SLOVENSKI STANDARD
SIST EN 10028-4:2017

01-oktober-2017

Nadomešča:
SIST EN 10028-4:2009

Ploščati jekleni izdelki za tlačne posode - 4. del: Jekla, legirana z nikljem, s specificiranimi lastnostmi pri nizkih temperaturah

Flat products made of steels for pressure purposes - Part 4: Nickel alloy steels with specified low temperature properties

Flacherzeugnisse aus Druckbehälterstählen - Teil 4: Nickellegierte kaltzähe Stähle

Produits plats en aciers pour appareils à pression — Partie 4 : Aciers alliés au nickel avec caractéristiques spécifées à basse temperature

Ta slovenski standard je istoveten z: **EN 10028-4:2017**

ICS:

77.140.30	Jekla za uporabo pod tlakom	Steels for pressure purposes
77.140.50	Ploščati jekleni izdelki in polizdelki	Flat steel products and semi-products

SIST EN 10028-4:2017 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS 77.140.30; 77.140.50

Supersedes EN 10028-4:2009

English Version

Flat products made of steels for pressure purposes - Part 4: Nickel alloy steels with specified low temperature properties

Produits plats en aciers pour appareils à pression - Partie 4 : Aciers alliés au nickel avec caractéristiques spécifiées à basse température

Flacherzeugnisse aus Druckbehälterstählen - Teil 4: Nickellegierte kaltzähe Stähle

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

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Contents

Page

European foreword

This document (EN 10028-4:2017) 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of an identical text or by endorsement, at the latest by January 2018 and conflicting national standards shall be withdrawn at the latest by January 2018.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 10028-4:2009.

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 B.

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.

1 Scope

This European Standard specifies requirements for flat products for pressure equipment made of nickel alloy steels as specified in Table 1.

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

NOTE 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 10020:2000, *Definition and classification of grades of steel*

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*

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

In accordance with EN 10020:2000 all steel grades covered by this document 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 European Standard 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 EN 10028-1:2017).

1) delivery condition other than that specified in Table 3 (see 8.2.2);

2) delivery of products in the untreated condition (see 8.2.3);

3) specification of a minimum impact energy of 40 J (see 8.4 and Table 4);

4) mid-thickness test pieces for the impact test (see Clause 10);

5) verification of impact energy for longitudinal test pieces (see Clause 11).

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 15NiMn6 and the number 1.6228 as specified in EN 10028-4, to be delivered with inspection certificate 3.1 as specified in EN 10204

10 plates – 50 × 2000 × 10 000 – EN 10028–4 –15NiMn6 – Inspection certificate 3.1

or

10 plates – 50 × 2000 × 10 000 – EN 10028-4 – 1.6228 – Inspection certificate 3.1

8 Requirements

8.1 Steelmaking process

See EN 10028-1:2017.

8.2 Delivery condition

8.2.1 The delivery condition shall be noted in the inspection document.

8.2.2 Unless otherwise agreed at the time of enquiry and order, the products covered by this document shall be supplied in the usual delivery conditions specified in Table 3.

8.2.3 If so agreed at the time of enquiry and order, the products may be supplied in the untreated condition.

In these cases, the specified tests shall be carried out on test pieces in the usual delivery condition as given in Table 3.

Annex A contains heat treatment information for the purchaser.

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.

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.	Mo max.	Nb max.	Ni	V max.
11MnNi5–3	1.6212	0,14	0,50	0,70 to 1,50	0,025	0,010	0,020	–	0,05	0,30 [b] to 0,80	0,05
13MnNi6–3	1.6217	0,16	0,50	0,85 to 1,70	0,025	0,010	0,020	–	0,05	0,30 [b] to 0,85	0,05
15NiMn6	1.6228	0,18	0,35	0,80 to 1,50	0,025	0,010	–	–	–	1,30 to 1,70	0,05
12Ni14	1.5637	0,15	0,35	0,30 to 0,80	0,020	0,005	–	–	–	3,25 to 3,75	0,05
X12Ni5	1.5680	0,15	0,35	0,30 to 0,80	0,020	0,005	–	–	–	4,75 to 5,25	0,05
X8Ni9	1.5662	0,10	0,35	0,30 to 0,80	0,020	0,005	–	0,10	–	8,5 to 10,0	0,05
X7Ni9	1.5663	0,10	0,35	0,30 to 0,80	0,015	0,005	–	0,10	–	8,5 to 10,0	0,01

[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. The content of Cr + Cu + Mo shall not exceed 0,50 %.

[b] For nominal thicknesses ≤ 40 mm, a minimum nickel content of 0,15 % is permitted.

Table 2 — Permissible product analysis tolerances on the limiting values given in Table 1 for the cast analysis

Element	Specified value in the cast analysis according to Table 1 % by mass	Permissible deviation [a] of the product analysis % by mass
C	≤ 0,18	+ 0,02
Si	≤ 0,50	+ 0,05
Mn	≤ 1,00	± 0,05
	> 1,00 to ≤ 1,70	± 0,10
P	≤ 0,015	+ 0,003
	> 0,015 to ≤ 0,025	+ 0,005
S	≤ 0,010	+ 0,003
Al	≥ 0,020	− 0,005
Mo	≤ 0,10	+ 0,03
Nb	≤ 0,05	+ 0,01
Ni	≤ 0,85	± 0,05
	> 0,85 to ≤ 3,75	± 0,07
	> 3,75 to ≤ 10,0	± 0,10
V	≤ 0,05	+ 0,01

[a] If several product analyses are carried out on one cast, and the contents of an individual element determined lie outside the permission range of the chemical composition specified for the cast analysis, then it is only allowed to exceed the permissible maximum value or fall short of the permissible minimum value, but not both for one cast.

8.4 Mechanical properties

The values given in Tables 3 and 4 (see also EN 10028-1:2017 and Clauses 10 and 11) shall apply.

Optionally, for steel grades 11MnNi5-3, 13MnNi6-3, 15NiMn6, 12Ni14 and X12Ni5, a minimum impact energy value of 40 J may be specified for temperatures where lower minimum values are specified (see Table 4, footnote d).