



SLOVENSKI STANDARD
SIST EN 10343:2009
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Štejni jekla za toplotno obdelavo - Tehnične pogoje dostave

Steels for quenching and tempering for construction purposes - Technical delivery conditions

Vergütungsstähle für das Bauwesen - Technische Lieferbedingungen

Aciers pour trempe et revenu pour usage de construction - Conditions techniques de livraison

Ta slovenski standard je istoveten z: **EN 10343:2009**

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EUROPEAN STANDARD

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Steels for quenching and tempering for construction purposes - Technical delivery conditions

Aciers pour trempe et revenu pour usage de construction -
Conditions techniques de livraison

Vergütungsstähle für das Bauwesen - Technische
Lieferbedingungen

This European Standard was approved by CEN on 14 February 2009.

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

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Foreword

This document (EN 10343:2009) has been prepared by Technical Committee ECISS/TC 23 “Steels for heat treatment, alloy steels and free-cutting steels - Qualities and dimensions”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by December 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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 Directive (89/106/EEC).

For relationship with EU Construction Products Directive (CPD), see informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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EN 10343:2009 (E)**1 Scope**

This document specifies the technical delivery requirements for the following steel products intended for use in the construction industry:

bars (including hammer-forged bars);

wide flats;

hot-rolled strip and sheet/plate;

forgings.

They are manufactured from the direct hardening non alloy steels for quenching and tempering and the direct hardening alloy steels for quenching and tempering and supplied in one of the heat treatment conditions given for the different types of products in Table 1.

These steels are generally intended for the manufacture of quenched and tempered parts, but can also be used in the normalized condition.

The requirements for mechanical properties are restricted to part sizes given in Tables 4 and 5.

NOTE 1 In accordance with EN 10020, the steels covered by this standard are quality and special steels. The differences between quality and special steels are characterized by the following requirements, which are valid for special steels only:

- the minimum impact values in the quenched and tempered condition (for non alloy special steels in the case of mean percentages by mass of carbon < 0,50 % only);
- limited oxide inclusion content;
- lower maximum contents for phosphorus and sulphur.

NOTE 2 This standard does not apply for bright steel products.

NOTE 3 This standard only applies for the manufacture of products without any further cold or hot forming and no additional heat treatment, i.e. the properties are according to the delivery condition (+N, +QT).

In addition to the specifications of this European Standard, the general technical delivery conditions given in EN 10021 will be applicable unless otherwise specified.

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.

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test at ambient temperature*

EN 10020:2000, *Definition and classification of grades of steel*

EN 10021, *General technical delivery conditions for steel products*

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

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

- EN 10045-1, *Metallic materials - Charpy impact test - Part 1: Test method*
- EN 10052:1993, *Vocabulary of heat treatment terms for ferrous products*
- EN 10079:2007, *Definition of steel products*
- EN 10083-1:2006, *Steels for quenching and tempering - Part 1: General technical delivery conditions*
- EN 10083-2:2006, *Steels for quenching and tempering - Part 2: Technical delivery conditions for non-alloy steels*
- EN 10083-3:2006, *Steels for quenching and tempering - Part 3: Technical delivery conditions for alloy steels*
- EN 10160, *Ultrasonic testing of steel flat product of thickness equal to or greater than 6 mm (reflection method)*
- EN 10163-2, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections - Part 2: Plates and wide flats*
- EN 10204, *Metallic products - Types of inspection documents*
- EN 10221, *Surface quality classes for hot-rolled bars and rods - Technical delivery conditions*
- EN 10308, *Non destructive testing – Ultrasonic testing of steel bars*
- EN ISO 377:1997, *Steel and steel products - Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997)*
- EN ISO 643, *Steels – Micrographic determination of the apparent grain size (ISO 643:2003)*
- EN ISO 3887, *Steels – Determination of depth of decarburization (ISO 3887:2003)*.
- EN ISO 9001:2008, *Quality management systems - Requirements (ISO 9001:2008)*
- EN ISO 14284:2002, *Steel and iron - Sampling and preparation of samples for the determination of chemical composition (ISO 14284:1996)*.
- CEN/TR 10261, *Iron and steel - Review of available methods of chemical analysis*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply in addition to the terms and definitions given in EN 10020:2000, EN 10052:1993, EN 10079:2007, EN ISO 377:1997 and EN ISO 14284:2002.

3.1

steels for quenching and tempering

engineering steels which because of their chemical composition are suitable for hardening and in the quenched and tempered condition have good toughness at a given tensile strength

3.2

ruling section

section for which the specified mechanical properties apply (see Annex A)

NOTE Independent of the actual shape and dimensions of the cross-section of the product the size of its ruling section is always given by a diameter. This corresponds to the diameter of an "equivalent round bar". That is, a round bar which, at the position of its cross-section specified for taking the test pieces for the mechanical tests, will, when being

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cooled from austenitizing temperature, show the same cooling rate as the actual ruling section of the product concerned at its position for taking the test pieces.

