BS EN 10222-2:2017+A1:2021

BSI Standards Publication

Steel forgings for pressure purposes

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

Documents
Document Sharing Hub

Full document details: BS EN 10222-2:2017+A1:2021

National foreword

This British Standard is the UK implementation of EN 10222-2:2017+A1:2021. It supersedes BS EN 10222-2:2017, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by ▌A1⟩ ⟨A1▌.

The UK participation in its preparation was entrusted to Technical Committee ISE/111, Steel Castings and Forgings.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association. It is intended to support requirements of the EU legislation detailed in the European Foreword. A European Annex, usually Annex ZA or ZZ, describes how this publication relates to that EU legislation.

For the Great Britain market (England, Scotland and Wales), if UK Government has designated this publication for conformity with UKCA marking (or similar) legislation, it may contain an additional National Annex. Where such a National Annex exists, it shows the correlation between this publication and the relevant UK legislation. If there is no National Annex of this kind, the relevant Annex ZA or ZZ in the body of the European text will indicate the relationship to UK regulation applicable in Great Britain. References to EU legislation may need to be read in accordance with the UK designation and the applicable UK law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

For the Northern Ireland market, UK law will continue to implement relevant EU law subject to periodic confirmation. Therefore Annex ZA/ZZ in the European text, and references to EU legislation, are still valid for this market.

UK Government is responsible for legislation. For information on legislation and policies relating to that legislation, consult the relevant pages of www.gov.uk.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

AVA Documents
Document Sharing Hub

BRITISH STANDARD

© The British Standards Institution 2021
Published by BSI Standards Limited 2021

ISBN 978 0 539 05049 3

ICS 77.140.30; 77.140.85

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2017.

Amendments/corrigenda issued since publication

Date	Text affected
31 December 2021	Implementation of CEN amendment A1:2021

Documents
Document Sharing Hub

Full document details: BS EN 10222-2:2017+A1:2021

Documents
Document Sharing Hub

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 10222-2:2017+A1

June 2021

ICS 77.140.30; 77.140.85

Supersedes EN 10222-2:2017

English Version

Steel forgings for pressure purposes - Part 2: Ferritic and martensitic steels with specified elevated temperatures properties

Pièces forgées en acier pour appareils à pression - Partie 2 : Aciers ferritiques et martensitiques avec propriétés spécifiées à température élevée

Schmiedestücke aus Stahl für Druckbehälter - Teil 2: Ferritische und martensitische Stähle mit festgelegten Eigenschaften bei erhöhten Temperaturen

This European Standard was approved by CEN on 25 December 2016 and includes Amendment 1 approved by CEN on 2 May 2021.

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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2021 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 10222-2:2017+A1:2021 E

Documents
Document Sharing Hub

Full document details: BS EN 10222-2:2017+A1:2021

Contents

Page

European foreword ... 3
1 Scope ... 4
2 Normative references ... 4
3 Terms and definitions ... 4
4 Classification and designation ... 4
4.1 Classification ... 4
4.2 Designation ... 4
5 Information to be supplied by the purchaser ... 4
5.1 Mandatory informations ... 4
5.2 Options ... 5
6 Requirements ... 5
6.1 Steelmaking process and manufacture of the product ... 5
6.2 Delivery condition ... 5
6.3 Chemical composition and chemical composition properties ... 5
6.3.1 Cast analysis ... 5
6.3.2 Product analysis ... 5
6.4 Mechanical properties ... 5
6.5 Surface condition ... 6
6.6 Internal soundness ... 6
6.7 Resistance to hydrogen induced cracking ... 6
7 Inspection ... 6
8 Sampling ... 6
9 Test methods ... 6
10 Retests ... 6
11 Marking ... 6
Annex A (informative) Reference data for stress rupture properties and 1 % creep limit properties ... 17
Annex B (informative) Significant technical changes to the version EN 10222-2:1999 ... 25
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2014/68/EU aimed to be covered ... 26
Bibliography ... 27

Documents
Document Sharing Hub
Full document details: BS EN 10222-2:2017+A1:2021

European foreword

This document (EN 10222-2:2017+A1:2021) has been prepared by Technical Committee ECISS/TC 459/SC 11 "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 December 2021, and conflicting national standards shall be withdrawn at the latest by December 2021.

