1.4 几何允许偏差

4.1.4 Geometrical tolerances

几何允许偏差的确定应考虑单个构件及结构体系整体的结构稳定性要求。

The selection or designation of geometrical tolerances shall consider requirements for structural stability for individual elements and for the structural system as a whole.

制造和安装的几何允许偏差应包含在建造技术规格书中。

Geometrical tolerances for fabrication and erection shall be included in the execution specification.

制造的几何允许偏差见标准 T/CSCS xxx-3，安装的几何允许偏差见标准 ISO 17607-4。

Geometrical tolerances for fabrication are addressed in ISO 17607-3. Geometrical tolerances for erection are addressed in ISO 17607-4.

注：组成产品的允许偏差在其适用的产品标准中予以规定。

NOTE: Tolerances for constituent products are addressed in their applicable product standards.

4.1.5 建筑裸露钢结构（AESS）

4.1.5 Architecturally exposed structural steel (AESS)

钢结构工程中建筑外露部分的位置和要求应在建造技术规格书中明确规定。

If the structural steelwork includes items that are designated as architecturally exposed, the location and requirements shall be included in the execution specification.

建筑裸露钢结构（AESS）的国家标准和文件见附录 E。

National standards and documents that address AESS are listed in Annex E.

4.2 质量要求

4.2 Quality requirements

4.2.1 质量管理体系

4.2.1 Quality management system

建造商应维护并运行质量管理体系，以确保符合本标准的要求。

The constructor shall maintain and operate a quality management system to ensure conformity to the requirements of this document.

应列出制造和安装使用的主要工艺，并制定控制计划。

The major processes used in fabrication and erection shall be listed and a control plan developed.

4.2.2 质量证明文件

4.2.2 Quality documentation

建造等级为 EXL2、EXL3 和 EXL4 的项目，应记录以下内容：

The following points shall be documented for EXL2, EXL3, and EXL4:

- a) 组织结构图和负责建造各环节的管理人员；
a) the organisation chart and managerial staff responsible for each aspect of the execution;
- b) 采用的建造工艺、建造方法和建造说明；
b) the procedures, methods, and work instructions to be applied;
- c) 钢结构工程的检查和测试方案（ITP），见附录 D；
c) an inspection and test plan (ITP) specific to the structural steelwork, see Annex D;
- d) 处理变更和修改的程序，见附录 D；
d) a procedure for handling changes and modifications, see Annex D;
- e) 处理不合格项、许可申请及质量争议的程序；
e) a procedure for handling of nonconformities, requests for concessions, and quality disputes;
- f) 明确的停工待检点或见证性检验/测试要求，以及由此产生的现场准入条

件。

f) specified hold-points or requirements to witness inspections or tests, and any consequent access requirements.

4.2.3 质量计划

4.2.3 Quality plan

若对钢结构工程提出建造质量计划要求，应在建造技术规格书中明确规定。

The execution specification shall specify if a quality plan for the execution of the structural steelwork is required.

若要求质量计划，其内容至少应包括：

If a quality plan is required, it shall include, as a minimum:

a) 总体的质量管理文件包括以下条目：

a) a general management document addressing the following points:

1) 针对工艺能力的建造技术规格书要求的审查；

1) review of specification requirements against process capabilities;

2) 在项目实施各个阶段的授权和分工；

2) the allocation of tasks and authority during the various phases of the project;

3) 检查原则和组织安排，包括对每项检查任务的职责分配。

3) principles and organisation arrangements for inspection including allocation of responsibilities for each inspection task。

b) 建造前的质量证明文件应在与之相关的建造步骤实施前提交；

b) quality documentation prior to execution. The documents shall be produced before execution of the construction step to which they relate;

c) 建造记录，即已完成的检查和测试的实际记录，或证明使用了具有资质

或认证的资源。与指定的停工待检点相关的建造记录应在该停工待检点解除之前完成编制。

c) execution records, which can be actual records of inspections and tests carried out or demonstrate implementation of qualified or certified resources. Execution records related to specified hold-points shall be produced before the hold-point is released.

附录 D 给出了钢结构工程建造质量计划建议内容的检查清单,并参考了标准 ISO 10005 中的通用指南。

Annex D gives a checklist for the content of a quality plan recommended for the execution of structural steelwork, with reference to the general guidelines in ISO 10005.

若建造技术规格书中不要求质量计划,建造商应在开工前审查质量要求。

If no quality plan is required in the execution specification, the constructor shall review the quality requirements prior to commencing work.

4.2.4 建造文件

4.2.4 Execution documentation

建造过程中应编制的文件,作为竣工结构的记录,用以证明钢结构工程的建造符合建造技术规格书的要求。

Documentation shall be prepared during execution, and as a record of the as-built structure to demonstrate that the structural steelwork has been carried out in accordance with the execution specification.

5 组成产品

5 Constituent products

5.1 概述

5.1 General

钢结构用材料和组成产品应从相关 ISO 标准、具有同等效力的国家标准或文件中进行选取，并在建造技术规格书中予以规定。

Materials and constituent products to be used for the execution of steel structures shall be selected from the relevant ISO standards, equivalent national standards, or equivalent documents, and shall be specified in the execution specification.

所用材料或组成产品未被本标准或其他文件涵盖的，则应在建造技术规格书中规定其相关性能参数。

If materials or constituent products not covered by standards or other documents are required, their relevant properties shall be specified in the execution specification.

5.2 符合检查标准要求

5.2 Conformance with inspection documents

按照相关 ISO 标准或具有同等效力的国家标准或文件选用的组成产品，应按照第 6.2.1 条检验其是否符合相应的产品标准。

For constituent products ordered to relevant ISO standards, equivalent national standards, or equivalent documents, their conformity with the relevant product standard shall be checked in accordance with 6.2.1.

未在本标准或其他标准中规定的组成产品性能，应通过与建造技术规格书中规定的特性进行比较的方式予以说明。

The properties of supplied constituent products not covered by standards or other documents shall be stated in a way that enables them to be compared to the properties specified in the execution specification.

钢材、铸件、高强度钢索和结构用支座，见标准 T/CSCS xxx-2。

For steels, castings, high-strength cables, and structural bearings, see ISO 17607-2.

桥梁伸缩缝，见标准 **T/CSCS xxx-4**。

For expansion joints for bridges, see ISO 17607-4.

焊接耗材，见标准 **T/CSCS xxx-5**。

For welding consumables, see ISO 17607-5.

螺栓连接产品及螺栓连接副，见标准 **T/CSCS xxx-6**。

For bolting products and assemblies, see ISO 17607-6.

建造要求应标记而未标记的组成产品应视为不合格产品。

If marking is required, unmarked constituent products shall be treated as non-conforming product.

标记方法应按照第 4.1.3.1 条和第 6.2 节中的规定执行。

Methods of marking shall be in accordance with that for components in accordance with 4.1.3.1 and 6.2.

