



SLOVENSKI STANDARD
SIST EN 10250-4:2000
01-november-2000

Open die steel forgings for general engineering purposes - Part 4: Stainless steels

Freiformschmiedestücke aus Stahl für allgemeine Verwendung - Teil 4: Nichtrostende Stähle

Pieces forgées en acier pour usage général - Partie 4: Aciers inoxydables

STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: EN 10250-4:1999

<https://standards.iteh.ai/catalog/standards/sist/f2a25873-205e-4793-91c0-ca0c82bbd1cd/sist-en-10250-4-2000>

ICS:

77.140.20	Visokokakovostna jekla	Stainless steels
77.140.85	Železni in jekleni kovani izdelki	Iron and steel forgings

SIST EN 10250-4:2000

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 10250-4:2000

<https://standards.iteh.ai/catalog/standards/sist/f2a25873-205e-4793-91c0-ca0c82bbd1cd/sist-en-10250-4-2000>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10250-4

October 1999

ICS 77.140.20; 77.140.85

English version

Open die steel forgings for general engineering purposes - Part 4: Stainless steels

Pièces forgées en acier pour usage général - Partie 4:
Aciers inoxydables

Freiformschmiedestücke aus Stahl für allgemeine
Verwendung - Teil 4: Nichtrostende Stähle

This European Standard was approved by CEN on 9 September 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

iTeh STANDARD PREVIEW
(standards.itteh.ai)

SIST EN 10250-4:2000
https://standards.itteh.ai/catalog/standards/sist/f2a25873-205e-4793-91c0-ca0c82bbd1cd/sist-en_10250-4-2000



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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Page 2
EN 10250-4:1999

Contents

Page

Foreword	3
1 Scope	4
2 Normative references	4
3 Chemical Composition	4
4 Heat treatment	10
5 Mechanical properties	10
Annex A (informative) Heat treatment details	14
Annex B (informative) Mechanical properties at low temperatures	17
Annex C (informative) Elevated temperature proof strength	18

STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 10250-4:2000

<https://standards.iteh.ai/catalog/standards/sist/f2a25873-205e-4793-91c0-ca0c82bbd1cd/sist-en-10250-4-2000>



Foreword

This European Standard has been prepared by Technical Committee ECISS/TC 28 "Steel forgings", the secretariat of which is held by BSI.

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 2000, and conflicting national standards shall be withdrawn at the latest by April 2000.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. This European Standard is considered to be a supporting standard to those application and product standards which in themselves support an essential safety requirement of a New Approach Directive and which make reference to this European Standard.

The titles of the other Parts of this European Standard are:

Part 1: General requirements

Part 2: Non-alloy quality and special steels

Part 3: Alloy special steels

<https://standards.iteh.ai/catalog/standards/sist/2a25873-205e-4793-91c0->

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This Part of this European Standard specifies the technical delivery requirements for open die forgings, forged bars and products pre-forged and finished in ring rolling mills, manufactured from stainless steels with ferritic, martensitic, austenitic and austenitic-ferritic structures.

NOTE1. The majority of steels listed in this Part of EN 10250 are identical to steels specified EN 10088-3 and more extensive information on properties is given in that European Standard.

General information on technical delivery conditions is given in EN 10021

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- | | |
|------------|------------------------------------------------------------------------------------------------------------------------------------|
| EN 10021 | General technical delivery requirements for iron and steel products |
| EN 10088-3 | Stainless steels – Part 3: Technical delivery conditions for semi-finished products, bars, rods and sections for general purposes. |
| EN 10250-1 | Open steel die forgings for general engineering purposes – Part 1: General requirements |

3 Chemical Composition

3.1 Cast Analysis

The chemical composition of the steel shall be determined by cast analysis and shall conform to the analysis given in tables 1, 2 and 3. (see A.7, A.8, and A.11 of EN 10250-1).

Elements not quoted in tables 1, 2, and 3 shall not be added intentionally to the steel without the agreement of the purchaser, except for the purpose of finishing the heat. All reasonable measures should also be taken to prevent the addition from the scrap, or other material used in the manufacture of the steel, of such elements which affect the corrosion resistance, mechanical properties and applicability of the steel.

3.2 Product Analysis

The product analysis shall not deviate from the specified cast analysis (see tables 1, 2 and 3) by more than the values specified in table 4 (see 9.2 to EN 10250-1).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 10250-4:2000

<https://standards.iteh.ai/catalog/standards/sist/f2a25873-205e-4793-91c0-ca0c82bbd1cd/sist-en-10250-4-2000>

