

SLOVENSKI STANDARD oSIST prEN 10025-5:2014

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Vroče valjani izdelki iz konstrukcijskih jekel - 5. del: Tehnični dobavni pogoji za konstrukcijska jekla z izboljšano odpornostjo proti atmosferski koroziji

Hot rolled products of structural steels - Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance

Warmgewalzte Erzeugnisse aus Baustählen - Teil 5: Technische Lieferbedingungen für wetterfeste Baustähle

Produits laminés à chaud en aciers de construction - Partie 5 : Conditions techniques de livraison pour les aciers de construction à résistance améliorée à la corrosion atmosphérique

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oSIST prEN 10025-5:2014

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Hot rolled products of structural steels - Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance

Produits laminés à chaud en aciers de construction - Partie 5 : Conditions techniques de livraison pour les aciers de construction à résistance améliorée à la corrosion atmosphérique Warmgewalzte Erzeugnisse aus Baustählen - Teil 5: Technische Lieferbedingungen für wetterfeste Baustähle

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EUROPEAN COMMITTEE FOR STANDARDIZATION COMITÉ EUROPÉEN DE NORMALISATION EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (prEN 10025-5:2014) has been prepared by Technical Committee ECISS/TC 103 "Structural steels other then reinforcements", the secretariat of which is held by DIN.

This document is currently submitted to the COCOR Vote.

This document will supersede EN 10025-5:2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Construction Products Regulation (EU) No 305/2011. For relationship with the EU Construction Products Regulation (EU) No. 305/2011, see informative Annex ZA of prEN 10025-1:2014.

The titles of the other parts of this document are:

Part 1: General;

Part 2: Technical delivery conditions for non-alloy structural steels;

Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels;

Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels;

Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition.

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1 Scope

Part 5 of this document, in addition to part 1, specifies technical delivery conditions for flat and long products of hot rolled steels with improved atmospheric corrosion resistance in the grades and qualities given in Tables 2 and 3 (chemical composition) and Tables 4 and 5 (mechanical properties) in the usual delivery conditions as given in 6.3.

The thicknesses in which products of the steel grades and qualities specified in this document may be supplied are given in Table 1.

In addition to prEN 10025-1:2014 the steels specified in this document are especially intended for use in welded, bolted and riveted components which shall have enhanced resistance to atmospheric corrosion, for service at ambient temperatures (subject to the restrictions described in 7.4.1).

The steels specified in this Part 5 are not intended to be heat treated except products delivered in the delivery condition +N. Stress relief annealing is permitted (see 7.3.1.1, NOTE). Products delivered in +N condition can be hot formed and/or normalized after delivery (see Clause 3).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 General standards

EN 1011-2, Welding – Recommendations for welding of metallic materials – Part 2: Arc welding of ferritic steels

EN 10020, Definition and classification of grades of steel 10025-5:2019

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EN 10021, General technical delivery conditions for steel products 025-5-2019

prEN 10025-1:2014, Hot rolled products of structural steels - Part 1: General

EN 10027-1, Designation systems for steels - Part 1: Steel names

EN 10027-2, Designation systems for steels - Part 2: Numerical system

EN 10079:2007, Definition of steel products

EN 10163-1, Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 1: General requirements

EN 10163-2, Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 2: Plates and wide flats

EN 10163-3, Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 3: Sections

EN 10164, Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions

EN 10168, Steel products – Inspection documents – List of information and description

EN 10204, Metallic products – Types of inspection documents

EN 10221, Surface quality classes for hot-rolled round bars and rods - Technical delivery conditions

CEN/TR 10347, Guidance for forming of structural steels in processing

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2.2 Standards on dimensions and tolerances (see 7.7.1)

EN 10017, Non-alloy steel rod for drawing and/or cold rolling – Dimensions and tolerances

EN 10024, Hot rolled taper flange I sections - Tolerances on shape and dimensions

EN 10029, Hot rolled steel plates 3 mm thick or above - Tolerances on dimensions and shape

EN 10034, Structural steel I and H sections - Tolerances on shape and dimensions

EN 10048, Hot rolled narrow steel strip - Tolerances on dimensions and shape

EN 10051, Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels - Tolerances on dimensions and shape

EN 10055, Hot-rolled steel equal flange tees with radiused root and toes - Dimensions and tolerances on shape and dimensions

EN 10056-1, Structural steel equal and unequal leg angles - Part 1: Dimensions

EN 10056-2, Structural steel equal and unequal leg angles - Part 2: Tolerances on shape and dimensions

EN 10058, Hot rolled flat steel bars for general purposes - Dimensions and tolerances on shape and dimensions

