



BSI Standards Publication

## Flat products made of steels for pressure purposes

---

Part 2: Non-alloy and alloy steels with specified elevated temperature properties

## National foreword

This British Standard is the UK implementation of EN 10028-2:2017. It supersedes BS EN 10028-2:2009, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/107, Steels for Pressure Purposes.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2017  
Published by BSI Standards Limited 2017

ISBN 978 0 580 87854 1

ICS 77.140.50; 77.140.30

**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 August 2017.

### Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

---

EUROPEAN STANDARD

**EN 10028-2**

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2017

ICS 77.140.30; 77.140.50

Supersedes EN 10028-2:2009

English Version

## Flat products made of steels for pressure purposes - Part 2: Non-alloy and alloy steels with specified elevated temperature properties

Produits plats en aciers pour appareils à pression -  
Partie 2 : Aciers non alliés et alliés avec  
caractéristiques spécifiées à température élevée

Flacherzeugnisse aus Druckbehälterstählen - Teil 2:  
Unlegierte und legierte Stähle mit festgelegten  
Eigenschaften bei erhöhten Temperaturen

This European Standard was approved by CEN on 7 May 2017.

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, 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 United Kingdom.



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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

<b>Contents</b>		Page
<b>European foreword</b> .....		3
<b>1</b>	<b>Scope</b> .....	4
<b>2</b>	<b>Normative references</b> .....	4
<b>3</b>	<b>Terms and definitions</b> .....	4
<b>4</b>	<b>Tolerances on dimensions</b> .....	4
<b>5</b>	<b>Calculation of mass</b> .....	4
<b>6</b>	<b>Classification and designation</b> .....	4
<b>6.1</b>	<b>Classification</b> .....	4
<b>6.2</b>	<b>Designation</b> .....	4
<b>7</b>	<b>Information to be supplied by the purchaser</b> .....	5
<b>7.1</b>	<b>Mandatory information</b> .....	5
<b>7.2</b>	<b>Options</b> .....	5
<b>7.3</b>	<b>Example for ordering</b> .....	5
<b>8</b>	<b>Requirements</b> .....	6
<b>8.1</b>	<b>Steelmaking process</b> .....	6
<b>8.2</b>	<b>Delivery condition</b> .....	6
<b>8.3</b>	<b>Chemical composition</b> .....	6
<b>8.4</b>	<b>Mechanical properties</b> .....	10
<b>8.5</b>	<b>Surface condition</b> .....	10
<b>8.6</b>	<b>Internal soundness</b> .....	10
<b>8.7</b>	<b>Resistance to hydrogen induced cracking</b> .....	10
<b>8.8</b>	<b>Embrittlement of CrMo steels</b> .....	10
<b>9</b>	<b>Inspection</b> .....	10
<b>9.1</b>	<b>Types of inspection and inspection documents</b> .....	10
<b>9.2</b>	<b>Tests to be carried out</b> .....	10
<b>9.3</b>	<b>Retests, sorting and reprocessing</b> .....	10
<b>10</b>	<b>Sampling</b> .....	10
<b>11</b>	<b>Test methods</b> .....	10
<b>12</b>	<b>Marking</b> .....	11
<b>Annex A (informative) Guidelines for heat treatment</b> .....		17
<b>Annex B (informative) Critical time temperature parameter <math>P_{crit}</math> and possible combinations of stress relieving temperature and holding time</b> .....		18
<b>Annex C (informative) Reference data of strength values for 1 % (plastic) creep strain and creep rupture</b> .....		20
<b>Annex D (normative) Evaluation of resistance to hydrogen induced cracking</b> .....		26
<b>Annex E (normative) Step cooling test</b> .....		27
<b>Annex F (informative) Changes to the previous version EN 10028-2:2009</b> .....		28
<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of European Directive 2014/68/EU</b> .....		29
<b>Bibliography</b> .....		30

## European foreword

This document (EN 10028-2:2017) 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 10028-2:2009.

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 F.

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 weldable non-alloy and alloy steels with elevated temperature properties 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 this Part 2 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 1011-1:2009, *Welding - Recommendations for welding of metallic materials - Part 1: General guidance for arc welding*

EN 1011-2:2001, *Welding - Recommendations for welding of metallic materials - Part 2: Arc welding of ferritic steels*

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*

EN 10229:1998, *Evaluation of resistance of steel products to hydrogen induced cracking (HIC)*

## 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, the grades P235GH, P265GH, P295GH and P355GH are non-alloy quality steels. All other grades are alloy special steels.

### 6.2 Designation

See EN 10028-1:2017.