Table 1: Steel grades and chemical composition - ferritic and martensitic grades

Steel designation		C %	Si max %	Mn max %	P max %	S max %	Cr %	Mo %	Ni %	Others %
Name	Number									
X6CrAl13	1.4002	≤ 0,08	1,00	1,00	0,040	0,030 ¹⁾	12,00 to 14,00	-	-	Al 0,10 to 0,30
X6Cr17	1.4016	≤ 0,08	1,00	1,00	0,040	0,030 ¹⁾	16,00 to 18,00	-	-	-
X12Cr13	1.4006	0,08 to 0,15	1,00	1,50	0,040	0,030 ¹⁾	11,50 to 13,50	-	≤ 0,75	-
X20Cr13	1.4021	0,16 to 0,25	1,00	1,50	0,040	0,030 ¹⁾	12,00 to 14,00	-	-	-
X30Cr13	1.4028	0,26 to 0,35	1,00	1,50	0,040	0,030 ¹⁾	12,00 to 14,00	-	-	-
X17CrNi16-2	1.4057	0,12 to 0,22	1,00	1,50	0,040	0,030 ¹⁾	15,00 to 17,00	-	1,50 to 2,50	-
X3CrNiMo13-4	1.4313	≤ 0,05	0,70	1,50	0,040	0,015	12,00 to 14,00	0,30 to 0,70	3,50 to 4,50	N ≥ 0,020
X4CrNiMo16-5-1	1.4418	≤ 0,06	0,70	1,50	0,040	0,030 ¹⁾	15,00 to 17,00	0,80 to 1,50	4,00 to 6,00	N ≥ 0,020
X5CrNiCuNb16-4	1.4542	≤ 0,07	0,70	1,50	0,040	0,030 ¹⁾	15,00 to 17,00	≤ 0,60	3,00 to 5,00	Nb=5xC to 0,45 Cu=3,00 to 5,00

¹⁾For products to be machined a controlled sulfur content of 0,015 to 0,030 % is recommended.

Table 2: Steel grades and chemical composition - austenitic grades

Steel designation		C max	Si max	Mn max	P max	S max	N	Cr	Mo	Ni	Nb	Ti	Others
Name	Number	%	%	%	%	%	%	%	%	%	%	%	%
X2CrNi18-9	1.4307	0,030	1,00	2,00	0,045	≤ 0,030 ¹⁾	≤ 0,11	17,50 to 19,50	-	8,00 to 10,00	-	-	-
X2CrNi19-11	1.4306	0,030	1,00	2,00	0,045	0,030 ¹⁾	≤ 0,11	18,00 to 20,00	-	10,00 to 12,00 ²⁾	-	-	-
X2CrNi18-10	1.4311	0,030	1,00	2,00	0,045	0,030 ¹⁾	0,12 to 0,22	17,00 to 19,50	-	8,50 to 11,50	-	-	-
X5CrNi18-10	1.4301	0,07	1,00	2,00	0,045	0,030 ¹⁾	≤ 0,11	17,00 to 19,50	-	8,00 to 10,50	-	-	-
X6CrNiTi18-10	1.4541	0,08	1,00	2,00	0,045	0,030 ¹⁾	-	17,00 to 19,00	-	9,00 to 12,00 ³⁾	-	5xC to 0,70	-
X2CrNiMo17-12-2	1.4404	0,030	1,00	2,00	0,045	0,030 ¹⁾	≤ 0,11	16,50 to 18,50	2,00 to 2,50	10,00 to 13,00 ²⁾	-	-	-
X2CrNiMoN17-11-2	1.4406	0,030	1,00	2,00	0,045	0,030 ¹⁾	0,12 to 0,22	16,50 to 18,50	2,00 to 2,50	10,00 to 12,00	-	-	-
X5CrNiMo17-12-2	1.4401	0,07	1,00	2,00	0,045	0,030 ¹⁾	≤ 0,11	16,50 to 18,50	2,00 to 2,50	10,00 to 13,00	-	-	-
X6CrNiMoTi17-12-2	1.4571	0,08	1,00	2,00	0,045	0,030 ¹⁾	-	16,50 to 18,50	2,00 to 2,50	10,50 to 13,50 ³⁾	-	5xC to 0,70	-
X2CrNiMoN17-13-3	1.4429	0,030	1,00	2,00	0,045	0,015	0,12 to 0,22	16,50 to 18,50	2,50 to 3,00	11,00 to 14,00 ²⁾	-	-	-
X3CrNiMo17-13-3	1.4436	0,05	1,00	2,00	0,045	0,030 ¹⁾	≤ 0,11	16,50 to 18,50	2,50 to 3,00	10,50 to 13,00 ²⁾	-	-	-
X2CrNiMo18-14-3	1.4435	0,030	1,00	2,00	0,045	0,030 ¹⁾	≤ 0,11	17,00 to 19,00	2,50 to 3,00	12,50 to 15,00	-	-	-
X1NiCrMoCu25-20-5	1.4539	0,020	0,70	2,00	0,030	0,010	≤ 0,15	19,00 to 21,00	4,00 to 5,00	24,00 to 26,00	10xC to 1,00	-	Cu 1,20 to 2,00
X6CrNiNb18-10	1.4550	0,08	1,00	2,00	0,045	0,015	-	17,00 to 19,00	-	9,00 to 12,00 ²⁾	-	-	-
X1NiCrMoCu31-27-4	1.4563	0,020	0,70	2,00	0,030	≤ 0,010	≤ 0,11	26,00 to 28,00	3,00 to 4,00	30,00 to 32,00	-	-	Cu 0,70 to 1,50
X1CrNiMoCuN20-18-7 ³⁾	1.4547 ³⁾	0,020	0,70	1,00	0,030	0,010	0,18 to 0,25	19,50 to 20,50	6,00 to 7,00	17,500 to 18,50	-	-	Cu 0,50 to 1,00
X1NiMoCuN25-20-7	1.4529	0,020	0,50	1,00	0,030	0,010	0,15 to 0,25	19,00 to 21,00	6,00 to 7,00	24,00 to 26,00	-	-	-

