

SLOVENSKI STANDARD
SIST EN 10028-1:2008+A1:2009
01-julij-2009

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Flat products made of steels for pressure purposes - Part 1: General requirements

Flacherzeugnisse aus Druckbehälterstählen - Teil 1: Allgemeine Anforderungen

Produits plats en acier pour appareils à pression - Partie 1: Prescriptions générales

Ta slovenski standard je istoveten z: EN 10028-1:2007+A1:2009

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ICS:

77.140.30	Jekla za uporabo pod tlakom	Steels for pressure purposes
77.140.50	Ú[z aak \ ^ } aš a ^ \ aš] [ã á ^ \ ã	Flat steel products and semi-products

SIST EN 10028-1:2008+A1:2009 **en,fr,de**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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Flat products made of steels for pressure purposes - Part 1: General requirements

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Allgemeine Anforderungen

This European Standard was approved by CEN on 21 October 2007 and includes Amendment 1 approved by CEN on 14 March 2009.

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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 CEN Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

	Page
Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	5
4 Dimensions and tolerances on dimensions	6
5 Calculation of mass	6
6 Classification and designation.....	6
6.1 Classification.....	6
6.2 Designation	6
7 Information to be supplied by the purchaser	7
7.1 Mandatory information.....	7
7.2 Options	7
7.3 Examples of ordering.....	8
8 Requirements	8
8.1 Steelmaking process	8
8.2 Delivery condition.....	8
8.3 Chemical composition	8
8.4 Mechanical properties.....	8
8.5 Surface condition.....	8
8.6 Internal soundness.....	8
9 Inspection	9
9.1 Types of inspection and inspection documents	9
9.2 Tests to be carried out	9
9.3 Retests, sorting and reprocessing.....	10
10 Sampling.....	10
10.1 Frequency of testing	10
10.2 Selection and preparation of samples and test pieces.....	11
10.2.1 Sampling and sample preparation	11
10.2.2 Preparation of test pieces	11
11 Test methods.....	15
11.1 Chemical analysis.....	15
11.2 Tensile test at room temperature	16
11.3 Tensile test at elevated temperature	16
11.4 Impact test	16
11.5 Other testing.....	17
12 Marking	17
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC	19
Bibliography	20

Foreword

This document (EN 10028-1:2007+A1:2009) 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 October 2009, and conflicting national standards shall be withdrawn at the latest by October 2009.

This document includes Amendment 1, approved by CEN on 2009-03-14.

This document supersedes \square_{A1} EN 10028-1:2007 \square_{A1} .

The start and finish of text introduced or altered by amendment is indicated in the text by tags \square_{A1} \square_{A1} .

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 Directive 97/23/EC.

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

EN 10028 consists of the following parts under the general title *Flat products made of steels for pressure purposes*:

- *Part 1: General requirements* (standards.iteh.ai)
- *Part 2: Non-alloy and alloy steels with specified elevated temperature properties*
SIST EN 10028-1:2008+A1:2009
- *Part 3: Weldable fine grain steels, normalized*
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- *Part 4: Nickel alloy steels with specified low temperature properties*
- *Part 5: Weldable fine grain steels, thermomechanically rolled*
- *Part 6: Weldable fine grain steels, quenched and tempered*
- *Part 7: Stainless steels*

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.

EN 10028-1:2007+A1:2009 (E)**1 Scope**

This European Standard specifies general technical delivery conditions for flat products for the construction of pressure equipment.

The general technical delivery conditions in EN 10021 also apply.

NOTE Once this European Standard is published in the EU Official Journal (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 (Part 1 and the other relevant part of the series) 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 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 10028-2:2003, *Flat products made of steels for pressure purposes — Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3:2003, *Flat products made of steels for pressure purposes — Part 3: Weldable fine grain steels, normalized*

EN 10028-4:2003, *Flat products made of steels for pressure purposes — Part 4: Nickel alloy steels with specified low temperature properties*

EN 10028-5:2003, *Flat products made of steels for pressure purposes — Part 5: Weldable fine grain steels, thermomechanically rolled*

EN 10028-6:2003, *Flat products made of steels for pressure purposes — Part 6: Weldable fine grain steels, quenched and tempered*

