SLOVENSKI STANDARD
SIST EN 10088-4:2009

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Nerjavna jekla - 4. del: Tehniļni dobavni pogoji za tanko in debelo ploļevino in trakove iz korozijsko odpornih konstrukcijskih jekel

Stainless steels - Part 4: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes

Nichtrostende Stähle - Teil 4: Technische Lieferbedingungen für Blech und Band aus korrosionsbeständigen Stählen für das Bauwesen

Aciers inoxydables - Partie 4: Conditions techniques de livraison des tôles et bandes en acier de résistance a la corrosion pour usage de construction

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ICS:

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77.140.50	Ploļi ati jekleni izdelki in polizdelki	Flat steel products and semi-products

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Stainless steels - Part 4: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes

Aciers inoxydables - Partie 4: Conditions techniques de livraison des tôles et bandes en acier résistant à la corrosion pour usage de construction

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Contents

Page

Foreword

This document (EN 10088-4:2009) 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of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by January 2011.

EN 10088, under the general title "Stainless steels", consists of the following parts:

Part 1: List of stainless steels (including a table of European Standards, in which these stainless steels are further specified, see Annex D);

Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes;

Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes;

Part 4: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes;

Part 5: Technical delivery conditions for bars, rods, wire, sections and bright products of corrosion resisting steels for construction purposes.

The European Committee for Standardisation (CEN) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents concerning two steel grades.

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1 Scope

The scope of this part of EN 10088 is to specify the technical delivery conditions for hot or cold rolled sheet/plate and strip of standard and special grades of corrosion resisting stainless steels for construction purposes in addition to the general technical delivery conditions specified in EN 10021.

This European Standard does not apply to components manufactured by further processing of the product forms listed above with quality characteristics altered as a result of such further processing.

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 10002-5, *Metallic materials - Tensile testing - Part 5: Method of testing at elevated temperature*

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

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

EN 10027-2, *Designation systems for steels - 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 10088-1:2005, *Stainless steels - Part 1: List of stainless steels*

EN 10088-2, *Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

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

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

EN 10204, *Metallic products - Types of inspection documents*

CEN/TR 10261, *Iron and steel – Review of available methods of chemical analysis*

EN 10307, *Non-destructive testing - Ultrasonic testing of austenitic and austenitic-ferritic stainless steels flat products of thickness equal to or greater than 6 mm (reflection method)*

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

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 sulphuric acid (ISO 3651-2:1998)*

EN ISO 6506-1, *Metallic materials - Brinell hardness test - Part 1: Test method (ISO 6506-1:2005)*

EN ISO 6507-1, *Metallic materials - Vickers hardness test - Part 1: Test method (ISO 6507-1:2005)*

EN ISO 6508-1, *Metallic materials - Rockwell hardness test - Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T) (ISO 6508-1:2005)*

EN ISO 9001:2008, *Quality management systems - Requirements (ISO 9001:2008)*

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 following terms and definitions apply.

3.1
stainless steels
the definition in EN 10088-1:2005 applies

3.2
corrosion resisting steels
steels with at least 10,5 % Cr and max. 1,20 % C if their resistance to corrosion is of primary importance

3.3
product forms
the definitions in EN 10079:2007 apply

3.4
types of heat-treatment
the definitions in EN 10052:1993 apply

3.5
standard grades
grades with a relatively good availability and a wider range of application

3.6
special grades
grades for special use and/or with limited availability

4 Designation and ordering

4.1 Designation of steel grades

The steel names and steel numbers (see Tables 1 to 4) are allocated in accordance with EN 10027-1 and EN 10027-2 respectively.

4.2 Order designation

The complete designation for ordering a product according to this European Standard shall contain the following information:

a) the desired quantity;

b) the product form (e.g.: strip or sheet/plate);

c) the nominal dimensions, the number of the appropriate European Standard (see Annex B) plus any choice of requirements;

d) the type of material (steel);

e) the number of this European Standard;

f) the steel name or steel number;

g) the symbol for the desired heat treatment or cold worked condition, if for the relevant steel in the tables for the mechanical properties more than one treatment condition is covered;

h) the desired process route (see symbols in Table 6);

i) verification of internal soundness, if required (flat products with thickness ≥ 6 mm shall be tested in accordance with EN 10307);

j) the type of inspection certificate (3.1 or 3.2) according to EN 10204;

k) regulatory marking requirements (see Annex ZA).