6 检查、测试和纠正

6 Inspection, testing, and correction

6.1 概述

6.1 General

本章规定了质量文件（见第 4.2.2 条）和质量计划（见第 4.2.3 条）中有关检查和测试的质量要求。

This clause specifies the requirements for inspection and testing with respect to the quality requirements included in quality documentation (see 4.2.2) and quality plan (see 4.2.3) as relevant.

应根据建造技术规格书及本标准规定的质量要求，对钢结构工程进行检查、测试和纠正。

Inspection, testing and corrections shall be undertaken on the structural steelwork in accordance with the execution specification and within the quality requirements set out in this document.

若不符合本标准规定的质量要求，应对每项缺陷进行单独评估，根据缺陷所在部件的功能及缺陷特征（如类型、大小及位置等），确定缺陷可接受或需采取修复措施。

In case of nonconformities with the requirements of this document, each defect may be assessed individually. Such evaluation should be based on the function of the component in which the defect occurs and on the characteristics of the imperfection (type, size, location) in deciding if the defect is either acceptable or shall be repaired.

所有检查和测试应按照符合建造技术规格书的预先方案进行，包括规定的停工待检点或见证检验/测试要求，并记录相应的检查、测试及纠正的过程。

All inspection and testing shall be undertaken to a predetermined plan, including specified hold-points or requirements to witness inspections or tests, in accordance with the execution specification with documented procedures. Specific inspection testing and associated corrections shall be documented.

6.2 组成产品和部件

6.2 Constituent products and components

6.2.1 组成产品

6.2.1 Constituent products

应检查组成产品的文件资料，以核实产品信息与订单要求一致。

Documents supplied with constituent products shall be checked to verify that the information on the products supplied matches those ordered.

若建造技术规格书无另行规定，则无需对产品进行特定测试。

Specific testing of products is not required unless specified in the execution specification.

条文说明 1：此类文件包括对板材、型材、闭口型钢、焊接耗材、栓钉、螺栓连接产品及螺栓连接副等的检查文件、测试报告和一致性声明等。

NOTE 1: These documents include inspection documents, test reports, declaration of conformity as relevant for plates, sections, hollow sections, welding consumables, studs, bolting products and assemblies.

条文说明 2：审核此类文件资料可免去产品的常规测试。

NOTE 2: This documentation check is intended to eliminate the need for testing products generally.

6.2.2 部件

6.2.2 Components

应检查采购部件的文件资料，以核实所采购部件的信息是否与订单要求一致。

Documents supplied with components shall be checked to verify that the information on the components supplied matches those ordered.

条文说明：本规定适用于所有已交付的成品和半成品，用于建造过程中后续加工的产品（如用于组合板梁的焊接工字型钢）及运至现场由建造商安装而非建造商制造的产品。

NOTE: This applies to all delivered and part-fabricated products received into a

constructor's works for further processing (e.g. welded I-sections for incorporation into plate girders), and to products received on site for erection by the constructor if these are not fabricated by the constructor.

6.2.3 不合格产品

6.2.3 Non-conforming products

若供应商所提供的文件资料不包含产品符合规定的一致性声明，则应在能够证明该产品满足检查和测试计划（ITP）的要求之前，将其视为不合格产品。

If the documentation supplied does not include a declaration from the supplier that the products conform to the specifications, they shall be treated as non-conforming products until it can be demonstrated that they meet the requirements of the ITP.

对于结构用螺栓连接产品，供应商可在产品上标明制造标记、性能等级、体系、产品标准和制造批号（如适用），证明符合相关规格。

For structural bolting products, the supplier may declare conformity to the specifications by means of marking the product with their manufacturing mark, the property class, the system, the product standard, and manufacturing lot number, if applicable.

若产品最初被认定为不合格产品，但后续的测试和复检证明其符合要求，应保留测试和复检结果。

If products are first designated as nonconforming and are subsequently proved to be in conformity by test or retest, the test results shall be recorded.

6.3 制造和安装部件的几何尺寸

6.3 Geometrical dimensions of fabricated and erected components

检查方案应考虑对钢材制品和部件进行必要的要求和检查。

The inspection plan shall consider the requirements and the checks necessary on prepared constituent steel products and fabricated components.

应量测每个部件的尺寸。

Dimensional measurements of components shall always be taken.

除非建造技术规格书中另有规定，应选择标准 ISO 7976-1 和标准 ISO 7976-2 中所列量测方法和仪器，量测精度可依据 ISO 17123 系列标准中相应分册的要求进行评估。

Methods and instruments used shall be selected, as appropriate, from those listed in ISO 7976-1 and ISO 7976-2 unless specified in the execution specification. Accuracy can be assessed in accordance with the relevant part of ISO 17123.

检查方案应规定尺寸量测的位置和频次。

The location and frequency of measurements shall be specified in the inspection plan.

制造的验收标准，见标准 T/CSCS xxx-3。

For acceptance criteria of fabrication, see ISO 17607-3.

安装的验收标准，见标准 T/CSCS xxx-4。

For acceptance criteria of erection, see ISO 17607-4.

偏差值的测量应以规定的起拱或预设变形为基准。

The deviations shall be measured with respect to any specified camber or preset.

若在验收检查中发现不合格项，应采取如下措施：

If acceptance inspection results in the identification of nonconformity, the action on such nonconformity shall be as follows:

a) 在可行的情况下，应采用符合相关标准的方法纠正不合格项，并进行复检；

a) if practicable, the nonconformity shall be corrected using methods that are in accordance with the applicable standard and checked again;

b) 另外，也可根据本标准第 6.1 节的要求评估不合格项是否可接受；

b) alternatively, the nonconformity shall be evaluated for acceptability according to 6.1;

c) 若不合格项无法纠正，可调整构件（部件）所属的钢结构，以弥补不合格项，但要符合处理不合格项的程序；

c) if correction is not practicable, modifications to the steel structure may be made to compensate for the nonconformity provided that this is in accordance with a procedure for handling nonconformities;

d) 否则，不得在工程中使用该部件。

d) otherwise, the component shall not be used.

7 符合本标准要求的证明文件

7 Documents required to claim conformity to this document

7.1 概述

7.1 General

建造商可通过以下方式声明符合本标准的规定：

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

— 采用本标准及 T/CSCS xxx-2、T/CSCS xxx-3、T/CSCS xxx-4、T/CSCS xxx-5、T/CSCS xxx-6、T/CSCS xxx-7 中引用的 T/CSCS 标准（视具体情况而定）。

— adoption of the ISO standards referenced in this document and in ISO 17607-2, ISO 17607-3, ISO 17607-4, ISO 17607-5, ISO 17607-6, as applicable; or

— 采用其他与本标准或 T/CSCS xxx-2、T/CSCS xxx-3、T/CSCS xxx-4、T/CSCS xxx-5、T/CSCS xxx-6、T/CSCS xxx-7 中列出的与 T/CSCS 标准具有同等技术条件的标准（视具体情况而定）。

— adoption of other standards that provide technically equivalent conditions to the ISO documents listed in this document or in ISO 17607-2, ISO 17607-3, ISO 17607-4, ISO 17607-5, ISO 17607-6, as applicable; or

— 采用其他与本标准或 T/CSCS xxx-2、T/CSCS xxx-3、T/CSCS xxx-4、T/CSCS xxx-5、T/CSCS xxx-6、T/CSCS xxx-7 中列出的 T/CSCS 标准具有同等技术条件的标准（视具体情况而定）。

— adoption of other documents that provide technically equivalent conditions to the ISO documents listed in this document or in ISO 17607-2, ISO 17607-3, ISO 17607-4, ISO 17607-5, ISO 17607-6, as applicable.