EN 10028-7:2007, *Flat products made of steels for pressure purposes — Part 7: Stainless steels*

EN 10029, *Hot rolled plates 3 mm thick or above — Tolerances on dimensions, shape and mass*

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

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

EN 10079:2007, *Definitions of steel products*

EN 10088-1:2005, *Stainless steels — Part 1: List of stainless steels*

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

EN 10163-2:2004, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections — Part 2: Plates and wide flats*

EN 10164:2004, *Steel products with improved deformation properties perpendicular to the surface of the product — Technical delivery conditions*

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

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

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

EN ISO 2566-1, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels (ISO 2566-1:1984)*

EN ISO 2566-2, *Steel — Conversion of elongation values — Part 2: Austenitic steels (ISO 2566-2:1984)*

EN ISO 3651-2, *Determination of resistance to intergranular corrosion of stainless steels — Part 2: Ferritic, austenitic and ferritic-austenitic (duplex) stainless steels — Corrosion test in media containing sulfuric acid (ISO 3651-2:1998)*

EN ISO 9445, *Continuously cold-rolled stainless steel narrow strip, wide strip, plate/sheet and cut lengths — Tolerances on dimensions and form (ISO 9445:2002)*

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

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3 Terms and definitions (standards.iteh.ai)

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10079:2007 and EN 10052:1993 (but see 3.1 to 3.3) 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 normalized condition is N

[deviating from EN 10052:1993]

3.2

thermomechanical rolling

[as defined in EN 10052:1993 for thermomechanical treatment]

NOTE Thermomechanical rolling (symbol M) may include processes of increased cooling rates with or without tempering including self-tempering but excluding definitively direct quenching and tempering.

3.3

quenching and tempering

[as defined in EN 10052:1993]

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

3.4

purchaser

person or organization that orders products in accordance with this European Standard

EN 10028-1:2007+A1:2009 (E)

NOTE 1 The purchaser is not necessarily, but may be, a manufacturer of pressure equipment in accordance with the EU Directive listed in Annex ZA

NOTE 2 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 for the products shall be agreed at the time of enquiry and order with reference to the dimensional standards listed below.

a) For non-continuously hot-rolled flat products, refer to EN 10029.

•• Unless otherwise agreed at the time of enquiry and order, class B as specified in EN 10029 shall apply to the tolerance on thickness of plates.

b) For continuously hot-rolled coil or sheet/plate cut from coils (rolled width 600 mm or above) and hot-rolled slit coil in widths less than 600 mm, refer to EN 10051.

c) For hot-rolled narrow strip (rolled width less than 600 mm) refer to EN 10048.

d) For stainless cold-rolled sheet/plate, cold-rolled coil and slit coil (rolled width 600 mm or above) and stainless cold-rolled coil and slit coil in rolled widths less than 600 mm refer to EN ISO 9445.

NOTE EN ISO 9445 contains options providing wider dimensional choice.

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5 Calculation of mass

SIST EN 10028-1:2008+A1:2009

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 of EN 10028-2 to EN 10028-6. Calculations for density of stainless steels shall be based on density values given in EN 10088-1:2005, Annex A.

6 Classification and designation**6.1 Classification**

6.1.1 The classification of the steel grades in accordance with EN 10020 is given in the specific parts of EN 10028.

6.1.2 Steels covered in EN 10028-7 are additionally classified according to their structure into

- ferritic steels;
- martensitic steels;
- austenitic steels;
- austenitic-ferritic steels.

NOTE For more details see EN 10088-1.

6.2 Designation

The steel grades specified in the individual parts of EN 10028 are designated with steel names and steel numbers. The steel names have been allocated 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) type of flat product;
- c) European Standard specifying the tolerances on dimensions, shape and mass (see Clause 4) and, if the relevant European Standard permits the purchaser certain options, e.g. regarding edge finishing or tolerance classes, specific information on these aspects;
- d) nominal dimensions of the product;
- e) number of the relevant part of this European Standard;
- f) steel name or number;
- g) delivery condition, if it differs from the usual condition specified in EN 10028-2, EN 10028-3, EN 10028-4, EN 10028-5 or EN 10028-6; for stainless steels – the process route selected from the relevant table of EN 10028-7;
- h) inspection document to be issued (see 9.1.1).