EN 10059, Hot rolled square steel bars for general purposes - Dimensions and tolerances on shape and dimensions

EN 10060, Hot rolled round steel bars - Dimensions and tolerances on shape and dimensions

EN 10061, Hot rolled hexagon steel bars - Dimensions and tolerances on shape and dimensions https://standards.iteh.ai/catalog/standards/sist/53794355-c945-4356-bda2

EN 10067, Hot rolled bulb flats - Dimensions and tolerances on shape, dimensions and mass

EN 10279, Hot rolled steel channels - Tolerances on shape, dimensions and mass

2.3 Standards on testing

EN 10160, Ultrasonic testing of steel flat product of thickness equal to or greater than 6 mm (reflection method)

EN 10306, Iron and steel - Ultrasonic testing of H beams with parallel flanges and IPE beams

EN 10308, Non-destructive testing - Ultrasonic testing of steel bars

EN ISO 148-1, Metallic materials – Chapry pendulum impact test – Part 1: Test method (ISO 148-1:2009)

EN ISO 643, Steels – Micrographic determination of the apparent grain size (ISO 643:2003)

EN ISO 6892-1, Metallic materials – Tensile testing – Part 1: Method of test at room temperature (ISO 6892-1:2009)

EN ISO 14284, Steel and iron – Sampling and preparation of samples for the determination of chemical composition (ISO 14283:1996)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 10025-1:2012 and the following apply.

3.1

normalized rolled

rolling process in which the final deformation is carried out in a certain temperature range leading to a material condition equivalent to that obtained after normalizing so that the specified values of the mechanical properties are retained even after normalizing

Note 1 to entry The abbreviated form of this delivery condition is +N.

Note 2 to entry In international publications for both the normalizing rolling, as well as the thermomechanical rolling, the expression "controlled rolling" may be found. However in view of the different applicability of the products a distinction of the terms is necessary

3.2

as-rolled

conventional hot rolling without any normalized rolling or thermomechanical rolling and/or heat treatment condition like normalizing or quenching.

Note 1 to entry The abbreviated form of this delivery condition is +AR.

3.3

thermomechanical rolling

rolling 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

Note 1 to entry The abbreviated form of this delivery condition is +M.

Note 2 to entry Hot forming or post weld heat treatment at a temperature above 580 °C may lower the strength values and should not be performed. Flame straightening can be applied in accordance with CEN/TR 10347.

Note 3 to entry Thermomechanical rolling leading to the delivery condition +M can include processes with an increasing cooling rate with or without tempering including self-tempering but excluding direct quenching and quenching and tempering.

Note 4 to entry In some publications the word TMCP (Thermomechanical Control Process) is also used.

3.4

normalizing

heat treatment consisting of austenitizing followed by air cooling

Note 1 to entry The abbreviated form of this delivery condition is +N.

3.5

steel with improved atmospheric corrosion resistance

steel in which a certain number of alloying elements, such as P, Cu, Cr, Ni, Mo, has been added in order to increase its resistance to atmospheric corrosion, by forming an auto-protective oxide layer on the base metal under the influence of weather conditions

Note 1 to entry Steel with improved atmospheric corrosion resistance is often called weathering steel.

Note 2 to entry Additional information for the use of steel with improved atmospheric corrosion resistance is given in Annex B.

4 Classification and designation

4.1 Classification

4.1.1 Main quality classes

The steel grades specified in this document shall be classified as alloy special steels according to EN 10020.

4.1.2 Grades and qualities

This document specifies four steel grades S235, S355, S420 and S460, which differ in their mechanical properties.

The steel grades may be supplied in different qualities. The qualities differ in specified impact energy requirements (see Table 5).

Grade S355 is subdivided into the classes W and WP, which differ mainly in their carbon and phosphorus contents (see Tables 2 and 3) and availability (see Table 1).

4.2 Designation

4.2.1 The designation shall be in accordance with prEN 10025-1.

- 4.2.2 The designation shall consist of:
- number of this document (prEN 10025-5);
- steel name or the steel number; the steel name consisting of:
 - symbol S (for structural steel);
 - indication of the minimum specified yield strength for thickness \leq 16 mm expressed in MPa¹;
 - quality designation (see 4.1.2) in respect of specified impact energy values;
 - letter W indicating that the steel has an improved atmospheric corrosion resistance;
 - if applicable, the letter P for the class with a greater phosphorus content (only in the case of grade S355);
- the indication "+N, +AR or +M", when the products are ordered and delivered in the condition +N, +AR or +M (see 3.1, 3.2, 3.3, 3.4 and 6.3). The indication "+N, +AR or +M" shall be added to the steel name or steel number.