除建造技术规格书中另有说明，建造商有责任证明所用标准或技术说明与相应的 T/CSCS xxx 标准具有同等效力。

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.

在建造之前，采用其他标准或文件资料应由规范编制者验证并批准，并应纳入建造技术规格书中。

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

7.2 符合性声明

7.2 Declaration of conformity

声明符合这些要求的建造商应列出适用的配套标准或文件。

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

附录 A

Annex A

(规范性附录)

(normative)

与建造等级相关的附加信息清单、选项清单和要求

Additional information, list of options and requirements related to the execution levels

A.1 所需附加信息清单

A.1 List of required additional information

钢材、铸件、高强度钢索和结构用支座，见标准 T/CSCS xxx-2。

For steels, castings, high-strength cables, and structural bearings, see ISO 17607-2.

部件的制造，包括桥梁用伸缩缝，见标准 T/CSCS xxx-3。

For fabrication of components, including expansion joints for bridges, see ISO 17607-3.

安装，见标准 T/CSCS xxx-4。

For erection, see ISO 17607-4.

焊接和焊接材料，见标准 T/CSCS xxx-5。

For welding and for welding consumables, see ISO 17607-5.

螺栓、螺栓连接产品及螺栓连接副，见标准 T/CSCS xxx-6。

For bolting, bolting products and assemblies, see ISO 17607-6.

涂装，包括涂装产品质量品控和涂装能力评价，见标准 T/CSCS xxx-7。

For coating, see EN 1090, ASFP Technical Guidance Document-TGD 11 Code.

表 A.1 列出了本标准正文中根据具体情况需提供的附加信息，以充分界定符合本标准的钢结构工程建造技术要求（即“应予以规定”等用语出现的条款）。

Table A.1 provides the additional information that is required in the text of this document as appropriate to fully define the requirements for execution of the work to be in accordance with this document (i.e. where the wording “shall be specified” is used).

表 A.1 — 所要求的附加信息

Table A.1 — Additional information required

条款	所要求的附加信息
Clause	Additional information required
4 – 建造技术规格书和质量要求	
4 – Execution specification and quality requirements	
4.1.2	制造和安装的建造等级 execution levels for fabrication and erection
4.1.3.1	标识要求 requirements for identification
4.1.3.1	标识文件的保留期限 retention period for Identification documents
4.1.4	制造和安装的几何允许偏差 geometrical tolerances for fabrication and erection
4.2 – 质量要求	
4.2 – Quality requirements	
4.2.2	质量文件 Quality documentation 规定的见证检测或测试的停工待检点或要求 specified hold-points or requirements to witness inspections or tests
5 – 组成产品	
5 – Constituent products	
5.1	使用的材料和组成产品 materials and constituent products to be used
5.1	未列入标准或文件的产品的性能 properties of products not covered by listed standards or documents
6 – 检查、测试和纠正	

6 – Inspection, testing, and correction	
6.1	需进行的检查、测试和纠正 inspection, testing and corrections to be undertaken
7 – 符合本标准要求的证明文件 7 – Documents required to claim conformity to these requirements	
7.1	采用其他标准或经验证和批准的文件 adoption of other standards or documents verified and approved
7.1	将经批准的标准或文件纳入建造技术规格书 incorporation of approved standards or documents into execution specification

A.2 选项清单

A.2 List of options

钢材、铸件、高强度钢索和结构用支座，见标准 **T/CSCS xxx-2**。

For steels, castings, high-strength cables, and structural bearings, see ISO 17607-2.

部件的制造，包括桥梁用伸缩缝，见标准 **T/CSCS xxx-3**。

For fabrication of components, including expansion joints for bridges, see ISO 17607-3.

安装，见标准 **T/CSCS xxx-4**。

For erection, see ISO 17607-4.

焊接和焊接材料，见标准 **T/CSCS xxx-5**。

For welding and for welding consumables, see ISO 17607-5.

螺栓、螺栓连接产品及螺栓连接副，见标准 **T/CSCS xxx-6**。

For bolting, bolting components and assemblies, see ISO 17607-6.

涂装，防腐蚀涂装规格书样本、涂装产品质量品控技术标准和钢结构防护涂装专项能力评价技术体系，见标准 **T/CSCS xxx-7**。

表 A.2 列出了可在建造技术规格书中规定的选项，用于在本标准给出选项时明确工程建造要求。

Table A.2 lists the items which may be specified in the execution specification to define requirements for the execution of the work where options are given in this document.

表 A.2 — 可规定的选项清单

Table A.2 — List of option(s) to be specified

条款	可规定的选项
Clause	Option(s) to be specified
4 – 建造技术规格书和质量要求	
4 – Execution specification and quality requirements	
4.1.3.1	是否禁止对承受循环荷载作用的构件使用模具（硬）冲压 If die (hard) stamping is prohibited for cyclically loaded members
4.1.3.2	未按表 1 中规定的可追溯性级别，需进行说明 If not as specified in Table 1, the level of traceability
4.1.3.2	如有要求，应标识并规定对工艺、程序、操作人员、焊工、设备、组成产品、检查记录等要素的可追溯性要求 If required. identification and specification of additional traceability requirements for processes, procedures, operators, welders, machines, constituent products, inspection records, or other factors
4.1.4	规定建筑裸露钢结构（AESS）的位置和要求 If designated as architecturally exposed, the location and requirements for AESS
4.2 – 质量要求	
4.2 – Quality requirements	
4.2.3	是否需要制定钢结构工程建造质量计划 If a quality plan for execution of the structural steelwork is required
6 – 检查、测试和纠正	
6 – Inspection, testing, and correction	

6.2.1	是否需要对产品进行特定测试 If specific testing of products is required
6.3	是否用替代标准接受不合格项 If alternative criteria are applicable for acceptance of nonconformities

A.3 建造等级相关要求

A.3 Requirements related to the execution levels

本附录条款列出了本标准引用的建造等级要求。

This clause lists requirements specific to each of the execution levels referenced in this document.

钢材、铸件、高强度钢索和结构用支座，见标准 **T/CSCS xxx-2**。

For steels, castings, high-strength cables, and structural bearings, see ISO 17607-2.

