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Steel forgings for pressure purposes – Part 5: Martensitic, austenitic and austenitic-ferritic stainless steels

The European Standard EN 10222-5:1999 has the status of a Swedish Standard. This document contains the official English version of EN 10222-5:1999.

Swedish Standards corresponding to documents referred to in this Standard are listed in "Catalogue of Swedish Standards", issued by SIS. The Catalogue lists, with reference number and year of Swedish approval, International and European Standards approved as Swedish Standards as well as other Swedish Standards.

Smide av stål för tryckkärlsändamål – Del 5: Martensitiska, austenitiska och austenit-ferritiska rostfria stål

Europastandarden EN 10222-5:1999 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 10222-5:1999.

Motsvarigheten och aktualiteten i svensk standard till de publikationer som omnämns i denna standard framgår av "Katalog över svensk standard", som ges ut av SIS. I katalogen redovisas internationella och europeiska standarder som fastställts som svenska standarder och övriga gällande svenska standarder.

Direktivet 97/23/EG för tryckbärande anordningar som fastställdes den 29 maj 1997 gäller från 29 november 1999. Som alternativ får dock de nationella regler som gällde dagen före detta datum tillämpas under en övergångstid t o m 29 maj 2002.

I Sverige innebär detta bl a:

- att tillverkningsdelen i ASS kungörelse AFS 1994:39 inte får tillämpas efter 2002-05-29. Från och med 2002-05-30 utgör AFS 1999:4, den svenska implementeringen av direktivet, det enda alternativet för sådana tryckbärande anordningar som täcks av direktivet.
- att de svenska Tryckkärls- och Rörledningsnormerna på sikt kommer att ersättas av europastandarder för oeldade tryckkärl (EN 13445) respektive rörledningar (EN 13480).
- att tillståndssiffran –27 i svenska standarder för rostfria stål med leveransformen smide kommer att dras in och ersättas av EN 10222-5.

ICS 77.140.30; 77.140.85

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10222-5

December 1999

ICS 77.140.30; 77.140.85

English version

**Steel forgings for pressure purposes - Part 5: Martensitic,
austenitic and austenitic-ferritic stainless steels**

Pièces forgées en acier pour appareils à pression - Partie
5: Aciers inoxydables martensitiques, austénitiques et
austéno-ferritiques

Schmiedestücke aus Stahl für Druckbehälter - Teil 5:
Martensitische, austenitische und austenitisch-ferritische
nichtrostende Stähle

This European Standard was approved by CEN on 3 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.



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

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

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZB, which is an integral part of this standard.

Attention is drawn to annex ZA which is an A-deviation requested by Sweden.

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

Part 1: General requirements for open die forgings

Part 2: Ferritic and martensitic steels with specified elevated temperature properties

Part 3: Nickel steels with specified low temperature properties

Part 4: Weldable fine grain steels with high proof strength

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 conditions for forgings for pressure purposes made of stainless steels, including creep resisting steels. Chemical composition and mechanical properties are specified.

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 10222-1:1998	Steel forgings for pressure purposes - Part 1: General requirements for open die forgings

3 Chemical composition

3.1 Cast analysis

The chemical composition (cast analysis), determined in accordance with EN 10222-1, shall conform to table 1.

3.2 Product analysis

The product analysis shall not deviate from the specified cast analysis (see table 1) by more than the values specified in table 2 (see 9.2 to EN 10222-1:1998).

4 Heat treatment and mechanical properties

When heat treated in accordance with table 1, the mechanical properties determined in accordance with EN 10222-1, shall conform to the requirements of table 1.

Verification of the impact properties of martensitic and austenitic-ferritic stainless steels shall be mandatory and for austenitic stainless steels shall be by agreement.

Elevated temperature 0,2 % proof strength ($R_{p0,2}$) values shall conform to table 3.

Elevated temperature 1,0 % proof strength ($R_{p1,0}$) values shall conform to table 4.

Elevated temperature tensile strength (R_m) values shall conform to the requirements of table 5.