EXAMPLE 10 plates of a steel grade with the name X5CrNi18-10 and the number 1.4301 as specified in EN 10088-4 with nominal dimensions thickness = 8 mm, width = 2000 mm, length = 5000 mm; tolerances on dimensions, shape and mass as specified in EN 10029 with thickness tolerance class B and "normal" flatness tolerance class, in process route 1D (see Table 6), inspection certificate 3.1 as specified in EN 10204 and declaration of conformity:

10 plates EN 10029-8B x 2000 x 5000
Steel EN 10088-4 - X5CrNi18-10+1D
Inspection certificate 3.1, CE

or

10 plates EN 10029-8B x 2000 x 5000
Steel EN 10088-4 - 1.4301+1D
Inspection certificate 3.1, CE

5 Classification of grades

Steels covered in this European Standard are classified according to their structure into

a) ferritic steels;

b) martensitic steels;

c) precipitation hardening steels;

d) austenitic steels;

e) austenitic-ferritic steels.

See also Annex B to EN 10088-1:2005.

6 Requirements

6.1 Steelmaking process

Unless a special steelmaking process is agreed at the time of enquiry and order, the steelmaking process for steels conforming to this European Standard shall be at the discretion of the manufacturer.

6.2 Delivery condition

The products shall be supplied by reference to the process route given in Table 6 and, where different alternatives exist, to the treatment conditions given in Tables 7 to 11, 13 and 14 (see also Annex A).

6.3 Chemical composition

6.3.1 The requirements given in Tables 1 to 4 shall apply with respect to the chemical composition according to the cast analysis.

If grades other than those included in this European Standard are required for construction purposes, they shall comply with EN 10088-2 and be in conjunction with the requirements of this European Standard.

6.3.2 The product analysis may deviate from the limiting values for the cast analysis given in Tables 1 to 4 by the values listed in Table 5.

6.4 Chemical corrosion properties

Referring to resistance to intergranular corrosion as defined in EN ISO 3651-2, for ferritic, austenitic and austenitic-ferritic steels the specification in Tables 7, 10 and 11 shall apply.

EN ISO 3651-2 shall not be applicable for testing martensitic and precipitation hardening steels.

NOTE The corrosion resistance of stainless steels is very dependant on the type of environment and can therefore not always be clearly ascertained through laboratory tests. It is therefore advisable to draw on the available experience of the use of the steels.

6.5 Mechanical properties

6.5.1 The mechanical properties at room temperature as specified in Tables 7 to 11 shall apply for the relevant specified heat treatment condition. This does not apply to the process route 1U (hot rolled, not heat treated, not descaled).

If the products are to be supplied in a non-heat-treated condition, the mechanical properties specified in 7 to 11 shall be obtained from reference test pieces which have received the appropriate heat treatment (simulated heat treatment).

For cold worked products, the tensile strength levels at ambient temperature as specified in Table 13 shall apply. The available tensile strength levels in the cold worked condition are indicated in Table 15.

Alternatively, cold worked products can be ordered according to their 0,2%-proof strength as given in Tables 14 and 16.

NOTE Austenitic steels are insensitive to brittle fracture in the solution annealed condition. Because they do not have a pronounced transition temperature, which is characteristic of other steels, they are also useful for application at cryogenic temperatures.

6.5.2 The values in Table 12 shall apply for the 0,2 %- and 1 %-proof strength of austenitic steels at elevated temperatures.

6.6 Surface quality

Slight surface imperfections, inherent in the rolling process, shall be permitted.

When products are delivered in coil form, the degree and extent of such imperfections can to be greater, due to the impracticability of removing short lengths of coil. For hot-rolled quarto-plates (symbol P in Tables 7 to 11), the requirements in EN 10163-2, class A2, shall apply unless otherwise agreed. For other products, where necessary, more precise requirements on surface quality can be agreed at the time of enquiry and order.

6.7 Internal soundness

The products shall be free of internal defects which would exclude them from being used for their intended purpose. If verification of internal soundness is required, ultrasonic testing of austenitic and austenitic-ferritic stainless steel flat products ≥ 6 mm shall be in accordance with EN 10307.

6.8 Formability at room temperature

Cold formability may be verified by elongation in the tensile test.

6.9 Dimensions and tolerances on dimensions and shape

Dimensions and tolerances on dimensions and shape shall be declared by reference to the appropriate European Standard (see Annex B). EN 10029 shall normally only be applied for product form P (individually rolled plates, "quarto plates") and not for product form H (continuously rolled strip and plate), for which EN 10051 shall be applied. When applying EN 10029, thickness tolerance class B shall apply unless specifically agreed otherwise.

6.10 Calculation of mass and tolerances on mass

6.10.1 When calculating the nominal mass from the nominal dimensions the values given in EN 10088-1 shall be used as a basis for the density of the steel concerned.

6.10.2 If the tolerances on mass are not specified in the dimensional standard listed in Annex B, they may be agreed at the time of enquiry and order.

