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

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

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Europastandarden EN 10222-5:2017 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 10222-5:2017.

Denna standard ersätter SS-EN 10222-5, utgåva 1.

The European Standard EN 10222-5:2017 has the status of a Swedish Standard. This document contains the official version of EN 10222-5:2017.

This standard supersedes the Swedish Standard SS-EN 10222-5, edition 1.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Rostfria stål, SIS/TK 135.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10222-5

April 2017

ICS 77.140.30; 77.140.85

Supersedes EN 10222-5:1999

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 austénitiques martensitiques et austénoferritiques

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

This European Standard was approved by CEN on 25 December 2016.

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 CEN-CENELEC Management Centre 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 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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European foreword

This document (EN 10222-5:2017) has been prepared by Technical Committee ECISS/TC 111 “Steel castings and forgings”, the secretariat of which is held by AFNOR.

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 October 2017, and conflicting national standards shall be withdrawn at the latest by October 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 10222-5:1999.

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 EU Directive 2014/68/EU.

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

EN 10222 consists of the following parts under the general title “*Steel forgings for pressure purposes*”:

— *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*

— *Part 5: Martensitic, austenitic and austenitic-ferritic stainless steels.*

Annex C provides details about significant technical changes to EN 10222-5:1999.

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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 the technical delivery conditions for forgings for pressure purposes, made of stainless steels, including creep resisting steels. Chemical composition and mechanical properties are specified.

NOTE Once this 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 standard 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. The series EN 10222–1 to EN 10222–5 is structured so that the data related to different materials is in the part allocated for that material. The presumption of conformity to the Essential Safety Requirements of Directive 2014/68/EU depends on both the text in part 1 and the data in part 2, 3, 4 or 5.

General information on technical delivery conditions is given in EN 10021.

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

EN 10222-1:2017, *Steel forgings for pressure purposes — Part 1: General requirements for open die forgings*

EN ISO 3651-2:1998, *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 3651-2:1998)*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in EN 10222-1:2017 apply.

4 Classification and designation

4.1 Classification

The steel grades covered in this document are classified according to their structure into:

— martensitic steels;

— austenitic steels;

— austenitic-ferritic steels.

NOTE For more details see EN 10088–1.

4.2 Designation

See EN 10222-1:2017.

5 Information to be supplied by the purchaser

5.1 Mandatory information

Shall be in accordance with EN 10222-1.

5.2 Options

A number of options are specified in this European Standard and listed below. Additionally the relevant options of EN 10222-1 apply. If the purchaser does not give any information 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 10222-1).

1) test temperature for the tensile test at elevated temperature, if applicable (see 6.4.3);

2) test temperature of the impact test at low temperature (see 6.4.4);

3) controlled sulphur content (see Table 2, footnote b).

6 Requirements

6.1 Steelmaking process and manufacture of the product

Shall be in accordance with EN 10222-1.

6.2 Delivery condition

The products shall be delivered in the heat treatment condition specified in Table 1.

6.3 Chemical composition and chemical corrosion properties

6.3.1 Cast analysis

The chemical composition (cast analysis), determined in accordance with EN 10222-1 shall conform to the requirements of Table 2.

6.3.2 Product analysis

The product analysis shall not deviate from the specified cast analysis (see 6.3.1) by more than the values specified in Table 3.

6.3.3 Resistance to intergranular corrosion

The specifications in Table 4 apply in respect to resistance to intergranular corrosion as defined in EN ISO 3651-2, for austenitic and austenitic-ferritic steels.

See EN 10222-1:2017, 9.9, Table 1.

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

NOTE 2 The corrosion resistance of stainless steels is very dependent on the type of environment and can therefore not always be clearly as certained through laboratory tests. It is therefore advisable to draw on the available experience of the use of the steels.

6.4 Mechanical properties

6.4.1 When heat treated in accordance with Table 1, the mechanical properties shall conform to the requirements of Table 4.