部件的制造，包括桥梁用伸缩缝，见标准 **T/CSCS xxx-3**。

For fabrication of components, including expansion joints for bridges, see ISO 17607-3.

安装，见标准 **T/CSCS xxx-4**。

For erection, see ISO 17607-4.

焊接和焊接材料，见标准 **T/CSCS xxx-5**。

For welding and for welding consumables, see ISO 17607-5.

螺栓、螺栓连接产品及螺栓连接副，见标准 **T/CSCS xxx-6**。

For bolting, bolting components and assemblies, see ISO 17607-6.

涂装，钢构件表面最低除锈等级，见标准 **T/CSCS xxx-7**。

For coating, Standard preparation grades for primary surface preparation, see EN 1090.

表 A.3 中以粗体标明的条款与建造控制通用体系相关，此类条款适用于整体钢结构工程（或某一阶段的钢结构工程）采用统一的建造等级。其余条款通常需要根据单个构件或连接细部逐一确定适用的执行等级。

Items identified in bold letters in Table A.3 relate to the general system of control of execution and are amenable to a common choice of execution level across the whole of the structural steelwork (or a phase of the structural steelwork). The other items generally demand the selection of the appropriate execution level on a component-by-component or a connection detail-by-detail basis.

表 A.3 — 针对每个建造等级的要求

Table A.3 — Requirements to each execution level

条款 Clauses	EXL1	EXL2	EXL3	EXL4
4 – 建造技术规格书和质量要求 4 – Execution specification and quality requirements				
4.1 – 质量要求 4.1 – Quality requirements 4.1.3.2 可追溯性 4.1.3.2 Traceability	T1	T2	T3	T4
4.2.2 质量文件 4.2.2 Quality documentation	—	是 Yes	是 Yes	是 Yes
注 Key 符号“—”表示文中无具体要求。 a dash “—” means no specific requirement in the text				

附录 B

Annex B

(资料性附录)

(informative)

建造技术规格书编制指南

Guidance for development of the execution specification

B.1 概述

B.1 General

建造技术规格书的定义见第 3.1.10 条，其要求见第 4.1 节。

The definition of the execution specification is given in 3.1.10, and the requirements are given in 4.1.

完整建造技术规格书的编制是一个渐进式过程，可随钢结构工程的推进而持续完善。需特别说明的是，完整的建造技术规格书将涵盖购买方/业主提出的变更和技术修改要求。

The development of the complete execution specification is a progressive one that may continue as the structural steelwork progresses. In particular, the complete execution specification will recognise changes and modifications specified on behalf of the purchaser/client.

B.2 编制过程

B.2 Development process

建造技术规格书的编制与设计工作同步推进。钢结构工程涵盖从概念设计、框架设计到深化设计的全过程。在多数情况下，上述设计阶段由多方参与完成。

The execution specification develops in parallel with the development of the design. In terms of steel construction, this is typically from design concept, through frame design to detail design. In many cases these phases of the design are undertaken by more than one party.

在某些情况下，建造商承担部分设计任务，如细节设计、加工详图绘制和工艺清单编制。此类文件提供了制造钢结构部件所需的必要信息和技术要求。建造商需

根据项目特点制定专项工艺流程，该流程作为钢结构工程建造方案的组成部分，应纳入完整的建造技术规格书，如制造商制定的轧制型材热弯工艺流程。

In some cases, the constructor undertakes some of the design tasks, such as detailing and production of the shop fabrication drawings and schedules. These latter documents give all necessary information and technical requirements for fabricating of a structural component. Other project-specific procedures can need developed as part of the constructor's methodology for undertaking the structural steelwork, and which would require inclusion in the complete execution specification. An example would be the fabricator's procedures for hot bending of rolled sections.

建造技术规格书应包括作为安装程序组成部分的安装图纸或等效技术文件。

The execution specification also includes erection drawings or equivalent instructions that form part of the erection procedure.

以建造技术规格书的编制过程为例，安装程序的编制是一个渐进式过程，具体如下：

As an example of how the execution specification is developed, it can be seen that the development of the erection procedure is a progressive process, as follows:

- a) 概念设计确定后，即可明确建造现场条件，可确定标准 **T/CSCS xxx-4** 中规定需纳入建造技术规格书的技术条款。通常情况下，这些条款以引用的形式纳入建造技术规格书，该说明涵盖所有现场作业的同类技术要求；
- a) once the design concept is defined, the site conditions can be established that permit those items in ISO 17607-4 to be specified for inclusion in the execution specification. Typically, those items are included by reference to a document often termed the execution specification that deals with similar issues for all site trades;
- b) 框架设计完成后，应将标准 **T/CSCS xxx-4** 中提及的基于设计的安装方法纳入建造技术规格书。特别地，需明确安装顺序及部分安装结构的稳定性控制要求，包括临时支撑体系或支柱（支架）的技术要求；

- b) once the frame design is complete, the design basis method of erection referred to in ISO 17607-4 can be included in the execution specification. In particular, this permits a sequence of erection and the stability concept for the part-erected structure to be defined including any requirements for temporary bracing or propping (shoring);
- c) 完成深化设计，明确了结构的现场安装方式，如具体选用焊接或螺栓连接，以及螺栓连接是否使用预紧装配组件。这些决策是承包商最终确定安装程序并从工程设计影响角度对其进行审查的必要前提。
- c) the completion of the detail design also defines how the structure is to be erected on site, for instance by the exact choice of welded or bolted connections and whether the latter are to use pretensioned assemblies. These decisions are needed in order for the constructor's erection procedure to be finalised, and for this to be reviewed in terms of its engineering design implications.

根据标准 **T/CSCS xxx-4** 的要求，安装流程需依据设计准则进行核查，特别需要验证部分已安装结构抵抗建造荷载及其他荷载的能力，包括侧移或倾覆力（特别是建造时由风荷载所引起的荷载效应）。为确保足够的抗侧移和抗倾覆能力，建造商可能需要增设临时结构，并通过焊接附件或附加螺栓孔将其与永久结构连接，此类做法需纳入建造技术规格书。

As stated in ISO 17607-4, the erection procedure needs to be checked in accordance with design rules, notably with respect to the resistance of the partly erected structure to erection loads and other loading, including identification of sway or overturning forces, particularly those due to the predicted wind conditions on site during erection. The exact methods of maintaining adequate sway and overturning resistance can require the constructor to provide temporary works that need to be connected to the permanent works (by welded attachments or additional bolt holes) and hence require incorporation into the execution specification.

附录 C

Annex C

(资料性附录)

(informative)

建造等级确定指南

Guidance for the determination of execution levels

C.1 概述

C.1 General

建造等级 (EXL) (3.1.12) 是针对整体钢结构工程、单个部件或细部规定的建造要求。

Execution level (EXL) is defined (see 3.1.12) as a classified set of requirements specified for the execution of the structural steelwork, of an individual component or of a detail of a component.

