SLOVENSKI STANDARD

SIST EN 10273:2008

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Nadomeġļa:

SIST EN 10273:2000

Vroļe valjane varive jeklene palice za tlaļne posode s specificiranimi lastnostmi pri poviġanih temperaturah

Hot rolled weldable steel bars for pressure purposes with specified elevated temperature properties

Warmgewalzte schweißgeeignete Stäbe aus Stahl für Druckbehälter mit festgelegten Eigenschaften bei erhöhten Temperaturen

Barres laminés a chaud en aciers soudables pour appareils a pression avec des caractéristiques spécifiées aux températures élevées

Ta slovenski standard je istoveten z: **EN 10273:2007**

ICS:

77.140.30	Jekla za uporabo pod tlakom	Steels for pressure purposes
77.140.60	Jeklene palice in drogovi	Steel bars and rods

SIST EN 10273:2008 **en,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 10273

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ICS 77.140.30; 77.140.60

Supersedes EN 10273:2000

English Version

Hot rolled weldable steel bars for pressure purposes with specified elevated temperature properties

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This European Standard was approved by CEN on 21 October 2007.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 10273:2007) has been prepared by Technical Committee ECISS/TC 22 “Steels for pressure purposes - Qualities”, 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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.

This document supersedes EN 10273:2000.

This European Standard 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 Directive 97/23/EC.

For relationship with EU Directive 97/23/EC, see informative Annex ZA, which is an integral part of this document.

NOTE The clauses marked with a point (•) contain information relating to agreements which are to be made at the time of enquiry and order. The clauses marked by two points (••) contain information relating to agreements that may be made at the time of enquiry and order.

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.

1 Scope

This European Standard specifies the technical delivery conditions for hot rolled weldable steel bars for the construction of pressure equipment for use at elevated temperatures.

The general technical delivery conditions in EN 10021 also apply to products supplied in accordance with this European Standard.

NOTE Once this European Standard is published in the Official Journal of the European Union (OJEU) under Directive 97/23/EC, presumption of conformity to the Essential Safety Requirements (ESRs) of Directive 97/23/EC is limited to technical data of materials in this European Standard and does not presume adequacy of the material to a specific item of equipment. Consequently, the assessment of the technical data stated in this material standard against the design requirements of this specific item of equipment to verify that the ESRs of the Pressure Equipment Directive 97/23/EC are satisfied, needs to be done.

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 10002-1:2001, *Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature*

EN 10002-5:1991, *Metallic materials — Tensile testing — Part 5: Method of testing at elevated temperatures*

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

EN 10021:2006, *General technical delivery conditions for steel products*

EN 10045-1:1990, *Metallic materials — Charpy impact test — Part 1: Test method*

EN 10052:1993, *Vocabulary of heat treatment terms for ferrous products*

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 for general purposes — Dimensions and tolerances on shape and dimensions*

EN 10061, *Hot rolled hexagon steel bars for general purposes — Dimensions and tolerances on shape and dimensions*

EN 10079:2007, *Definition of steel products*

EN 10168:2004, *Steel products — Inspection documents — List of information and description*

EN 10204:2004, *Metallic products — Types of inspection documents*

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

EN ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997)*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10052:1993, EN 10079:2007 and the following apply.

3.1
normalizing rolling
rolling process in which the final deformation process 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 The symbol for this delivery condition and for the normailised condition is N.

[deviating from EN 10052:1993]

3.2
quenching and tempering

[as defined in EN 10052:1993]

NOTE Quenching and tempering (symbol QT) also includes direct hardening plus tempering

3.3
purchaser
person or organization that orders products in accordance with this European Standard. The purchaser is not necessarily, but may be, a manufacturer of pressure equipment in accordance with the EU Directive listed in Annex ZA

NOTE Where a purchaser has responsibilities under this EU Directive, this European Standard will provide a presumption of conformity with the essential requirements of the Directive so identified in Annex ZA.

4 • Dimensions and tolerances on dimensions

The nominal dimensions and tolerances on dimensions shall be agreed at the time of enquiry and order with reference to the relevant dimensional standard EN 10058, EN 10059, EN 10060 or EN 10061.

5 Calculation of mass

A density of 7,85 kg/dm^3 shall be used as the basis for the calculation of the nominal mass from the nominal dimensions of all steel grades.