The testing temperature for impact properties and elevated temperature properties shall be agreed at the time of enquiry and order.

Reference data for stress rupture properties are given in annex A for information.

Table 1: Chemical composition, mechanical properties and heat treatment

Steel designation	Chemical composition % (cast analysis) ¹⁾											Mechanical properties at room temperature						Heat treatment							
	Name	Number	C	Si max.	Mn max.	P max.	S max.	Cr	Mo	Ni	N	Others ⁸⁾	Thickness of the ruling section t _R mm max.	0,2% proof strength R _{p0,2} min. N/mm ²	1,0% proof strength R _{p1,0} min. N/mm ²	Tensile strength R _m N/mm ²	Elongation ³⁾ A	Impact energy (ISO-V) KV > 10 mm thick at 20 °C J min.	Symbol ⁴⁾	Solution temp. °C	Cooling in ⁵⁾				
Martensitic steel	X3 CrNiMo 13-4	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	0,020 min	-	350	550	-	750 to 900	17	16	100	80	100	100	100	950 to 1050	a.o. ⁷⁾
													250	650	-	780 to 930	17	15	90	70	-	-	-	950 to 1050	a.o. ⁸⁾
Austenitic steels	X2 CrNi 18-9	1.4307	≤ 0,030	1,00	2,00	0,045	0,015 ²⁾	17,50 to 19,50	-	8,00 to 10,00	0,11 max	-	250	200	230	500 to 700	45	35	100	60	100	100	100	1025 to 1100	w.a
		1.4311	≤ 0,030	1,00	2,00	0,045	0,015 ²⁾	17,00 to 19,50	-	8,50 to 11,50	0,12 to 0,22	-	250	270	305	550 to 750	45	35	100	60	100	100	100	1000 to 1100	w.a
		1.4301	≤ 0,07	1,00	2,00	0,045	0,015 ²⁾	17,00 to 19,50	-	8,00 to 10,50	0,11 max	-	250	200	230	500 to 700	45	35	100	60	100	100	100	1000 to 1100	w.a
		1.4541	≤ 0,08	1,00	2,00	0,045	0,015 ²⁾	17,00 to 19,00	-	9,00 to 12,00	-	Ti 5% C to 0,70	450	200	235	510 to 710	40	30	100	60	100	100	100	1020 to 1120	w.a
		1.4550	≤ 0,08	1,00	2,00	0,045	0,015 ²⁾	17,00 to 19,00	-	9,00 to 12,00	-	Nb 10% C to 1,00	450	205	240	510 to 710	40	30	100	60	100	100	100	1020 to 1120	w.a
		1.4948	0,04 to 0,08	1,00	2,00	0,035	0,015 ²⁾	17,00 to 19,00	-	8,00 to 11,00	0,11 max	-	250	195	230	490 to 690	45	35	100	60	100	100	100	1050 to 1120	w.a
X6 CrNiTiB 18-10	1.4941	0,04 to 0,08	1,00	2,00	0,035	0,015 ²⁾	17,00 to 19,00	-	9,00 to 12,00	-	Ti 5% C to 0,80 B 0,0015 to 0,0050	450	175	210	490 to 690	40	30	100	60	100	100	100	1070 to 1140	w.a	

¹⁾ Elements not listed in this table may not be intentionally added to the steel without the agreement of the purchaser except for finishing the cast. All appropriate precautions are to be taken to avoid the addition of such elements from scrap and other materials used in production which would impair mechanical properties and the suitability of the steel.
²⁾ For products to be machined a controlled sulfur content of 0,015 % to 0,030 % is recommended and permitted by agreement.
³⁾ l = longitudinal; t = tangential; tr = transverse
⁴⁾ AT = solution treated; QT = quenched and tempered; T = tempered
⁵⁾ a = air; o = oil; w = water
⁶⁾ Patented grade.
⁷⁾ Double temper at 600 °C to 620 °C.
⁸⁾ Temper at 570 °C to 600 °C.