本标准按表 A.3 列出的要求指定建造等级。表 A.3 列出了建造控制通用体系的相关要求，此类要求适用于在整体钢结构工程（或钢结构工程的某一阶段）中统一选择建造等级。其他要求通常根据每个部件或每个连接细部的具体情况选择适当的建造等级。

This document requires that the execution level is specified for requirements as listed in A.3. A.3 identifies some of these requirements that relate to the general system of control of execution and are amenable to a common choice of execution level across the whole of the structural steelwork (or a phase of the structural steelwork). The other items generally demand the selection of the appropriate execution level on a component-by-component or a connection detail-by-detail basis.

因此，规范编制人员需要为整体钢结构工程指定适当的建造等级，见附录 C.2.1。

规范编制人员还需考虑是否存在与此通用规范不同的特定要求，见附录 C.2.2。

Hence the specifier needs to specify a suitable execution level for the structural steelwork as a whole, see C.2.1. The specifier then separately needs to consider whether there are any particular requirements that differ from this general specification, see C.2.2.

表 C.1 可用于指导选择合适的建造等级，尤其是针对整体钢结构工程。

Table C.1 can be used for guidance on selection of the appropriate execution level, especially for structural steelwork as a whole.

C.2 选取准则

C.2 Selection criteria

C.2.1 整体钢结构工程的选取准则

C.2.1 Selection criteria for the structural steelwork as a whole

建议整体钢结构工程的建造等级应基于所需的可靠性要求、结构类型及结构设计荷载类型选择。可靠性的考量范畴可包括安全性、适用性、耐久性、全寿命周期、失效后果、结构响应及其他相关因素。

With respect to the execution of the structural steelwork as a whole, it is recommended that the selection of the execution level should be based on the required reliability, the type of structure, and the type of loading for which the structure is designed. Reliability can include considerations of safety, serviceability, durability, life-cycle considerations, consequences, structural response, and other factors as appropriate for the structure.

基于结构可靠性要求及结构类型，建议指定 EXL2 等级作为多数建筑结构的参考建造等级，指定 EXL3 等级作为多数桥梁结构的参考建造等级。

In terms of the required reliability and the type of structure, it is recommended that EXL2 be used as a reference level that should provide a level of reliability that is appropriate to most building structures, and EXL3 be used as a reference level that should provide a level of reliability that is appropriate to most bridge structures.

因此，建议仅将 EXL1 等级指定用于小型工程。

Consequently, it is recommended that EXL1 is only specified for the execution of minor works.

在荷载类型方面，承受静态和准静态荷载（如重力荷载以及常见的风荷载、雪荷载等环境荷载）的结构建议指定 EXL2 等级。该等级也同样适用于地震活动水平较低或极低地区。

In terms of the type of loading it is recommended that the choice of EXL2 should be

appropriate for static and quasi-static loading, for example gravity and commonly-occurring environmental loading from wind or snow. It can also be appropriate for structures in areas of low or very low levels of seismicity.

在中、高地震烈度区，建议指定 EXL3 等级。

In areas of medium or high seismicity, it is recommended that EXL3 is specified.

在结构类型方面，建议对人员密集、高耸或大型结构指定 EXL3 等级。

In terms of the type of structure, it is recommended that EXL3 is specified for those structures with high public occupancy and for tall- or large-scale structures.

桥梁结构的冗余度定义为结构在一个/多个构件或连接失效后，通过替代传力路径降低失效后果的能力。

For bridge structures, redundancy can be considered as the ability of a structure to find alternative load paths following failure of one or more members or connections, thus limiting the consequences of such failures.

表 C.1 — 各类建筑类型的推荐建造等级

Table C.1 — Recommended execution levels for building types

建造等级 Execution level	建筑类型 Building type
EXL3	高层建筑（即 15 层以上） High rise buildings (i.e. over 15 storeys)
	大型看台和体育场（即容纳人数 5000 人以上） Large grandstands and stadia (i.e. over 5000 persons)
	重型工业板材结构（如厂房结构、料仓、料斗、筒仓等） Heavy industrial plate work (e.g. plant structures, bunkers, hoppers, silos).
	含有碳氢化合物的设备或管道的支承结构，或失效后将损坏碳氢化合物管道或容器的结构 Structures supporting equipment/piping containing hydrocarbons or whose failure would damage hydrocarbon

	piping/vessels
EXL2	不超过 15 层的中、低层建筑 Medium and low-rise buildings up to 15 storeys
	棚顶结构，包括大跨桁架和管状钢结构 Sheds including those with large span trusses and tubular steelwork
	机械设备框架、工厂支承结构和输送机支架 Frames for machinery, supports for plant and conveyors
	经专业加工制造的构件（如弯曲成型构件、蜂窝梁、板梁等） Specialist fabrication services (e.g. bending, cellular/castellated beams, plate girders)
EXL1	用于储存或养殖的小型建筑 Minor buildings for storage or farm animals
	人员流动较少的工业用小型建筑 Minor buildings for industry, where personnel visit only occasionally
	建筑钢构件（如楼梯、阳台、雨篷等） Architectural steelwork (e.g. staircases, balconies, canopies)
	轻型构件，包括消防逃生梯、爬梯及脚手架 Lighter fabrications including fire escapes, ladders and catwalks

表 C.2 — 各类桥梁类型的推荐建造等级

Table C.2 — Recommended execution levels for bridge types

建造等级 Execution level	桥梁类型 Bridge type
EXL3	缆索支承桥梁（如斜拉桥或悬索桥）及其他大型结构（如跨度 100 米的桥梁） Cable-supported bridges (e.g. cable-stayed or suspension) and other major structures (e.g. 100 metre span)
	具有复杂加劲板件的桥梁（如桥面板、箱形梁或拱形箱）

	Bridges with stiffened complex plate work (e.g. in decks, box girders or arch boxes)
	可移动桥梁 Moving bridges
	主要由桁架或钢板梁（或两者组合）建造的桥梁 Bridges made principally from truss work or plate girders, or both
	主要由非冗余设计的轧制型钢建造的桥梁 Bridges made principally from non-redundant rolled shapes
EXL2	主要由冗余设计的轧制型钢建造的桥梁 Bridges made principally from rolled shapes, using redundant members
	人行桥和主体结构标志架 Footbridges and sign gantries
	翻新的桥梁 Bridge refurbishment
EXL1	无 None

C.2.2 单个部件或细部的选取准则

C.2.2 Selection criteria for individual components or details

基于附录 A.3 中列出项目的相关性评估，针对特定部件或细部可指定不同于整体结构的建造等级。若采用该做法，则应在建造技术规格书中对这些部件或细部予以明确标识。

Based on a review of the relevance of the items listed in A.3, it can be appropriate to specify an execution level for particular components or details that is different from that applicable to the structure in general, and if so these components or details should be clearly identified in the execution specification.