6 Classification and designation

6.1 Classification

According to EN 10020 the steel grades P235GH, P250GH, P265GH, P295GH, P355GH, P275NH and P355NH are non-alloy quality steels. All other steel grades are alloy special steels.

6.2 Designation

The steel grades are designated with steel names in accordance with EN 10027-1. The corresponding steel numbers have been allocated in accordance with EN 10027-2.

7 Information to be supplied by the purchaser

7.1 Mandatory information

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

a) quantity required;

b) shape of bars:

c) European Standard specifying tolerances on dimensions, shape and mass (see Clause 4);

d) nominal dimensions of the product;

e) number of this European Standard, i.e. EN 10273;

f) steel name or number;

g) delivery condition (see 8.2);

h) inspection document to be issued (see 9.1.1).

7.2 Options

A number of options are specified in this European Standard and listed below. If the purchaser does not indicate his wish to implement any of these options the products shall be supplied in accordance with the basic specification (see 7.1).

1) specification of the steelmaking process (see 8.1);

2) deviating delivery condition (see 8.2.1 and 8.2.3);

3) specification of a higher minimum chromium content (see Table 1, footnote h);

4) specification of a lower maximum copper content and a maximum tin content (see Table 1, footnote i);

5) specification of a maximum carbon equivalent value (see 8.3.3 and Table 3);

6) mechanical properties for diameters or thicknesses > 150 mm (see Table 4, footnote b);

7) elevated temperature values for diameters or thicknesses > 100 mm, steel grade P460NH (see Table 6, footnote e);

8) special surface condition (see 8.5);

9) requirements for and verification of internal soundness (see 8.6);

10) delivery of data on suitable welding conditions (see 8.7.2);

11) product analysis (see Table 7, 10.1.1 and 11.1);

12) verification of proof strength $R_{p0,2}$ at an agreed elevated temperature (see Table 7 and 11.3);

13) verification of the impact energy at a temperature other than +20 °C (see 11.4);

14) special marking requirements (see 12.2).

7.3 Examples for ordering

EXAMPLE 1 5 t bars, dimensional tolerances as specified in EN 10059, 50 mm x 50 mm, supplied in fixed lengths of 10 000 mm, made of the steel grade 16Mo3 (steel number 1.5415) in accordance with EN 10273, with inspection document 3.1 as specified in EN 10204:

5 t bars EN 10059 – 50×50×10000(F) – steel EN 10273 – 16Mo3 – inspection document 3.1

or

5 t bars EN 10059 – 50×50×10000(F) – steel EN 10273 – 1.5415 – inspection document 3.1

EXAMPLE 2 2 t rounds, dimensional tolerances as specified in EN 10060, 75 mm diameter, supplied in exact lengths of 5 000 mm made of a steel grade 16Mo3 (steel number 1.5415) in accordance with EN 10273, surface quality class B in accordance with EN 10221; inspection document 3.1 as specified in EN 10204:

2 t rounds EN 10060 – 75x5000(E) – steel EN 10273 – 16Mo3 – EN 10221 – class B – inspection document 3.1

or

2 t rounds EN 10060 – 75x5000(E) – steel EN 10273 – 1.5415 – EN 10221 – class B – inspection document 3.1

8 Requirements

8.1 Steelmaking process

●● Unless a special steelmaking process is agreed at the time of enquiry and order, the steelmaking process shall be at the discretion of the manufacturer.

8.2 Delivery condition

8.2.1 ●● Unless otherwise agreed at the time of enquiry and order, the products covered by this European Standard shall be supplied in the delivery condition given in Table 4.

8.2.2 Normalizing may be replaced by normalizing rolling for steel grades P235GH, P250GH, P265GH, P295GH, P355GH, P275NH, P355NH and P460NH. This means that the requirements have to be met even after subsequent normalizing.

In the case of the grade P460NH delayed cooling or additional tempering may be necessary for small sections and in special cases.

8.2.3 ●● Products made of steel grades P235GH, P250GH, P265GH, P295GH, P355GH, P275NH, P355NH, P460NH and 16Mo3 may also be delivered in the untreated condition if so agreed. (Annex A contains for the grades P...GH as well as for 16Mo3, 13CrMo4-5, 10CrMo9-10 and 11CrMo9-10 heat treatment information for the purchaser.)

