

Nederlandse norm

# NEN-EN 10088-2

(en)

Roestvaste staalsoorten - Deel 2: Technische leveringsvoorwaarden voor plaat en band van corrosievaste staalsoorten voor algemeen gebruik

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

Vervangt NEN-EN 10088-2:2005;  
NEN-EN 10088-2:2012 Ontw.

ICS 77.140.20; 77.140.50  
november 2014

Als Nederlandse norm is aanvaard:  
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Voor de in deze norm vermelde normatieve verwijzingen bestaan in Nederland de volgende equivalenten:

<u>vermelde norm</u>	<u>Nederlandse norm</u>	<u>titel</u>
EN 10021	NEN-EN 10021	Algemene technische leveringsvoorwaarden voor staalproducten
EN 10027-1	NEN-EN 10027-1	Systemen voor het aanduiden van staalsoorten - Deel 1: Aanduiding met symbolen
EN 10027-2	NEN-EN 10027-2	Systemen voor het aanduiden van staalsoorten - Deel 2: Numeriek systeem
EN 10052:1993	NEN-EN 10052:1994	Termen en definities van de warmtebehandeling van ijzer- en staalproducten
EN 10079:2007	NEN-EN 10079:2007	Definitie van staalproducten
EN 10088-1:2014	NEN-EN 10088-1:2014	Roestvaste staalsoorten - Deel 1: Lijst van roestvaste staalsoorten
EN 10163-2	NEN-EN 10163-2	Leveringsvoorwaarden voor de oppervlaktegesteldheid van warmgewalste platen, plaatstroken en profielen van staal - Deel 2: Platen en plaatstroken
EN 10168	NEN-EN 10168	Producten van staal - Keuringsdocumenten - Lijst van informatie en omschrijving
EN 10204	NEN-EN 10204	Producten van metaal - Soorten keuringsdocumenten
EN 10307	NEN-EN 10307	Niet-destructief onderzoek - Ultrasoon onderzoek van platte producten van austenitisch en austenitisch-ferritisch corrosievast staal met een dikte gelijk aan of groter dan 6 mm (reflectiemethode)
EN ISO 148-1	NEN-EN-ISO 148-1	Metallische materialen - Kerfslagproef volgens Charpy - Deel 1: Beproevingmethode
EN ISO 377	NEN-EN-ISO 377	Staal en producten van staal - Ligging en voorbereiding van monsters en proefstaven voor mechanische beproeving
EN ISO 3651-2	NEN-EN-ISO 3651-2	Bepaling van de weerstand tegen interkristallijne aantasting van corrosievast staal - Deel 2: Ferritisch, austenitisch en ferritisch-austenitisch (duplex) corrosievast staal - Corrosieproef in een milieu dat zwavelzuur bevat
EN ISO 6506-1	NEN-EN-ISO 6506-1	Metallische materialen - Hardheidsmeting volgens Brinell - Deel 1: Beproevingmethode
EN ISO 6507-1	NEN-EN-ISO 6507-1	Metalen - Hardheidsmeting volgens Vickers - Deel 1: Beproevingmethode
EN ISO 6508-1	NEN-EN-ISO 6508-1	Metalen - Hardheidsmeting volgens Rockwell - Deel 1: Beproevingmethode (schalen A, B, C, D, E, F, G, H, K, N, T)
EN ISO 6892-1	NEN-EN-ISO 6892-1	Metalen - Trekproef - Deel 1: Beproevingmethode bij kamertemperatuur
EN ISO 6892-2	NEN-EN-ISO 6892-2	Metalen - Trekproef - Deel 2: Beproevingmethode bij verhoogde temperatuur
EN ISO 14284	NEN-EN-ISO 14284	Staal en ijzer - Monsternamen en voorbereiding van monsters voor de bepaling van de chemische samenstelling

Voorbeeld  
Preview

EUROPEAN STANDARD

**EN 10088-2**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2014

ICS 77.140.20; 77.140.50

Supersedes EN 10088-2:2005

English Version

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

Aciers inoxydables - Partie 2: Conditions techniques de livraison des tôles et bandes en acier de résistance à la corrosion pour usage général

Nichtrostende Stähle - Teil 2: Technische Lieferbedingungen für Blech und Band aus korrosionsbeständigen Stählen für allgemeine Verwendung

This European Standard was approved by CEN on 9 August 2014.

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## Foreword

This document (EN 10088-2:2014) has been prepared by Technical Committee ECISS/TC 105 "Steels for heat treatment, alloy steels, free-cutting steels and stainless steels", 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 April 2015 and conflicting national standards shall be withdrawn at the latest by April 2015.

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 supersedes EN 10088-2:2005.

This standard mainly differs from the 2005 edition as follows:

- a) addition of austenitic grades 1.4618, 1.4376, 1.4640, 1.4646, addition of austenitic-ferritic (duplex) grades 1.4162, 1.4662, 1.4482, 1.4062, addition of ferritic grades 1.4600, 1.4607, 1.4611, 1.4613, 1.4630, 1.4634;
- b) chemical composition was changed for following grades: austenitic grade 1.4371, 1.4597, austenitic-ferritic grade 1.4362;
- c) standard inspection document is now a test report 2.2 according to EN 10204;
- d) products delivered with hot-rolled or cold-rolled finishes shall be supplied with a prime surface;
- e) a new cold rolled surface finish (2A) has been introduced for ferritic stainless steel grades that have been 'bright-pickled and skin passed';
- f) mechanical values have been changed for austenitic grade 1.4372, for ferritic grades 1.4016 and for martensitic grade 1.4034.

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 B);
- *Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes* [the present document];
- *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*.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Introduction

The European Organization for Standardization (CEN) draws attention to the fact that it is claimed that compliance with this document may involve the use of patents applied to seven steel grades.