7.2 Options

A number of options are specified in this part of EN 10028 and listed below. If the purchaser does not indicate a wish to implement any of these options at the time of enquiry and order, the products shall be supplied in accordance with the basic specification (see 7.1).

- 1) deviating tolerance class (see 4.1 a));
- 2) specification of the steelmaking process (see 8.1.1);
- 3) mechanical properties after additional heat treatment (see 8.4.1);
- 4) specification of special classes for the reduction of area (see 8.4.2);
- 5) verification of internal soundness (see 8.6);
- 6) one or several of the optional tests (see Table 1);
- 7) deviating frequency of testing (see 10.1.1 and 10.1.3);
- 8) deviating delivery condition (see 10.2.1.3);
- 9) use of longitudinal test pieces for the impact test (see 10.2.2.3);
- 10) specification of an analytical method (see 11.1);
- 11) temperature of the tensile test at elevated temperature (see 11.3);
- 12) deviating testing temperature for the impact test (see 11.4);
- 13) marking method (see 12.1);
- 14) special marking (see 12.2 and 12.3).

EN 10028-1:2007+A1:2009 (E)**7.3 Examples of ordering**

Examples of ordering are given in the relevant Part 2, 3, 4, 5, 6 or 7 of this European Standard.

8 Requirements**8.1 Steelmaking process**

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

8.1.2 Steels other than stainless steels shall be fully killed.

8.2 Delivery condition

See the individual parts of EN 10028 (see also 3.1 to 3.3).

8.3 Chemical composition**8.3.1 Cast analysis**

The cast analysis reported by the steel producer shall apply and comply with the requirements of the individual parts of EN 10028.

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8.3.2 Product analysis

The permissible product analysis tolerances on the limiting values given for the cast analysis are specified in the individual parts of EN 10028.

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8.4 Mechanical properties

8.4.1 The values given in the individual parts of EN 10028 apply for test pieces taken and prepared in accordance with 10.2.2. The values relate to the nominal thickness (thickness on ordering) of the products and apply to the usual delivery conditions (see the specific parts of EN 10028).

●● Agreement shall be reached, where appropriate, at the time of enquiry and order about the mechanical properties to be adhered to after additional heat treatment.

A₁ The minimum impact energy values specified in the relevant parts of EN 10028 apply, even if they are not to be verified in the case of product thicknesses < 6 mm (see 10.2.2.3 c)). **A₁**

8.4.2 ●● For products (except products made of stainless steels) of thickness 15 mm and above, it may be agreed at the time of enquiry and order to meet the requirements of one of the quality classes Z 15, Z 25, or Z 35 as specified in EN 10164:2004 characterized by minimum values for the reduction of area perpendicular to the product surface.

8.5 Surface condition

For plates, the requirements of surface quality as specified in EN 10163-2:2004 shall apply as follows:

- a) class B2 for plates in accordance with EN 10028-2 to -6;
- b) class B3 for plates in accordance with EN 10028-7.

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 may be agreed at the time of enquiry and order (see Table 1 and 11.5.3).

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 specify the required type of inspection document (3.1 or 3.2) in accordance with EN 10204.

A1) If an inspection document 3.1 is specified, the manufacturer shall operate a quality assurance system, certified by a competent Body established within the European Community and having undergone a specific assessment for materials.

NOTE See Directive 97/23/EC, Annex I, section 4.3, third paragraph and for further information the Guidelines of the EU Commission and the Member States for its interpretation (see e. g. Guidelines 7/2 and 7/16 [4]). **A1)**

If an inspection certificate 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-C29	tensile test at room temperature (including, if applicable, the test perpendicular to the product surface) and, if applicable, at elevated temperatures;
C40-C43	impact test, if applicable;
C70	steelmaking process, if applicable
C71-C92	cast analysis and, if applicable, product analysis;
D01	marking, dimensional and visual inspection and, if applicable, verification of the resistance to intergranular corrosion;
D02-D50	non-destructive tests , if applicable;
Z	validation.

9.2 Tests to be carried out

The mandatory and optional tests to be carried out and the extent of testing are specified in Table 1.