In these cases, the test pieces shall be tested in the delivery condition as indicated in Table 4.

NOTE The testing of the test pieces in a simulated heat treated condition does not discharge the processor who carries out the heat treatment from the obligation of providing proof of the specified properties in the finished product.

8.3 Chemical composition

8.3.1 The cast analysis reported by the steel producer shall apply and comply with the requirements of Table 1.

8.3.2 The product analysis shall not deviate from the specified values for the cast analysis as specified in Table 1 by more than the values given in Table 2.

8.3.3 ●● A maximum value for the carbon equivalent may be agreed upon at the time of enquiry and order for steel grades P235GH, P265GH, P295GH, P355GH, P275NH and P355NH. In this case, for the grades P275NH and P355NH the values given in Table 3 shall apply.

8.4 Mechanical properties

The values given in Tables 4 to 6 shall apply for the specified heat treatment conditions and dimensions.

NOTE Unless otherwise noted, the $R_{p0,2}$ values in Table 6 were derived in accordance with EN 10314.

If by agreement (see 8.2.3) the products are supplied in a non-heat treated condition, the mechanical properties shall be obtainable from reference test pieces which have received the appropriate heat treatment (simulated heat treatment).

Annex B gives preliminary data for the purchaser about creep strain and creep rupture properties of some steel grades covered by this European Standard.

8.5 Surface condition

Slight surface imperfections, inherent in the production process, are permitted.

●● If more exact requirement for the surface condition are necessary, these may be agreed at the time of enquiry and order, where appropriate on the basis of EN 10221.

8.6 Internal soundness

The products shall be sound and free from defects that preclude their intended use.

●● Where appropriate, requirements together with the conditions for their verification (see 11.5.3 and Table 7) may be agreed at the time of enquiry and order.

8.7 Weldability

8.7.1 The steels specified in this European Standard are suitable for welding processes in current use (see NOTES 1 to 3 in 8.7.2). Information on welding is given in EN 1011-1 and EN 1011-2.

8.7.2 ●● The manufacturer shall, if so agreed at the time of enquiry and order, provide the purchaser with data on suitable welding conditions determined on the basis of weld procedure tests.

NOTE 1 With increasing product section and strength level cold cracking can occur. Cold cracking is caused by the following factors in combination:

— amount of diffusible hydrogen in the weld metal;

— microstructure of the heat affected zone;

— tensile stress concentrations in the welded joint.

NOTE 2 When using recommendations as laid down, for example in EN 1011-2, the recommended welding conditions of the steel grades can be determined depending on the product diameter or thickness, the applied welding energy, the design requirements, the electrode efficiency, the welding process and the weld metal properties.

NOTE 3 Inappropriate post weld heat treatment (PWHT) conditions may decrease the mechanical properties. It is therefore recommended that the purchaser seeks, at the time of enquiry and order, the advise of the manufacturer and considers, where appropriate, the verification of the mechanical properties on simulated post weld heat treated samples.

9 Inspection

9.1 Types of Inspection and Inspection documents

9.1.1 The compliance with the requirements of the order shall be checked for products in accordance with this European Standard by specific inspection.

• The purchaser shall state the required type of inspection document (3.1 or 3.2) in accordance with EN 10204.

If an inspection document 3.2 is specified, the purchaser shall notify the manufacturer of the name and address of the organization or person who is to carry out the inspection and produce the inspection document. It shall also be agreed which party shall issue the certificate.

9.1.2 The inspection document shall include, in accordance with EN 10168, the following codes and information:

A	commercial transactions and parties involved;
B	description of products to which the inspection certificate applies (including tempering temperature in the case of quenched and tempered or tempered products);
C03	test temperature;
C10-C13	tensile test at room temperature and, if applicable, at elevated temperatures;
C40-C43	impact test;
C70	steelmaking process, if applicable;
C71-C92	cast analysis and, if applicable, product analysis;
D01	marking, dimensional and visual inspection;
D02-D99	non-destructive tests, if applicable;
Z	validation.

9.2 Tests to be carried out

The mandatory and optional tests to be carried out, the size of the test units, and the number of samples and test pieces to be taken are specified in 10.1 and Table 7.

9.3 Retests, sorting and reprocessing

For retests, sorting and reprocessing the requirements of EN 10021 shall apply.