

SVENSK STANDARD

SS-EN 10028-3:2017



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Platta produkter av stål för tryckändamål – Del 3: Svetsbara finkornstål i normaliserat tillstånd

Flat products made of steels for pressure purposes – Part 3: Weldable fine grain steels, normalized

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Denna standard ersätter SS-EN 10028-3:2009, utgåva 3.

The European Standard EN 10028-3:2017 has the status of a Swedish Standard. This document contains the official version of EN 10028-3:2017.

This standard supersedes the Swedish Standard SS-EN 10028-3:2009, edition 3.

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EUROPEAN STANDARD

EN 10028-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2017

ICS 77.140.30; 77.140.50

Supersedes EN 10028-3:2009

English Version

Flat products made of steels for pressure purposes - Part 3: Weldable fine grain steels, normalized

Produits plats en aciers pour appareils à pression -
Partie 3 : Aciers soudables à grains fins, normalisés

Flacherzeugnisse aus Druckbehälterstählen - Teil 3:
Schweißgeeignete Feinkornbaustähle, normalgeglüht

This European Standard was approved by CEN on 7 May 2017.

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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-CENELEC Management Centre has the same status as the official versions.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

SS-EN 10028-3:2017 (E)

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European foreword

This document (EN 10028-3:2017) has been prepared by Technical Committee ECISS/TC 107 “Steels for pressure purposes”, 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of an identical text or by endorsement, at the latest by January 2018 and conflicting national standards shall be withdrawn at the latest by January 2018.

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 10028-3:2009.

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 Directive 2014/68/EU.

For relationship with Directive 2014/68/EU, see informative Annex ZA, which is an integral part of this document.

A list of changes between this document and the previous version can be found in Annex C.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

SS-EN 10028-3:2017 (E)

1 Scope

This European Standard specifies requirements for flat products for pressure equipment made of weldable fine grain steels as specified in Table 1.

NOTE 1 Fine grain steels are understood as steels with a ferritic grain size of 6 or finer when tested in accordance with EN ISO 643.

The requirements and definitions of EN 10028-1:2017 also apply.

NOTE 2 Once this European Standard is published in the EU Official Journal (OJEU) under Directive 2014/68/EU, presumption of conformity to the Essential Safety Requirements (ESRs) of Directive 2014/68/EU 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 2014/68/EU are satisfied, needs to be done.

2 Normative references

The following 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 1011-1:2009, *Welding - Recommendations for welding of metallic materials - Part 1: General guidance for arc welding*

EN 1011-2:2001, *Welding - Recommendations for welding of metallic materials - Part 2: Arc welding of ferritic steels*

EN 10028-1:2017, *Flat products made of steels for pressure purposes - Part 1: General requirements*

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

EN 10229:1998, *Evaluation of resistance of steel products to hydrogen induced cracking (HIC)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10028-1:2017 apply.

4 Tolerances on dimensions

See EN 10028-1:2017.

5 Calculation of mass

See EN 10028-1:2017.

6 Classification and designation

6.1 Classification

6.1.1 The steel grades covered by this document are given in four qualities:

- a) room temperature quality (P ... N),
- b) elevated temperature quality (P...NH),
- c) low temperature quality (P...NL1) and
- d) special low temperature quality (P...NL2).

6.1.2 The grades P275NH to P355NL2 are alloy quality steels, the grades P275NL2 and the grades P420NH to P460NL2 are alloy special steels.

6.2 Designation

See EN 10028-1:2017.

7 Information to be supplied by the purchaser

7.1 Mandatory information

See EN 10028-1:2017.

7.2 Options

A number of options are specified in this document and listed below. Additionally the relevant options of EN 10028-1:2017 apply. 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 also EN 10028-1:2017).

- 1) tests in the simulated normalized condition (see 8.2.2);
- 2) delivery of products in the untreated condition (see 8.2.3);
- 3) maximum carbon equivalent value (see 8.3.3);
- 4) no option, intentionally left blank;
- 5) modified values for R_{eH} and R_m for grades P460NH and P460NL1 (see Table 4, footnote a);
- 6) application of the $R_{p0,2}$ values of Table 5 for the corresponding P...NL1 and P...NL2 grade (see 8.4.2);
- 7) no option, intentionally left blank;
- 8) specification of a minimum impact energy of 40 J (see 8.4.1 and Table 6);
- 9) HIC test in accordance with EN 10229 (see 8.7);
- 10) mid thickness test pieces for the impact test (see Clause 10);
- 11) verification of impact energy for longitudinal test pieces (see Clause 11);
- 12) use of test solution B for the HIC test with agreed acceptance criteria (see Annex A);
- 13) limitation of copper and/or tin content (see Table 1, footnote g).

