



# SLOVENSKI STANDARD SIST EN 10028-5:1997

01-december-1997

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Flat products made of steels for pressure purposes - Part 5: Weldable fine grain steels, thermomechanically rolled

Flacherzeugnisse aus Druckbehälterstählen - Teil 5: Schweißgeeignete Feinkornbaustähle, thermomechanisch gewalzt

Produits plats en aciers pour appareils a pression - Partie 5: Aciers soudables a grains fins, laminés thermomécaniquement

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**Ta slovenski standard je istoveten z: EN 10028-5:1996**

**ICS:**

77.140.50 Ú[[ z aĉĉ \ | ^ } aĉ a ^ \ aĉ Flat steel products and semi-products  
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EUROPEAN STANDARD

EN 10028-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 1996

ICS 77.140.50

Descriptors: flat product, plate, strip, steels, welded construction, pressure equipment, specifications, chemical composition, grades:quality, designation, mechanical properties, tests

English version

**Flat products made of steels for pressure purposes - Part 5: Weldable fine grain steels, thermomechanically rolled**

Produits plats en aciers pour appareils à pression - Partie 5: Aciers soudable à grains fins, laminé thermomécaniquement

Flacherzeugnisse aus Druckbehälterstählen - Teil 5: Schweißgeeignete Feinkornbaustähle, thermomechanisch gewalzt

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This European Standard was approved by CEN on 1996-11-14. 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.

The European Standards exist 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

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

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NOTE: The clauses marked with two points (..) contain information relating to agreements which may be made at the time of enquiry and order.



## Foreword

This European Standard has been prepared by Technical Committee ECISS/TC 22 "Steels for pressure purposes - Qualities", the secretariat of which is held by DIN.

Annex A contains national A-deviations specifying the restrictions for the application of this European Standard in Sweden.

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 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

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

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## 1 Scope

This part of EN 10028 specifies the requirements for flat products for pressure equipments made of themomechanically rolled steels as listed in table 1.

The steels are not suitable for hot forming.

NOTE: Until now insufficient data for the standardardization of the elevated temperature properties of these steels are available. If their use at such temperatures is intended the conditions for this shall be specially agreed between the interested parties.

Other parts of this European Standard are:

- EN 10028-1 Flat products made of steels for pressure purposes - General requirements
- EN 10028-2 Flat products made of steels for pressure purposes - Part 2: Non-alloy and alloy steels with specified elevated temperature properties
- EN 10028-3 Flat products made of steels for pressure purposes - Part 3: Weldable fine grain steels, normalized
- EN 10028-4 Flat products made of steels for pressure purposes - Part 4: Nickel-alloy steels with specified low temperature properties
- EN 10028-6 Flat products made of steels for pressure purposes - Part 6: Weldable fine grain steels, quenched and tempered
- EN 10028-7 Flat products made of steels for pressure purposes - Part 7: Stainless steels

## 2 Normative references

This European Standard incorporates by dated or undated references 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 10020 Definition and classification of grades of steel
- EN 10028-1 Flat products made of steels for pressure purposes - Part 1: General requirements

IC 2 Weldable fine-grained structural steels;  
Recommendations for processing, in particular for  
welding (EURONORM Information Circular)

### 3 Definitions

See EN 10028-1.

### 4 Dimensions and tolerances on dimensions

See EN 10028-1.

### 5 Calculation of mass

See EN 10028-1.

### 6 Designation and ordering

See EN 10028-1.

### 7 Classification into grades

7.1 This European Standard covers the steel grades given in table 1  
in three series: **(standards.iteh.ai)**

- a) the basic series (P...M)
- b) series with low temperature properties down to  $-40^{\circ}\text{C}$  (P...ML1)
- c) series with low temperature properties down to  $-50^{\circ}\text{C}$  (P...ML2).

7.2 In accordance with EN 10020 all the steels covered in table 1  
are alloy special steels.

## 8 Requirements

### 8.1 Steelmaking process

See EN 10028-1.

### 8.2 Delivery condition

The products complying with this European Standard are supplied in  
the thermomechanically rolled condition.

### 8.3 Chemical composition

8.3.1 The data in table 1 apply for the chemical composition according to the cast analysis.

8.3.2 The product analysis may deviate from the specified values of the cast analysis given in table 1 by the values given in table 2.

8.3.3 .. For steel grades covered by this European Standard, a carbon equivalent according to table 3 may be agreed upon.

#### 8.4 Mechanical properties

The values given in tables 4 and 5 apply (see also EN 10028-1).

#### 8.5 Surface condition

See EN 10028-1.

#### 8.6 Internal soundness

See EN 10028-1.

#### 8.7 Weldability

8.7.1 The steels specified in this European Standard shall be suitable for welding processes in current use (see notes 1 and 2 below).

8.7.2 The manufacturer shall, if requested, provide the purchaser with data on suitable welding conditions determined on the basis of weld procedure tests.

NOTE 1: With increasing product thickness and strength level cold cracking can occur. Cold cracking is caused by the following factors in combination:

- the amount of diffusible hydrogen in the weld metal;
- brittle structure of the heat affected zone;
- tensile stress concentrations in the welded joint.

NOTE 2: When using recommendations as laid down, for example in IC 2 or in any relevant national standard, the recommended welding conditions and the various welding ranges of the steel grades can be determined depending on the product thickness, the applied welding energy, the design requirements, the electrode efficiency, the welding process and the weld metal properties.

NOTE 3: Excessive post weld heat-treatment (PWHT) conditions may decrease the mechanical properties. Where PWHT with a Hollomon-Jaffee Parameter P exceeding

$$P = T_s (20 + \lg t) \cdot 10^{-3} = 17$$

are intended where

$T_s$  = stress relieving temperature in K,

$t$  = holding time in hours,



the purchaser should in his enquiry and order inform the manufacturer accordingly and, where appropriate, tests on simulated post weld heat treated samples may be agreed to check whether after such a treatment the properties specified in this European Standard can still be regarded as valid.

## 9 Testing

### 9.1 Type and content of inspection documents

See EN 10028-1.

### 9.2 Tests to be carried out

See EN 10028-1.

### 9.3 Number of tests

See EN 10028-1.

### 9.4 Selection and preparation of samples and test pieces

See EN 10028-1 **iTeh STANDARD PREVIEW**

### 9.5 Test procedures **(standards.iteh.ai)**

See EN 10028-1.

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### 9.6 Re-tests

See EN 10028-1.

## 10 .. Marking

See EN 10028-1.