SLOVENSKI STANDARD

SIST EN 10273:2000

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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 für Druckbehälter mit festgelegten Eigenschaften bei erhöhten Temperaturen

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

Ta slovenski standard je istoveten z: EN 10273:2000

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English version

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This European Standard was approved by CEN on 29 October 1999.

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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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

Annex D contains national A-deviations specifying the restrictions for the application of this European Standard in Sweden.

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(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this standard.

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

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

1 Scope

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

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

2 Normative references

This European Standard incorporates by dated or undated refer-ence, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

CR 10260	Designation systems for steel - Additional symbols for steel names
prEN 1011-2	Welding - Recommendations for welding of metallic materials - Part 2: Arc welding of ferritic steels
EN 10002-1	Metallic materials - Tensile testing - Part 1: Method of test (at ambient temperature) (including Corrigendum AC1:1990)
EN 10002-5	Metallic materials - Tensile testing - Part 5: Method of test at elevated temperatures
EN 10020	Definition and classification of grades of steel
EN 10021	General technical delivery requirements for steel and iron products
EN 10027-1	Designation systems for steel - Part 1: Steel names, principal symbols
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	Vocabulary of heat treatment terms for ferrous products
EN 10079	Definition of steel products

EN 10168[1)] Iron and steel products - Inspection and delivery documents contents - List of information and description

EN 10204 Metallic products - Types of inspection documents (including amendment A1:1995)

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

EN ISO 377 Steel and steel products - Location and prepara-tion of samples and test pieces for mechanical testing (ISO 377:1997)

ISO 14284 Steel and iron - Sampling and preparation of samples for the determination of chemical composition

3 Definitions

For the purposes of this standard the definitions of

- EN 10020 for classification of steels,
- EN 10052 for the types of heat treatment and
- EN 10079 for the various product forms

apply.

Deviating from (see 3.1) or additional to (see 3.2) EN 10052 the following is defined:

3.1 Normalizing rolling is a 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. The symbol for this delivery condition is N.

3.2 Additionally to the definitions for quenching and tempering the following should be noted:

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

3.3 Purchaser: The person or organization that orders products in accordance with this standard. The purchaser is not necessarily, but may be, a manufacturer of pressure equipment in accordance with the EU Directive listed in Annex ZA. Where a purchaser has responsibilities under this EU Directive, this standard will provide a presumption of conformity with the essential requirements of the Directive so identified in Annex ZA.

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1) In preparation; until this document is published as European Standard a corresponding national standard should be agreed at the time of enquiry and order.

4 • Dimensions and tolerances on dimensions

The nominal dimensions and tolerances on dimensions for the products shall be agreed at the time of enquiry and order with reference to one of the dimensional standards listed below for

- rectangular section to EURONORM 58,
- square section to EURONORM 59,
- round section to EURONORM 60,
- hexagonal section to EURONORM 61.

5 Calculation of mass

A density of 7,85 kg/dm³ shall be used as the basis for the calculation of the nominal mass from the nominal dimensions of all steels.

6 Classification and designation

6.1 Classification

This European Standard covers the steel grades given in table 1.
According to EN 10020 the steels P235GH, P250GH, P265GH, P295GH, P355GH, P275NH and P355NH are non-alloy quality steels. All other steel grades covered by this European Standard are alloy special steels.

6.2 Designation

The steel grades specified in this European Standard are designated with steel names and steel numbers in accordance with EN 10027-1 and CR 10260. The corresponding steel numbers have been established in accordance with EN 10027-2.

7 Information to be supplied by the purchaser

7.1 Mandatory information

The complete order of a product as specified in this European Standard shall include the following information:

a) the quantity required;

b) the shape of bars;

c) the tolerances on dimensions, shape and mass (see clause 4);

d) the nominal dimensions of the product;

e) the number of this European Standard;

f) the steel name or number;

g) the delivery condition (see 8.2);

h) type of inspection document (see 9.2.1).

7.2 Options

A number of options are specified in this European Standard and these are 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 lower maximum copper content and a maximum tin content (see table 1, footnote 2);
4) Specification of a higher minimum chromium content (see table 1, footnote 9);
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 2);
7) Special surface condition (see 8.5);
8) Requirements for and verification of internal soundness (see 8.6);
9) Specific tests for verification of general delivery requirements (see 8.6 and 9.1);
10) Delivery of data on suitable welding conditions (see 8.7.2);
11) Product analysis (see 9.3.2, 10.1.1 and 11.1);
12) Verification of 0,2 % proof strength at elevated temperature (see 9.3.2 and 11.3);
13) Special marking requirements (see 12.2).

8 Requirements

8.1 •• Steelmaking process

Unless a special steelmaking process is agreed at the time of enquiry and order, the steelmaking process for steels in accordance with this European Standard 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 conditions 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 again 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 B 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 requirements of table 1 shall apply for the chemical composition determined from the cast analysis.

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.

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 A 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 shall be agreed at the time of enquiry and order, where appropriate on the basis of EN 10221.

8.6 •• Internal soundness

For the internal soundness, where appropriate, requirements together with the conditions for their verification may be agreed at the time of enquiry and order.

8.7 Weldability

8.7.1 The steels specified in this European Standard shall be suitable for welding processes in current use (see notes 1 to 3 to 8.7.2).

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:

- the 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 prEN 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 •• General

The manufacturer shall carry out appropriate process control, inspection and testing to assure himself that the delivery complies with the requirements of the order.

This includes the following:

- a suitable frequency of verification of the dimensions of the products;

- an adequate intensity of visual examination of the surface quality of the products;