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7.3 Example for ordering

10 plates with nominal dimensions, thickness = 50 mm, width = 2 000 mm, length = 10 000 mm, made of a steel grade with the name P275NL2 and the number 1.1104 as specified in EN 10028-3, to be delivered with inspection certificate 3.1 as specified in EN 10204:

10 plates – 50 × 2000 × 10000 – EN 10028-3 – P275NL2 – Inspection certificate 3.1.

or

10 plates – 50 × 2000 × 10000 – EN 10028-3 – 1.1104 – Inspection certificate 3.1.

8 Requirements

8.1 Steelmaking process

See EN 10028-1:2017.

8.2 Delivery condition

8.2.1 Unless otherwise agreed at the time of enquiry and order (see 8.2.3), the products covered by this document shall be supplied in the normalized condition.

For steels with minimum yield strength ≥ 420 MPa, delayed cooling or additional tempering may be necessary for small product thicknesses and in special cases. If such a treatment is performed, this shall be noted in the inspection document.

8.2.2 Normalizing may, at the discretion of the manufacturer, be replaced with normalizing rolling for all steel grades covered by this standard. In this case, additional tests on simulated normalized samples with an agreed frequency of testing may be agreed at the time of enquiry and order to verify that the specified properties are complied with.

8.2.3 If agreed at the time of enquiry and order, products covered by this document may also be delivered in the untreated condition.

In these cases, testing shall be carried out in the simulated normalized condition (but see 8.2.1).

8.2.4 Information on welding are given in Annex B of this standard.

8.3 Chemical composition

8.3.1 The requirements of Table 1 shall apply for the chemical composition according to 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 in accordance with Table 3 may be agreed at time of enquiry and order.

Table 1 — Chemical composition (cast analysis) ^a

Steel grade		% by mass															
Steel name	Steel number	C max.	Si max.	Mn	P max.	S max.	Al _{total} min.	N max.	Cr max.	Cu ^g max.	Mo max.	Nb max.	Ni max.	Ti max.	V max.	Nb + Ti + V max.	
P275NH	1.0487	0,16	0,40	0,80 ^b to 1,50	0,025	0,010	0,020 ^{c d}	0,012	0,30 ^e	0,30 ^e	0,08 ^e	0,05	0,50	0,03	0,05	0,05	
P275NL1	1.0488					0,008											
P275NL2	1.1104					0,020											0,005
P355N	1.0562	0,18	0,50	1,10 to 1,70	0,025	0,010	0,020 ^{c d}	0,012	0,30 ^e	0,30 ^e	0,08 ^e	0,05	0,50	0,03	0,10	0,12	
P355NH	1.0565					0,008											
P355NL1	1.0566					0,020											0,005
P355NL2	1.1106					0,020											0,005
P420NH	1.8932	0,20	0,60	1,10 to 1,70	0,025	0,010	0,020 ^{c d}	0,020	0,30 ^e	0,30 ^e	0,10 ^e	0,05	0,80	0,03	0,20	0,22	
P420NL1	1.8912					0,008											
P420NL2	1.8913					0,020											0,005
P460NH	1.8935	0,20	0,60	1,10 to 1,70	0,025	0,010	0,020 ^{c d}	0,025	0,30	0,70 ^f	0,10	0,05	0,80	0,03	0,20	0,22	
P460NL1	1.8915					0,008											
P460NL2	1.8918					0,020											0,005

^a Elements not listed in this table shall not be intentionally added to the steel without the agreement of the purchaser except for finishing the cast. All appropriate measures shall be taken to prevent the addition from scrap or other materials used in steelmaking of these elements which may adversely affect the mechanical properties and usability.

^b For nominal thicknesses < 6 mm, a minimum Mn content of 0,60 % is permitted.

^c The Al_{total} content may fall short this minimum if niobium, titanium or vanadium are additionally used for nitrogen binding.

^d If only aluminium is used for nitrogen binding, a ratio $\frac{Al}{N} \geq 2$ shall apply.

^e The sum of the percentages by mass of the three elements chromium, copper and molybdenum shall not exceed 0,45 %.

^f If the percentage by mass of copper exceeds 0,30 %, the percentage by mass of nickel shall be at least half the percentage by mass of copper.

^g A lower maximum copper content and/or a maximum sum of copper and tin content, e.g. Cu + 6 Sn ≤ 0,33 %, may be agreed upon at the time of enquiry and order, e.g. with regard to hot formability.