7 Inspection and testing

7.1 General

The process control, inspection and testing shall be carried out according to 8.3 to ensure that the product complies with the requirements of both this European Standard and the order.

This includes the following:

a) A suitable frequency of verification of the dimensions of the products;

b) An adequate intensity of visual examination of the surface quality of the products;

c) An appropriate frequency and type of test to ensure that the correct grade of steel is used.

The nature and frequency of these verifications, examinations and tests shall be in accordance with the manufacturer's written procedures in compliance with 8.3.

7.2 Agreement on tests and inspection documents

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 7.3 shall be carried out and confirmed together with the following information in the inspection certificate with the code numbers and details required by EN 10168:2004.

a) the information groups A, B and Z of EN 10168:2004;

b) the results of the cast analysis in accordance with the code numbers C71 to C92 in EN 10168:2004;

c) the results of the tests marked in Table 17, second column, by "m";

d) the result of any optional test or inspections agreed at the time of enquiry and order;

e) the regulatory information (see Annex ZA).

7.3 Specific inspection and testing

7.3.1 Extent of testing

The tests to be carried out and the composition and size of the test units and the number of sample products, samples and test pieces to be taken shall be as in Table 17.

7.3.2 Selection and preparation of samples and test pieces

7.3.2.1 Sampling and sample preparation shall be in accordance with the requirements of EN ISO 14284 and EN ISO 377. In addition, the stipulations in 7.3.2.2 apply for the mechanical tests.

7.3.2.2 The samples for the tensile test shall be taken in accordance with Figure 1 in such a way that they are located halfway between the centre and a longitudinal edge. Impact test samples shall be taken from the same location.

The samples shall be taken from products in the delivery condition. If agreed, the samples may be taken before flattening. For samples to be given a simulated heat treatment the conditions for annealing, hardening and tempering shall be agreed.

7.3.2.3 Samples for the hardness test and for the resistance to intergranular corrosion test shall be taken from the same locations as those for the mechanical tests. For direction of bending the test piece in the resistance to intergranular corrosion test, see Figure 2.

7.4 Test methods

7.4.1 The chemical analysis shall be carried out using the appropriate European Standard for the element being analysed. In the absence of an appropriate European Standard, the choice of a suitable physical or chemical analytical method for the analysis shall be at the discretion of the manufacturer. The manufacturer shall declare the test method used, if required.

The list of available European Standards on chemical analysis is given in CEN/TR 10261.

7.4.2 The tensile test at room temperature shall be carried out in accordance with EN 10002-1 taking into account the additional or deviating conditions specified in Figure 1, footnote a.

The tensile strength, elongation after fracture and the 0,2 % proof strength shall be determined. In addition for austenitic steels only, the 1 %-proof strength shall be determined.

7.4.3 The tensile test for austenitic steels at elevated temperature shall be carried out in accordance with EN 10002-5. If the proof strength is to be verified for austenitic steels, the 0,2%- and the 1 %-proof strength shall be determined.

7.4.4 The impact test shall be carried out in accordance with EN 10045-1 on test pieces with a V-notch. The average obtained from three test pieces shall be considered to be the test result (see also EN 10021).

7.4.5 The Brinell hardness test shall be carried out in accordance with EN ISO 6506-1, the Rockwell hardness test in accordance with EN ISO 6508-1, and the Vickers hardness test in accordance with EN ISO 6507-1.

7.4.6 The resistance to intergranular corrosion shall be tested in accordance with EN ISO 3651-2 for ferritic, austenitic and austenitic-ferritic steels.

7.4.7 Dimensions and dimensional tolerances of the products shall be tested in accordance with the requirements of the dimensional standard relevant to the product form.

7.5 Retests

Shall be according to EN 10021.

8 Evaluation of Conformity

8.1 General

The conformity of a steel product to the requirements of this standard and with the stated values (including classes) shall be demonstrated by:

initial type testing;

factory production control by the manufacturer, including product assessment.

For the purposes of testing, steel products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for all steel products within that same family (a product may be in different families for different characteristics).

The testing of samples taken at the works in accordance with the manufacturer's prescribed plan shall be the means of evaluation of conformity of the steel product delivered in accordance with this European Standard (see Table ZA.3). The report of such testing shall be in an inspection document in accordance with EN 10204.

NOTE The assignment of tasks is given in Table ZA.3.

8.2 Initial type testing

8.2.1 General

An initial type test is the complete set of tests or other procedures, in respect of the characteristics to be assessed, determining the performance of samples of products representative of the product type.

8.2.1.1 Initial type testing

Initial type testing (see Table ZA.3) shall be performed to show conformity with this European Standard for a steel product being put onto the market and:

a) at the beginning of the production of a new or modified steel product design;