通常只有部分部件承受显著的疲劳荷载作用，建议对此类部件指定 EXL3 等级。若采用 EXL2 等级满足要求且失效后果可控，可采用 EXL2 等级。

In terms of fatigue loading, it is common that only some components of the whole works are subjected to significant fatigue loading, and it is recommended that EXL3 is

specified for those components, unless the consequence of failure is low when EXL2 is sufficient.

针对抗疲劳需求高的特定焊缝，若 EXL3 等级无法满足要求可指定 EXL4 等级，且不应影响附录 C.2.1 规定的整体钢结构工程建造等级。若指定 EXL4 等级，规范编制者需明确特定细部（如某一焊缝）的检查/测试要求及验收标准。

It is possible that the fatigue demand on some particular welds is very high and that EXL3 is insufficient. In such a case and similar cases there can be the need to specify EXL4. If EXL4 is specified, then it should make no difference to the execution level specified for the structural steelwork as a whole selected in accordance with C.2.1. If EXL4 is specified, (e.g. an individual weld), the specifier needs to specify the relevant detail-specific inspection/testing required and the relevant acceptance criteria.

仅用于屋顶和墙板的次要支承部件，若其不属于主要承载结构框架，则可考虑将其建造等级指定为 EXL1 等级。

Some components may only be used to provide secondary supports to roof and wall panels. Provided that these components do not form part of the main load-resisting structural frame, they may be considered for specification as EXL1.

建议仅对制造工艺相对简单的部件指定 EXL1 等级。建议将以下类型部件的最低建造等级指定为 EXL2 等级：

However, it is recommended that EXL1 is specified only for components that are simpler to fabricate. Hence, it is recommended that the following types of components be specified as EXL2 minimum:

- a) 采用屈服强度不低于 355 MPa 的钢材制品制成的焊接部件；
a) welded components fabricated from steel products of specified minimum yield strength of 355 MPa and greater;
- b) 在建造现场通过焊接组装且对结构完整性起关键作用的焊接部件；
b) welded components essential for structural integrity that are assembled by welding on the construction site;

- c) 需要端部坡口切割的圆形闭口截面格构梁焊接部件；
- c) welded components of circular hollow section lattice girders requiring end profile cuts;
- d) 在制造过程中进行热成型或热处理的部件。
- d) components with hot forming during fabrication or receiving thermic treatment during fabrication.

C.3 可追溯性的影响

C.3 Implications for traceability

C.3.1 概述

可追溯性指在建筑全寿命周期内，识别结构中特定钢材制品及其对应检查文件的能力，这些检查文件通常为材料测试报告或工厂测试报告（MTR）。若钢材制品由供应商加工，通常使用供应商测试报告作为可追溯性中的检验文件。因此，可追溯性要求的实施成本远高于标识要求。规范编制者应充分理解两者间的差异、局限性和相关成本。

Traceability means the ability to identify a specific piece of steel in a structure throughout the life of the structure, and its specific inspection document, which is commonly referred to as a material test report or a mill test report (MTR). If the steel product is transformed by the supplier, an inspection document, commonly referred to as a supplier's test report, is used in traceability. As such, traceability requirements are significantly more expensive than the identification requirements. The specifier should clearly understand the differences, limitations and relative costs involved.

四个建造等级的可追溯性详细说明如下：

In terms of traceability, further commentary for each of the four execution levels is as follows:

C.3.2 建造等级 1（EXL1）（可追溯级别 T1）

C.3.2 Execution level 1 (EXL1) (Traceability level T1)

EXL1 等级不要求可追溯性，但要求对进场材料进行采购订单监管，监管范围涵盖钢材制品、耗材、螺栓连接产品及连接副、分包加工部件，以及檩条等直接现场交付的材料。

EXL1 does not require traceability, however it does require the control of the incoming material against the purchase order. This includes steel products, consumables, bolting products and assemblies, subcontracted fabrication, and items delivered directly to site such as purlins.

C.3.3 建造等级 2 (EXL2) (追溯级别 T2)

EXL2 等级要求对进场材料进行采购订单监管，并满足 T2 级别可追溯性标准。T2 级别仅适用于主要构件的钢材制品。主要构件指通过必要的设计荷载路径传递重力荷载和横向荷载的钢构件或部件，此类构件需满足更严格的制造和测试要求，等同于“主构件（部件）”。规范编制者应在建造技术规格书中明确标识主构件，常见类型包括：

EXL2 requires control of incoming material against the purchase order and a certain level of traceability defined as T2. T2 traceability is required only for steel products of primary components or sometimes referred to as main or major components or members. A primary member is defined as a steel member or component that transmits gravity and lateral loads through a necessary as-designed load path. These members are subjected to more stringent fabrication and testing requirements; considered synonymous with the term ‘main member’. Primary members shall be explicitly identified in the execution specification by the specifier. Several examples of primary members are:

- 次梁、主梁、帽梁、纵梁、楼盖梁；
- beams, girders, bent caps, stringers, floor beams;

- 刚性框架；
- rigid frames;

- 柱、拱肋和塔柱构件；
- columns, arch ribs, and tower members;

- 水平或垂直支撑、钢板剪力墙、组合剪力墙；
- bracing (horizontal or vertical), steel plate shear wall, composite shear wall;

- 平面弯梁桥中的端部横隔板/横向联结系和跨间横隔板/横向联结系；
- end cross-frames/diaphragms and cross-frames/diaphragms in horizontally curved girder bridges;
- 吊杆（索）/拉杆（索）、悬索及其锚碇；
- suspenders/tension ties and anchorage, suspension cables and anchorages;
- 桁架、梁架。
- trusses, joists.

C.3.4 建造等级 3（EXL3）（追溯级别 T3）

C.3.4 Execution level 3 (EXL3) (Traceability level T3)

EXL3 等级需根据采购订单对进场材料进行控制，其可追溯性要求高于 T2 级别。

T3 级别可追溯性要求适用于主部件及其间的子部件连接，且应追溯钢材产品的检查文件。建造技术规格书中应明确规定需满足 T3 级别可追溯性要求的主部件之间或其他子部件之间的连接。典型示例如下：

EXL3 requires control of the incoming material against the purchase order and a higher degree of traceability than T2. T3 traceability is required for main components and for steel sub-component connections between main components and shall be traceable to the inspection documents for the steel products. Connections between main components or other steel sub-component connections requiring T3 traceability shall be specified in the execution specification. Several examples are:

- 主要构件间的连接和节点；
- connections and joints between primary members;
- 在抗震结构体系（SLRS）中起保险丝作用的连接；
- connection used as fuse in a Seismic Load Resisting System (SLRS);
- 主要构件连接用的拼接板；
- splice plates joining primary members;

- 承受厚度方向拉力的加劲肋；
- stiffeners under through-thickness tension;

- 纵向腹板和翼缘加劲肋。
- longitudinal web and flange stiffeners.