¹⁾ For products to be machined a controlled sulfur content of 0,015 to 0,030 % is recommended.

²⁾ Where for special reasons, e.g. hot workability for fabrication where it is necessary to minimize the delta ferrite content, or with the aim of low permeability, the maximum Ni content may be increased by the following amounts:

0,50 % : 1.4571 - 1,00 % : 1.4306, 1.4429, 1.4436, 1.4541, 1.4550 - 1,50 % : 1.4404

³⁾ Patented steel

Table 3: Steel grades and chemical composition - austenitic-ferritic grades

Steel designation		C	Si	Mn	P	S	N	Cr	Mo	Ni	Others
Name	Number	max %	max %	max %	max %	max %	%	%	%	%	%
X2CrNiN23-4 ²⁾	1.4362 ²⁾	0,030	1,00	2,00	0,035	0,015	0,05 to 0,20	22,00 to 24,00	0,10 to 0,60	3,50 to 5,50	Cu 0,10 to 0,60
X3CrNiMoN27-5-2	1.4460	0,05	1,00	2,00	0,035	0,030 ¹⁾	0,05 to 0,20	25,00 to 28,00	1,30 to 2,00	4,50 to 6,50	-
X2CrNiMoN22-5-3	1.4462	0,030	1,00	2,00	0,035	0,015	0,10 to 0,22	21,00 to 23,00	2,50 to 3,50	4,50 to 6,50	-
X2CrNiMoCuN25-6-3	1.4507	0,030	0,70	2,00	0,035	0,015	0,15 to 0,30	24,00 to 26,00	2,70 to 4,00	5,50 to 7,50	Cu 1,00 to 2,50
X2CrNiMoN25-7-4 ²⁾	1.4410 ²⁾	0,030	1,00	2,00	0,035	0,015	0,20 to 0,35	24,00 to 26,00	3,00 to 4,50	6,00 to 8,00	-
X2CrNiMoCuWN25-7-4	1.4501	0,030	1,00	1,00	0,035	0,015	0,20 to 0,30	24,00 to 26,00	3,00 to 4,00	6,00 to 8,00	W 0,50 to 1,00 Cu 0,50 to 1,00

1) For products to be machined a controlled sulfur content of 0,015 to 0,030 % is recommended.

2) Patented steel

Table 4: Permissible deviations between the product analysis and the limiting values given in tables 1, 2 and 3 for the cast analysis

Element	Permissible maximum content in the cast analysis %	Permissible deviation %
Carbon	$\leq 0,030$ $> 0,030 \leq 0,20$ $> 0,20 \leq 0,35$	$+ 0,005$ $\pm 0,01$ $\pm 0,02$
Silicon	$\leq 1,00$	$+ 0,05$
Manganese	$\leq 1,0$ $> 1,0 \leq 2,0$	$+ 0,03$ $\pm 0,04$
Phosphorus	$\leq 0,045$	$+ 0,005$
Sulfur	$\leq 0,015$ $> 0,015 \leq 0,030$	$+ 0,003$ $+ 0,005$
Nitrogen	$\leq 0,35$	$\pm 0,01$
Aluminium	$> 0,10 \leq 0,30$	$\pm 0,05$
Chromium	$> 11,50 \leq 15,00$ $> 15,00 \leq 20,00$ $> 20,00 \leq 28,00$	$\pm 0,15$ $\pm 0,20$ $\pm 0,25$
Copper	$\leq 1,00$ $> 1,00 \leq 5,00$	$\pm 0,07$ $\pm 0,10$
Molybdenum	$\leq 0,60$ $> 0,60 \leq 1,75$ $> 1,75 \leq 7,00$	$\pm 0,03$ $\pm 0,05$ $\pm 0,10$
Nickel	$\leq 1,00$ $> 1,00 \leq 5,00$ $> 5,00 \leq 10,00$ $> 10,00 \leq 20,00$ $> 20,00 \leq 32,00$	$+ 0,03$ $\pm 0,07$ $\pm 0,10$ $\pm 0,15$ $\pm 0,20$
Titanium	$\leq 0,70$	$\pm 0,05$
Niobium	$\leq 1,00$	$\pm 0,05$
Tungsten	$\leq 1,00$	$\pm 0,05$