6.4.2 Elevated temperature proof strength ($R_{p0,2}$ and $R_{p1,0}$) values shall conform to the requirements of Table 5 and Table 6. Elevated temperature tensile strength (R_m) values shall conform to Table 7.

6.4.3 If verification of specified proof strength at elevated temperature is requested (see EN 10222-1:2017, Table 1), the testing temperature should be agreed at the time of enquiry and order. Otherwise, the test shall be carried out at 300 °C, except for the austenitic-ferritic steels, where the test shall be carried out at 250 °C.

6.4.4 The impact test, if applicable (see EN 10222-1:2017, Table 1), shall be carried out at 20 °C.

Where impact tests at low temperature have been agreed (see EN 10222-1:2017, Table 1), the test temperature shall also be agreed at the time of enquiry and order.

6.4.5 Reference data for 1 % (plastic) creep strain and creep rupture are given in Annex A.

6.5 Surface condition

See EN 10222-1.

6.6 Internal soundness

See EN 10222-1.

6.7 Physical properties

For reference data on physical properties, see EN 10088-1:2014, Annex E.

6.8 Post weld heat treatment

Guidelines for the purchaser on post weld heat treatment are given in Annex B.

7 Inspection

See EN 10222-1.

8 Sampling

See EN 10222-1.

9 Test methods

See EN 10222-1.

10 Retests

See EN 10222-1.

11 Marking

See EN 10222-1.

Table 1 — Heat treatment

Steel grade		Heat treatment[a]	Solution annealing °C	Cooling in[b]
Steel name	Steel number			
Martensitic steel				
X3CrNiMo13–4	1.4313	+QT or +T	950 to 1 050 (for quenching)	a, o[c]
		+QT		a, o[d]
Austenitic steels[e]				
X2CrNi18–9	1.4307	+AT	1 025 to 1 100	w, a
X2CrNi19–11	1.4306	+AT	1 000 to 1 100	w, a
X2CrNiN18–10	1.4311	+AT	1 000 to 1 100	w, a
X5CrNi18–10	1.4301	+AT	1 000 to 1 100	w, a
X6CrNiTi18–10	1.4541	+AT	1 020 to 1 120	w, a
X6CrNiNb18–10	1.4550	+AT	1 020 to 1 120	w, a
X6CrNi18–10	1.4948	+AT	1 050 to 1 120	w, a
X6CrNiTiB18–10	1.4941	+AT	1 070 to 1 140	w, a
X7 CrNiNb18–10	1.4912	+AT	1 070 to 1 125	w, a
X2CrNiMo17–12–2	1.4404	+AT	1 020 to 1 120	w, a
X2CrNiMoN 17–11–2	1.4406	+AT	1 020 to 1 120	w, a
X5CrNiMo17–12–2	1.4401	+AT	1 020 to 1 120	w, a
X6CrNiMoTi 17–12–2	1.4571	+AT	1 020 to 1 120	w, a
X2 CrNiMo17–12–3	1.4432	+AT	1 020 to 1 120	w, a
X2CrNiMoN 17–13–3	1.4429	+AT	1 020 to 1 120	w, a
X3CrNiMo17–13–3	1.4436	+AT	1 020 to 1 120	w, a
X2CrNiMo18–14–3	1.4435	+AT	1 020 to 1 120	w, a
X3CrNiMoN17–13–3	1.4910	+AT	1 020 to 1 100	w, a
X2CrNiMoN17–13–5	1.4439	+AT	1 060 to 1 120	w, a
X1NiCrMoCu25–20–5	1.4539	+AT	1 060 to 1 120	w, a
X1CrNiMoCuN20–18–7	1.4547	+AT	1 020 to 1 120	w, a
X1CrNiMoCuN25–20–7	1.4529	+AT	1 020 to 1 100	w, a
X2CrNiCu19–10	1.4650	+AT	1 050 to 1 125	w, a
X3CrNiMo18–12–3	1.4449	+AT	1 050 to 1 125	w, a