C.3.5 建造等级 4 (EXL4) (追溯级别 T4)

C.3.5 Execution level 4 (EXL4) (Traceability level T4)

EXL4 等级要求根据采购订单对进场材料进行控制，且其可追溯性要求高于 T3 级别。T4 级别可追溯性覆盖所有组成产品，包括螺栓连接产品和焊接耗材。该等级的可追溯性通常仅应用于核电设施建造等非常关键的结构或用途。

EXL4 requires control of the incoming material against the purchase order and a higher degree of traceability than T3. T4 traceability is required for all constituent products, including bolting products and welding consumables. This level of traceability is typically reserved for very critical structures or applications only, such as the construction of a nuclear power facility.

附录 D

Annex D

(资料性附录)

(informative)

质量计划检查清单

Checklist for the content of a quality plan

D.1 概述

D.1 General

根据本标准第 4.2.3 条规定，本附录列出钢结构建造项目专项质量计划的建议检查清单。

In accordance with 4.2.3, this annex gives a list of recommended items to be included in a project-specific quality plan for the execution of a steel structure.

D.2 内容

D.2 Content

D.2.1 管理

D.2.1 Management

建议的管理事项包括：

Recommended management items include:

- 规定项目中的具体钢结构及其所在位置与工程项目的关系；
- definition of the particular steel structure and its location with relation to the project;
- 项目管理组织计划，应注明关键人员的姓名、职能和职责、管理级别及联系方式；
- project management organisation plan stating names of key personnel, their function and responsibilities during the project, the chain of command, and lines of communication;

- 项目实施期间与其他各方进行规划和协调，并监督绩效和项目进程；
- arrangements for planning and coordination with other parties throughout the project, and for monitoring of performance and progress;
- 确认分包商和其他非企业内部各方的职能；
- identification of functions delegated to subcontractors and others not in-house;
- 确认和审核拟在该项目中任职人员（如监督、生产和检查人员等）的资质；
- identification and proof of competence of qualified personnel to be employed on the project, such as supervision, production, and inspection personnel;
- 管控项目实施期间发生的各类变更和修改。
- arrangements for controlling variations and changes that take place during the project.

D.2.2 特殊评审

D.2.2 Specification review

建议的特殊评审事项包括：

Recommended specification review items include:

- 对特定项目要求进行评审以确定其影响，包括选择超出公司质量管理体系保障范畴、需采取额外或特殊措施的建造等级；
- requirement to review the specified project requirements to identify the implications, including the choices of execution levels that would require additional or unusual measures beyond those ensured by the company's quality management system;
- 评审特定项目要求所需的附加质量管理程序。
- additional quality management procedures necessitated by the review of the specified project requirements.

D.2.3 归档

D.2.3 Documentation

D.2.3.1 概述

D.2.3.1 General

管理收发建造文件的程序，建议包含以下项目：

Recommended items for procedures to manage all received and issued execution documentation include:

- a) 确认当前修订版本；
- a) identification of the current revision status;

- b) 防止内部人员或分包商使用无效或过时的文件。
- b) prevention of the use of invalid or obsolete documents in-house or by subcontractors.

D.2.3.2 建造前归档

D.2.3.2 Documentation prior to execution

提供建造前归档的程序，建议包含以下项目：

Recommended items for procedures providing documentation prior to execution include:

- a) 组成产品（包括耗材）的合格证书；
- a) reports for constituent products including consumables;

- b) 焊接工艺规程和焊接工艺评定报告；
- b) weld procedure specifications and qualification records;

- c) 建造方案说明（包括安装方案）；
- c) procedures, including those for erection;

- d) 螺栓连接副的预紧力施加方案说明；
- d) bolting procedures for pretensioning bolting assemblies;
- e) 建造安装方案要求的临时工程设计计算书；
- e) design calculations for temporary works necessitated by the erection procedures;

- f) 建造前对第二方或第三方单位的文件批准或验收的范围界定和时间安排。
- f) arrangements for scope and timing of second- or third-party approval or acceptance of documentation prior to execution.

D.2.3.3 建造记录

D.2.3.3 Execution records

建造过程记录建议包含以下项目：

Recommended items for procedures for providing execution records include:

- a) 从已完成部件追溯至组成产品；
- a) constituent products traced to completed components;

- b) 检查、测试报告和处理不合格项所采取的措施，涉及以下内容：
- b) inspection and test reports and action taken to deal with nonconformities, concerning:
 - 1) 焊接前的坡口面准备；
 - 1) preparation of joint faces prior to welding;

 - 2) 正在焊接和已完成的焊件；
 - 2) welding and completed weldments;

 - 3) 部件的几何允许偏差；
 - 3) geometrical tolerances of fabricated components;

 - 4) 建造设备校准，包括用于控制螺栓连接副预紧力的设备；
 - 4) calibration of equipment including those used for control of pretensioning of bolting assemblies;

- c) 安装前确保建造现场满足安装条件的检验结果；
- c) pre-erection survey results leading to acceptance that the site is suitable for erection to commence;

- d) 提供进场部件交付计划，并标明其在建成结构中的安装位置；
- d) delivery schedules for components delivered to site identified to location with the completed structure;
- e) 结构尺寸测量与处理不合格项所采取的必要措施；
- e) dimensional surveys of the structure and action taken to deal with nonconformities;
- f) 安装完成和移交报告。
- f) reports for completion of erection and handover.

D.2.3.4 文件记录

D.2.3.4 Documentary records

建议安排文件记录的检查和保存，保存期至少为五年，或根据项目需要延长期限。

It is recommended to include arrangements for making documentary records available for inspection, and for retaining them for a minimum period of five years, or longer if required by the project.

D.2.4 检查和测试程序

D.2.4 Inspection and testing procedures

检查和测试程序建议包含以下项目：

Recommended items for inspection and testing procedures include:

- a) 确认建造技术规格书中要求的强制性检查和测试要求，以及建造商的质量体系中提供的项目建造所需的检查和测试要求，包括：
- a) Identification of the mandatory tests and inspections required by the execution specification and those provided in the constructor's quality system that are necessary for the execution of the project, including:
 - 1) 检查范围；
 - 1) the scope of inspection;

- 2) 验收标准;
- 2) acceptance criteria;

- 3) 处理和纠正不合格项所采取的措施;
- 3) actions for dealing with nonconformities and corrections;

- 4) 接受/拒收管理程序。
- 4) release/rejection procedures.

- b) 项目规定的检查和测试要求, 包括见证特殊测试或检测要求, 或指定第三方单位进行检验的条目。
- b) Project-specific requirements for inspection and testing, including requirements that particular tests or inspections are to be witnessed, or points where a nominated third party is to carry out an inspection.

- c) 确定第二方或第三方单位见证、审批或验收测试/检验结果相关的见证点。
- c) Identification of witness points associated with second- or third-party witnessing, approval, or acceptance of test or inspection results.