4 Classification and designation**4.1 Classification**

The classification of the relevant steel grades according to EN 10020 is used in this European Standard.

4.2 Designation**4.2.1 Steel names**

For the steel grades covered by this European Standard, the steel names as given in the relevant tables are allocated in accordance with EN 10027-1.

4.2.2 Steel numbers

For the steel grades covered by this European Standard, the steel numbers as given in the relevant tables are allocated in accordance with EN 10027-2.

5 Designation to be used on ordering

The manufacturer shall establish the following information from the purchaser at the time of enquiry and order:

- a) quantity to be delivered;
- b) designation of the product form (e.g. round bar, sheet or forging);
- c) number of the dimensional standard (e.g. EN 10060);
- d) dimensions and tolerances on dimensions and shape and, if applicable, letters denoting relevant special tolerances;
- e) number of this European Standard;
- f) steel name or steel number (see 4.2);
- g) heat treatment condition (+QT or +N, see 6.3.1);
- h) whether the purchaser wishes to specify following characteristics:
 - 1) any particular surface condition (see 6.3.2)
 - 2) any verification of the product analysis (see 7.1.2.2)
 - 3) any fine grain requirements or verification of fine grain size (see 7.3.1);
 - 4) any requirements for the verification of non-metallic inclusion content of special steels (see 7.3.2);
 - 5) any requirement for internal soundness (see 7.4);
 - 6) any requirement relating to surface quality (see 7.5.3);
 - 7) any requirement regarding the permissible depth of decarburization for special steels (see 7.5.4);

- 8) any requirement relating to removal of surface defects (see 7.5.5);
- 9) any requirement concerning special marking of the products (see 12 and B.7 of EN 10083-1:2006);
- i) type of inspection certificate (3.1 or 3.2) in accordance with EN 10204,
- j) regulatory marking requirements (see Annex ZA).

The requirements on ordering information in the European Standards for the relevant steels for quenching and tempering shall apply. If the order agreed between manufacturer and purchaser contains special requirements, which differ from those specified or referenced in this European Standard, then these special requirements shall apply in addition to the requirements in this European Standard, insofar as they do not conflict with the regulatory requirements of this European Standard.

EXAMPLE

20 round bars with nominal diameter 20 mm and the nominal length of 8000 mm according to EN 10060 made of steel grade 25CrMo4 (1.7218) according to this standard in the heat treatment condition +QT, inspection certificate 3.1 as specified in EN 10204 and the declaration of conformity.

20 round bars EN 10060 - 20x8000
prEN 10343 – 25CrMo4+QT,
EN 10204 – 3.1, CE
or

20 round bars EN 10060 - 20x8000
prEN 10343 – 1.7218+QT,
EN 10204 – 3.1, CE

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6 Manufacturing process

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6.1 General

The manufacturing process of the steel and of the products shall be at the discretion of the manufacturer with the exceptions given by the requirements in 6.2 to 6.4.

6.2 Deoxidation

All steels shall be killed.

6.3 Heat treatment and surface condition at delivery

6.3.1 Heat treatment condition

The products shall be delivered in one of the heat-treatment conditions (+N or +QT) given in Table 1, lines 2 and 3.

6.3.2 Surface condition

The products shall be delivered in the hot worked surface condition.

If so agreed at the time of enquiry and order products shall be delivered with one of the particular surface conditions given in Table 2, lines 3 to 7 of EN 10083-2:2006 or EN 10083-3:2006.

EN 10343:2009 (E)**6.4 Cast separation**

The products shall be delivered separated by cast.

7 Requirements**7.1 Chemical composition and mechanical properties****7.1.1 General**

Table 1 gives the combinations of heat-treatment conditions at delivery, product forms and requirements as specified in Tables 4 and 5.

7.1.2 Chemical composition

7.1.2.1 The chemical composition determined by cast analysis shall comply with the values in Table 2.

7.1.2.2 If the product analysis is required (see B.6 of EN 10083-1:2006), permissible deviations between the limiting values for cast analysis and the values for product analysis shall be as in Table 3.

7.1.3 Weldability

Steels according to this European standard are not always suitable to weld. Special welding procedures may be required.

7.1.4 Mechanical properties

The mechanical property values given in Tables 4 and 5 apply to test pieces in the quenched and tempered or normalized condition which have been taken and prepared in accordance with Figure 1 or Figures 2 and 3.

Using test pieces from quenched and tempered flat steel products of thickness less than 10 mm the minimum values for the impact strength given in Table 4 shall be reduced in direct proportion to the cross-sectional area of the test piece. Impact tests shall not be required for nominal thickness < 8 mm and nominal diameter < 16 mm for quenched and tempered steels and not for nominal thickness and diameter < 16 mm for normalized steels.