EXAMPLE Structural steel (S) with improved atmospheric corrosion resistance (W), with a specified minimum yield strength at room temperature of 355 MPa¹) with a minimum impact energy value of 27 J at 0 °C (J0), delivery condition +N:

Steel prEN 10025-5 - S355J0W+N or Steel prEN 10025-5 - 1.8959+N

 $^{^{1)}}$ 1 MPa = 1 N/mm².

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5 Information to be supplied by the purchaser

5.1 Mandatory information

The following information shall be supplied by the purchaser at the time of the order:

- a) quantity to be delivered;
- b) product form;
- c) number of the relevant part of this document;
- d) steel name or the steel number (see 4.2.2);
- e) nominal dimensions and tolerances on dimensions and shape (see 7.7.1);
- f) additional requirements of inspection and testing as specified in prEN 10025-5;
- g) whether products have to be submitted to specific or non-specific inspection and testing and which inspection document is required according to EN 10204 (see 8.2);
- h) all required options (see 5.2);

5.2 Options

A number of options are specified in Clause 13. In the event that the purchaser does not indicate his wish to implement any of these options, the supplier shall supply in accordance with the basic specification.

6 Manufacturing process

6.1 Steel making process

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The steel making process is at the discretion of the manufacturer with the exclusion of the open hearth (Siemens-Martin) process.

See option 1.

6.2 Deoxidation

- **6.2.1** The method of deoxidation shall be as given in Table 2.
- 6.2.2 The deoxidation methods are designated as follows:
- a) FN Rimming steel not permitted;
- b) FF Fully killed steel containing nitrogen binding elements in amounts sufficient to bind the available nitrogen (for example min. 0,020 % total aluminium). The usual guideline is a minimum aluminium to nitrogen ratio of 2:1, when no other nitrogen binding elements are present. Such other elements shall be reported in the inspection document.

6.3 Delivery conditions

Unless otherwise agreed the delivery condition of products can be +AR, +N or +M at the manufacturer's discretion.

The delivery condition +AR, +N or +M can be ordered.

See option 19a.

If an inspection document is required (see 8.2) the delivery condition shall be indicated in it with its specific symbol (+N, +AR or +M). In case the products are ordered in the delivery condition +N, +AR or +M the specific symbol (+N, +AR or +M) shall be added to the designation (see 4.2.2).

7 Requirements

7.1 General

The following requirements apply when sampling, preparation of test pieces and testing specified in Clauses 8, 9 and 10 are carried out.

7.2 Chemical composition

7.2.1 The chemical composition determined by ladle analysis shall comply with the specified values of Table 2.

For elements not defined in tables for the chemical composition for ladle analysis, limit values of Table 1 of EN 10020:2000 shall apply as maximum values.

7.2.2 The limits applicable for the product analysis are given in Table 3.

The product analysis shall be carried out when specified at the time of the order.

See option 2.

For elements not defined in tables for the chemical composition for product analysis, limit values of Table 1 of EN 10020:2000 shall apply as maximum values.

7.2.3 The maximum carbon equivalent values based on the ladle analysis given in Table 2 shall apply. For the carbon equivalent value formula see prEN 10025-1:2014, 4.4.

7.3 Mechanical properties

7.3.1 General

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7.3.1.1 Under the inspection and testing conditions as specified in Clauses 8, 9 and 10 and in the delivery condition as specified in 6.3 the mechanical properties shall comply with the values given in Tables 4 and 5.

NOTE Stress relieving at more than 580 °C or for over 1 h may lead to a deterioration of the mechanical properties of the steel grade as defined in prEN 10025-5. For normalized and normalized rolled flat products the maximum stress relief temperature should be 560 °C. If the purchaser intends to stress relief the products at higher temperatures or for longer times than mentioned above the minimum values of the mechanical properties after such a treatment should be agreed at the time of the order.

7.3.1.2 For flat and bar products ordered and supplied in the normalized or normalized rolled condition the mechanical properties shall comply with the relevant tables for mechanical properties of prEN 10025-5 in the normalized or normalized rolled condition or after normalizing by heat treatment after delivery or after hot forming if the provisions of CEN/TR 10347 are satisfied.

7.3.1.3 For flat products the nominal thickness applies. For long products of irregular section the nominal thickness of that part from which the samples are taken applies (see Annex A of prEN 10025-1:2014).

7.3.2 Impact properties

7.3.2.1 The verification of the impact energy value shall be carried out in accordance with prEN 10025-1.

7.3.2.2 The impact properties of steel grade S355 class WP are verified only when specified at the time of the order.

See option 3.