CEN takes no position concerning the evidence, validity and scope of these patent rights.

The holder of these patent rights has ensured CEN that they are willing to negotiate licenses, under reasonable and non-discriminatory terms and conditions, with applicants throughout the world. In this respect, the statements of the holders of these patent rights are registered with CEN. Information may be obtained from:

Grade 1.4162, 1.4662  
Outokumpu Stainless AB  
SE-77480 Avesta, Sweden

Grade 1.4062  
Ugitech  
F-73403 Ugine Cedex, France

Grade 1.4062  
Industeel  
F-71200 Creusot, 56 Rue Clemenceau, France

Grade 1.4646, 1.4611, 1.4613  
Acciai Speciali Terni  
I-05100 Terni, Italy

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## 1 Scope

This European Standard specifies the technical delivery conditions for hot or cold rolled sheet/plate and strip of standard grades and special grades of corrosion resisting stainless steels for general purposes.

NOTE General purposes include the use of stainless steels in contact with foodstuffs.

The general technical delivery conditions specified in EN 10021 apply in addition to the specifications of this European Standard, unless otherwise specified in this European Standard.

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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10021, *General technical delivery conditions 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 10052:1993, *Vocabulary of heat treatment terms for ferrous products*

EN 10079:2007, *Definition of steel products*

EN 10088-1:2014, *Stainless steels — Part 1: List of stainless steels*

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

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

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

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 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method (ISO 148-1)*

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

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)*

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

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

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)*

**EN 10088-2:2014 (E)**

EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1)*

EN ISO 6892-2, *Metallic materials — Tensile testing — Part 2: Method of test at elevated temperature (ISO 6892-2)*

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

**3 Terms and definitions**

For the purposes of this document, the terms and definitions regarding types of heat-treatment in EN 10052:1993, regarding product forms in EN 10079:2007 and the following apply.

**3.1****stainless steels**

steels with at least 10,5 % of chromium and maximum 1,2 % of carbon

[SOURCE: EN 10020:2000, 3.2.2]

Note 1 to entry: Stainless steels are further subdivided in accordance with their main property into corrosion resisting steels, heat resisting steels and creep resisting steels.

Note 2 to entry: One type steel in Table 7 in EN 10088-1:2014 and five types of steel in Table 9 in EN 10088-1:2014 contain less chromium than the minimum defined for stainless steels, but are included in the heat-resisting and creep-resisting steels standards respectively, because they form a part of these two families of steels.

**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****general purposes**

purposes other than the special purposes mentioned in the Bibliography

**3.4****standard grades**

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

**3.5****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) were formed in accordance with EN 10027-1 and EN 10027-2 respectively.

**4.2 Designation to be used on ordering**

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

— desired quantity;

- product form (strip or sheet/plate);
- where an appropriate dimensional standard is available (see Annex B) the number of the standard, plus any choice of requirements;
- if there is no dimensional standard, the nominal dimensions and tolerances required;
- type of material (steel);
- number of this document;
- steel name or steel number;
- if for the relevant steel in the table for the mechanical properties more than one treatment condition is covered, the symbol for the desired heat treatment or cold worked condition;
- desired process route (see symbols in Table 6);
- if a verification of internal soundness is required, flat products with thickness  $\geq 6$  mm shall be tested in accordance with EN 10307;
- any additional optional tests or inspections (see 7.2.3 d));
- standard designation for a test report 2.2 or, if required, any other type of inspection document in accordance with EN 10204 (see 7.2.1)

EXAMPLE 10 plates according to EN ISO 18286 with thickness = 8 mm, width = 2000 mm, length = 5 000 mm; tolerances on width and length class B, flatness tolerance class N made of steel EN 10088-2 with the name X5CrNi18-10 and the number 1.4301 in process route 1D (see Table 6) inspection certificate 3.1 as specified in EN 10204:

10 plates EN ISO 18286 — 8 × 2000 × 5000 B  
 Steel EN 10088-2 — X5CrNi18-10  
 EN 10204 — 3.1

or

10 plates EN ISO 18286 — 8 × 2000 × 5000 B  
 Steel EN 10088-2 — 1.4301+1D  
 EN 10204 — 3.1

## 5 Classification of grades

Steels covered in this document are classified according to their structure into:

- austenitic steels,
- austenitic-ferritic steels,
- ferritic steels,
- martensitic steels,
- precipitation hardening steels.

See also EN 10088-1:2014, Annex C.

**EN 10088-2:2014 (E)****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 document shall be at the discretion of the manufacturer.

**6.2 Delivery condition**

The products shall be supplied in the delivery condition agreed at the time of enquiry and order 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, 17 and 18 (see also Annex A).

**6.3 Chemical composition**

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

**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 austenitic and austenitic-ferritic and ferritic steels the specification in Tables 7, 8 and 9 applies.

NOTE 1 EN ISO 3651-2 is not applicable for testing martensitic and precipitation hardening steels.

NOTE 2 The corrosion resistance of stainless steels is very dependent 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 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 by agreement at the time of ordering the products are to be supplied in a non-heat-treated condition, the mechanical properties specified in Tables 7, 8, 9, 10 and 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 17 apply. The available tensile strength levels in the cold worked condition are indicated in Table 19.

Alternatively, cold worked products can be ordered according to their 0,2 %-proof strength as given in Tables 18 and 20.

NOTE Austenitic steels are insensitive to brittle fracture in the solution annealed condition. As 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 Tables 12 to 16 apply for the 0,2 %- and 1 %-proof strength at elevated temperatures.

**6.6 Surface quality**

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

# Bestelformulier

# NEN

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