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

This document supersedes [A1⟩ EN 10222-2:2017 ⟨A1].

This document includes Amendment 1 approved by CEN on 11 April 2021.

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1⟩ ⟨A1].

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.*

[A1⟩ *deleted sentence* ⟨A1].

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.

Documents
Document Sharing Hub
Full document details: BS EN 10222-2:2017+A1:2021

1 Scope

This part of this European Standard specifies the technical delivery conditions for forgings for pressure purposes, made of ferritic and martensitic steels with specified elevated temperature properties. 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 condition 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 10222-1:2017, *Steel forgings for pressure purposes — Part 1: General requirements*

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

In accordance with EN 10020, the grades P235GH, P245GH, P250GH, P265GH, P280GH, P295GH and P305GH are non-alloy quality steels. All others are alloy special steels.

4.2 Designation

See EN 10222-1:2017.

5 Information to be supplied by the purchaser

5.1 Mandatory informations

See EN 10222-1:2017

Documents
Document Sharing Hub
Full document details: BS EN 10222-2:2017+A1:2021

5.2 Options

A number of options are specified in this European Standard and listed below. Additionally the relevant options of EN 10222-1:2017 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 10222-1:2017).

1) test temperature for the tensile test at elevated temperature, if applicable (see 6.4);

2) normalized forming instead normalizing (see Table 1, footnote c);

3) carbon equivalent for non-alloy steels (see Table 2);

4) increased minimum chromium content (see Table 2, footnote b);

5) minimum impact energy values (see Table 4, footnote d);

6) test to evaluate the resistance to hydrogen induced cracking (see 6.7);

7) different test temperature for the impact energy and appropriate values (see Table 4, footnote e);

8) higher sulphur content for alloy steels (see Table 2, footnote e).

6 Requirements

6.1 Steelmaking process and manufacture of the product

Shall be in accordance with EN 10222-1:2017.

6.2 Delivery condition

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

6.3 Chemical composition and chemical composition properties

6.3.1 Cast analysis

The chemical composition (cast analysis), determined in accordance with EN 10222-1:2017 shall conform the requirements of Table 2.

6.3.2 Product analysis

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

6.4 Mechanical properties

When heat treated in accordance with Table 1, the mechanical properties at room temperature determined in accordance with EN 10222-1:2017, shall conform to the requirements of Table 4.

Elevated temperature proof strength ($R_{p0,2}$) properties shall conform to the requirements of Table 5.

If verification of specified proof strength at elevated temperature is requested (see option in EN 10222-1:2017), the testing temperature should be agreed at the time of enquiry and order. Otherwise, the test shall be carried out at 300 °C.

Documents
Document Sharing Hub
Full document details: BS EN 10222-2:2017+A1:2021

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

6.5 Surface condition

See EN 10222-1:2017.

6.6 Internal soundness

See EN 10222-1:2017.

6.7 Resistance to hydrogen induced cracking

Non-alloy and low alloy steels may be susceptible to cracking when exposed to corrosive H_2S containing environments, usually referred to as „sour service“.

A test to evaluate the resistance to hydrogen induced cracking in accordance with EN 10229 may be agreed at the time of enquiry and order.

7 Inspection

See EN 10222-1:2017.

8 Sampling

See EN 10222-1:2017.

9 Test methods

See EN 10222-1:2017.

10 Retests

See EN 10222-1:2017.

11 Marking

See EN 10222-1:2017.

Documents
Document Sharing Hub
Full document details: BS EN 10222-2:2017+A1:2021