附录 E

Annex E

(资料性附录)

(informative)

建筑裸露钢结构 (AESS)

Architecturally exposed structural steel (AESS)

表 E.1 列出了依据建造技术规格书第 4.1.5 条针对建筑裸露钢结构 (AESS) 建议参考的国家标准和文件。

Table E.1 gives a list of recommended national standards and documents for reference when AESS is specified in the execution specification in accordance with 4.1.5.

表 E.1 建筑裸露钢结构 (AESS) 建议参考的国家标准和参考文献

Table E.1 Recommended national standards and references for architecturally exposed structural steel (AESS)

AS/NZS	AS/NZS 5131, Structural Steel Work—Fabrication and Erection AS/NZS 5131, 钢结构——制造与安装
CISC	CISC Code of Standard Practice for Structural Steel CISC 钢结构标准建造规范
	CISC Guide for Specifying Architecturally Exposed Structural Steel, 2nd Edition CISC, 建筑裸露钢结构规范, 第 2 版
AISC	AISC 303, Code of Standard Practice for Steel Buildings and Bridges AISC 303, 钢结构建筑与桥梁标准建造规范
	AISC, Architecturally Exposed Structural Steel, Supplement to Modern Steel Construction, May 2003 AISC, 建筑裸露钢结构, 现代钢结构杂志补编, 2003 年 5 月

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- [5] ISO 10005, Quality management — Guidelines for quality plans
- [6] ISO 10474:2013, Steel and steel products — Inspection documents
- [7] ISO 16228, Fasteners — Types of inspection documents
- [8] ISO 17123 (all parts), Optics and optical instruments — Field procedures for testing geodetic and surveying instruments
- [9] ISO 17607-2, Steel structures — Execution of structural steelwork — Part 2: Steels
- [10] ISO 17607-3, Steel structures — Execution of structural steelwork — Part 3: Fabrication
- [11] ISO 17607-4, Steel structures — Execution of structural steelwork — Part 4: Erection
- [12] ISO 17607-5, Steel structures — Execution of structural steelwork — Part 5: Welding
- [13] ISO 17607-6, Steel structures — Execution of structural steelwork — Part 6: Bolting
- [14] ISO 17635, Non-destructive testing of welds — General rules for metallic materials

钢结构的区域标准及相关文件——欧洲

Regional standards and documents for steel structures – Europe

- [15] EN 1090-1, Execution of steel structures and aluminium structures — Part 1:
Requirements for conformity assessment of structural components
- [16] EN 1090-2:2018, Execution of steel structures and aluminium structures — Part
2: Technical requirements for steel structures
- [17] EN 1990, Eurocode — Basis of structural design
- [18] EN 1993 (all parts), Eurocode 3: Design of steel structures
- [19] EN 1994 (all parts), Eurocode 4: Design of composite steel and concrete
structures
- [20] EN 1998-1, Eurocode 8: Design of structures for earthquake resistance — Part 1:
General rules, seismic actions and rules for buildings
- [21] EN 13001-1, Crane —General design — Part 1: General principles and
requirements

钢结构国家标准及相关文件——澳大利亚/新西兰

National standards and documents for steel structures – Australia/New Zealand

- [22] AS 4100, Steel structures
- [23] AS/NZS 5100, Part 6: Steel and composite construction
- [24] AS/NZS 5131, Structural Steel Work — Fabrication and Erection
- [25] NZS 3404 Parts 1 and 2, Steel Structures Standard

钢结构国家标准及相关文件——加拿大

National standards and documents for steel structures – Canada

- [26] CISC, Code of Standard Practice for Structural Steel
- [27] CISC, Guide for Specifying Architecturally Exposed Structural Steel
- [28] CSA S6, Canadian Highway Bridge Design Code
- [29] CSA S16, Design of steel structures
- [30] CMAA, Specification No. 70, Top Running Bridge and Gantry Type Multiple
Girder Electric Overhead Traveling Cranes

钢结构国家标准及相关文件——中国

National standards and documents for steel structures – China

- [31] GB 50017, Code for design of steel structures
- [32] GB 50205, Code for Acceptance of Construction Quality of Steel Structures
- [33] GB 50755, Code for Construction of Steel Structures
- [34] GB 51022, Technical Code for Steel structure of Light-weight Building with Gabled Frames
- [35] GB 55006, General specification for steel structures

钢结构国家标准及相关文件——英国

National standards and documents for steel structures – United Kingdom

- [36] BCSA, National Structural Steelwork Specification for Building Construction

钢结构国家标准及相关文件——日本

National standards and documents for steel structures – Japan

- [37] JARA, Japanese Design Specifications for Highway Bridges, Part I Common
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- [39] JASS 6, Structural Steelwork Specification for Building Construction
- [40] JSCE, Standard Specifications for Steel and Composite Structures
- [41] Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Manual for Structural Regulations for Building Design, Building Center of Japan, Tokyo, Japan. (in Japanese)

钢结构国家标准及相关文件——俄罗斯联邦

National standards and documents for steel construction – Russian Federation

- [42] GOST 17032, Horizontal steel tanks for petroleum products. Specifications
- [43] GOST 23118, Building steel structures. General specifications

- [44] GOST 24839, Structural steelwork. Layout of holes in rolled shapes. Dimensions
- [45] GOST 26047, Building steel structures. Symbols (marks)
- [46] GOST 31385, Vertical cylindrical steel tanks for oil and oil-products. General specifications
- [47] SP 14.13330, Seismic building design code
- [48] SP 16.13330, Steel structures
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- [50] SP 35.13330, Bridges and culverts
- [51] SP 43.13330, Constructions of the industrial enterprises
- [52] SP 46.13330, Bridges and pipes
- [53] SP 53-101, Production and quality control of steel building structures
- [54] SP 68.13330, Acceptance into operation completed construction objects. Basic provisions
- [55] SP 70.13330, Load-bearing and separating constructions
- [56] [SP 159.1325800, Steel and concrete composite bridge decks on highways. Rules of analysis
- [57] SP 259.1325800, Bridges in dense urban areas. Design rules
- [58] SP 260.1325800 Cold-formed thin-walled steel profile and galvanized corrugated plate constructions. Design rules
- [59] SP 266.1325800, Composite steel and concrete structures. Design rules
- [60] SP 294.1325800, The construction of steel. Design rules
- [61] SP 365.1325800, Vertical cylindrical steel tanks for storage of oil products. Rules of work's production and acceptance under installation
- [62] SP 375.1325800, Industrial chimneys. Design rules
- [63] SP 470.1325800, Steel structures. Rules of production work

钢结构国家标准及相关文件——美国

National standards and documents for steel construction - United States of America

- [64] AASHTO, LRFD Bridge Construction Specifications
- [65] AISC 303, Code of Standard Practice for Steel Buildings and Bridges
- [66] AISC 341, Seismic Provisions for Structural Steel Buildings
- [67] AISC 360, Specification for Structural Steel Buildings
- [68] AISC 358, Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications
- [69] Design Guide AISC, 7, Industrial Building Design
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