7.2 Machinability

Where improved machinability is required, the grades with a specified sulphur range should be ordered and /or with a specific treatment to improve machinability (e.g. Ca treatment).

7.3 Structure

7.3.1 For non-alloy steels, unless otherwise agreed at the time of enquiry and order, the grain size shall be left to the discretion of the manufacturer. If a fine grain structure is required in accordance with a reference treatment, special requirement A.3 of EN 10083-2:2006 shall apply.

All alloy steels shall have an austenite grain size of 5 or finer, when tested in accordance with EN ISO 643. Regarding verification of fine grain size see A.3 of EN 10083-3:2006.

7.3.2 The special steels shall have a degree of cleanness corresponding to the special steel quality (see B.4 of EN 10083-1:2006).

NOTE Segregation is the result of a natural phenomenon. Segregations can be found in ingots as well as slabs, blooms and billets from the continuous casting process. The positive segregation is a concentration of various elements at different locations in the ingot, slab, bloom and billet. In case of flat products customers should note, that these

segregations can occur parallel to the surface of the product. Especially for medium and high carbon contents segregations lead to a higher hardness and should be taken into consideration during further heat treatments.

7.4 Internal soundness

Where appropriate, requirements relating to the internal soundness of products shall be agreed at the time of enquiry and order, if possible with reference to European standards. EN 10160 specifies requirements of ultrasonic testing of flat products of thickness equal to or greater than 6 mm and EN 10308 specifies requirements of ultrasonic testing of steel bars (see B.5 of EN 10083-1:2006).

7.5 Surface quality

7.5.1 All products shall have a smooth finish appropriate to the shaping processes applied.

NOTE See also 6.3.2.

7.5.2 Minor surface imperfections which may occur also under normal manufacturing conditions, such as scores originating from rolled-in scale in the case of hot-rolled products, shall not be regarded as defects.

7.5.3 Where appropriate, requirements relating to the surface quality of the products shall be agreed on at the time of enquiry and order, if possible with reference to European Standards.

Sheet/plate and wide flats are delivered with surface class A, subclass 2 according to EN 10163-2 unless otherwise agreed at the time of enquiry and order.

Bars are delivered with surface class A according to EN 10221 unless otherwise agreed at the time of enquiry and order.

7.5.4 Requirements relating to the permissible depth of decarburization can be agreed at the time of enquiry and order for special steels. [SIST EN 10343:2009](https://standards.iteh.ai/catalog/standards/sist/80c74ce0-60c6-4a16-bcbb-)

The depth of decarburization shall be determined in accordance with the micrographic method specified in EN ISO 3887.

7.5.5 The removal of surface defects by welding shall only be permitted with the approval of the customer or his representative.

If surface discontinuities are repaired, the method and maximum depth of removal shall be agreed at the time of enquiry and order.

7.6 Dimensions, tolerances on dimensions and shape

Dimensions and tolerances on dimensions and shape shall be declared by reference to the appropriate European standard (see normative Annex B). Dimensions and tolerances on dimensions and shape of profiles not covered by European Standards shall be in accordance with a national standard valid in the intended place of use of the product or as agreed at the time of enquiry and order.

If not agreed during enquiry and order for hot-rolled plates the tolerances on dimensions and shape are applicable according to EN 10029 included class A for the tolerances on thickness and for round bars normal tolerances are applicable according to EN 10060.

EN 10343:2009 (E)**8 Inspection****8.1 Testing procedures and types of documents**

8.1.1 Products declaring compliance with this European Standard shall be delivered with an inspection certificate 3.1 or 3.2 as specified in EN 10204. The type of certificate shall be agreed upon at the time of enquiry and order. If the order does not contain any specification of this type, inspection certificate 3.1 shall be issued.

The specific inspection described in 8.3, 10 and 11 shall be carried out and confirmed together with the following information in the inspection certificate:

- a) the manufacturer's results for the cast analysis of all elements specified in the Table 2 for the steel grade concerned;
- b) the results of inspections and tests ordered as a result of supplementary requirements (see Annex A of EN 10083-2 and EN 10083-3);
- c) the symbol letters or numbers relating the inspection certificate, test pieces and products to each other;
- d) the confirmation that the material complies with the requirements of the order;
- e) the regulatory information (see Annex ZA).

8.1.2 Unless otherwise agreed at the time of the order, inspection of surface condition and dimensions shall be carried out by the manufacturer (see also 6.3.2).

8.2 Frequency of testing**8.2.1 Sampling**

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Sampling shall be in accordance with Table 6.

8.2.2 Test units

The test units and the extent of testing shall be in accordance with Table 6.

8.3 Tests to be carried out for specific inspection**8.3.1 Verification of mechanical properties**

For steels the mechanical properties given for the relevant heat-treatment condition in Table 1, Column 6, subclause 2, shall be verified.

8.3.2 Visual and dimensional inspection

The number of visual and dimensional inspections shall be done dependant of the kind of product to ensure compliance with the specification.