



# SLOVENSKI STANDARD

## SIST EN 10085:2002

01-september-2002

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Nitriding steels - Technical delivery conditions

Nitrierstähle - Technische Lieferbedingungen

Aciers pour nitruration - Conditions techniques de livraison

Ta slovenski standard je istoveten z: **EN 10085:2001**

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**ICS:**

77.140.10      Jekla za toplotno obdelavo      Heat-treatable steels

**SIST EN 10085:2002**

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EUROPEAN STANDARD

EN 10085

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2001

ICS 77.140.10

English version

## Nitriding steels - Technical delivery conditions

Aciers pour nitruration - Conditions techniques de livraison

Nitrierstähle - Technische Lieferbedingungen

This European Standard was approved by CEN on 19 January 2001.

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 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 Management Centre 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.

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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 23 “Steels for heat treatment, alloy steels and free-cutting steels - Qualities and dimensions”, 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of an identical text or by endorsement, at the latest by September 2001, and conflicting national standards shall be withdrawn at the latest by September 2001.

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.

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## 1 Scope

**1.1** This European Standard specifies the technical delivery requirements for

- semi-finished products, e. g. blooms, billets, slabs (see NOTE 3);
- bars (see NOTE 3);
- rod;
- wide flats;
- hot- or cold-rolled strip and sheet/plate;
- forgings (see NOTE 3)

manufactured from the nitriding steels listed in Table 3 and supplied in one of the heat-treatment conditions given for the different types of products in Table 1, line 2 to 4 and in one of the surface conditions given in Table 2.

The steels are, in general, intended for the fabrication of quenched and tempered and generally machined and subsequently nitrided parts.

NOTE 1 Some grades from EN 10083-1 are also used for nitriding treatment.

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NOTE 2 Related European Standards are given in Bibliography.

NOTE 3 Hammer-forged semi-finished products (blooms, billets, slabs etc.) and hammer-forged bars are in the following covered under semi-finished products or bars and not under the term “forgings”.

**1.2** In special cases, variations in these technical delivery requirements or additions to them may form the subject of an agreement at the time of enquiry and order (see annex B).

**1.3** In addition to the specifications of this European Standard, the general technical delivery requirements of EN 10021 are applicable.

## 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 (including amendments).

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Test method (at ambient temperature)* “including Addendum AC1:1990”

EN 10020, *Definition and classification of grades of steel*

- EN 10021, *General technical delivery requirements for steel and iron products*
- EN 10027-1, *Designation systems for steel - Part 1: Steel names, principal symbols*
- EN 10027-2, *Designation systems for steel - Part 2: Numerical system*
- EN 10045-1, *Metallic materials - Charpy impact test - Part 1: Test method*
- EN 10052, *Vocabulary of heat treatment terms for ferrous products*
- EN 10079, *Definition of steel products*
- EN 10163-2, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections - Part 2: Plates and wide flats*
- EN 10204, *Metallic products - Types of inspection documents (includes amendment A1:1995)*
- EN 10221, *Surface quality classes for hot-rolled bars and rods - Technical delivery conditions*
- CR 10260, *Designation systems for steels - Additional symbols*
- CR 10261, *ECISS IC 11 - Iron and steel - Review of available methods of chemical analysis*
- EN ISO 377, *Steel and steel products - Location and preparation of samples and test pieces for mechanical testing*
- EN ISO 6506-1, *Metallic materials - Brinell hardness test - Part 1: Test method (ISO 6506-1:1999)*
- EURONORM 103<sup>1)</sup>, *Microscopic determination of the ferritic or austenitic grain size of steels*
- EURONORM 104<sup>1)</sup>, *Determination of the depth of decarburization of non-alloy and low alloy structural steels*
- ISO 14284, *Steel and iron - Sampling and preparation of samples for the determination of chemical composition*

### 3 Terms and definitions

For the purpose of this European Standard, the following terms and definitions apply in addition to the terms and definitions given in EN 10020, EN 10052, EN 10079, EN ISO 377 and ISO 14284.

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<sup>1)</sup> It may be agreed at the time of ordering, until these EURONORMS have been adopted as European Standards, that these EURONORMS or the corresponding national standards should be applied.

### 3.1 ruling section

that section for which the specified mechanical properties apply

Independent of the actual shape and dimensions of the cross-section of the product the size of its ruling section is always given by a diameter. This corresponds to the diameter of an “equivalent round bar”. That is, a round bar which, at the position of its cross-section specified for taking the test pieces for the mechanical tests, will, when being cooled from austenitizing temperature, show the same cooling rate as the actual ruling section of the product concerned at its position for taking the test pieces.

### 3.2 nitriding steels

heat-treatable steels containing controlled amounts of two or more of the nitride forming elements aluminium, chromium, molybdenum, vanadium, making them particularly suitable for nitriding

## 4 Classification and designation

### 4.1 Classification

All steels covered by this European Standard are classified as alloy special steels according to EN 10020.

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### 4.2 Designation

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#### 4.2.1 Steel names

For the steel grades covered by this European Standard, the steel names as given in the relevant tables are allocated in accordance with EN 10027-1 and CR 10260.

#### 4.2.2 Steel numbers

For the steel grades covered by this European Standard, the steel numbers as given in the relevant tables are allocated in accordance with EN 10027-2.

## 5 Information to be supplied by the purchaser

### 5.1 Mandatory information

The following information shall be supplied by the purchaser at the time of enquiry and order:

- a) the quantity to be delivered;
- b) the designation of the product form (e. g. round or square);
- c) the number of the dimensional standard;
- d) the dimensions and tolerances on dimensions and shape and, if applicable, letters denoting relevant special tolerances;



- e) the number of this European Standard (EN 10085);
- f) steel name or steel number (see 4.2);
- g) if appropriate, the symbol for the heat treatment condition at delivery (see 6.2.1, 6.2.2 and Table 1);
- h) if appropriate, the symbol for the surface condition at delivery (see 6.2.3 and Table 2);
- i) if required, the type of inspection document in accordance with EN 10204 (see 8.1).

#### EXAMPLE

20 rounds EURONORM 60 - 20x8000  
EN 10085 - 34CrAlNi7-10+A  
EN 10204 - 3.1.B

or

20 rounds EURONORM 60 - 20x8000  
EN 10085 - 1.8550+A  
EN 10204 - 3.1.B

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## 5.2 Options

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A number of options are specified in this European Standard and listed below. If the purchaser does not indicate his wish to implement one of these options, the supplier shall supply in accordance with the basis specification of this European Standard (see 5.1).

- a) any special requirement on grain size (see 7.3.1 and 8.2.2);
- b) any requirement concerning the admissible ferrite content in the core (see 7.3.2);
- c) any requirement for internal soundness (see 7.4 and B.3);
- d) any requirement relating to surface quality (see 7.5.3);
- e) any requirement regarding the permissible depth of decarburization (see 7.5.4);
- f) any requirement relating to removal of surface defects (see 7.5.5);
- g) any verification of the mechanical properties of reference test pieces in the quenched and tempered condition (see 8.2.1.1 and B.1);
- h) any requirement concerning special marking of the product (see clause 9 and B.5);
- i) any verification of the product analysis (see Table 8 and B.4);
- j) any requirement concerning non-metallic inclusion content (see B.2).

## 6 Manufacturing process

### 6.1 General

The manufacturing process of the steel and of the products is left to the discretion of the manufacturer with the restrictions given by the requirements in 6.2 and 6.3.

### 6.2 Heat-treatment and surface condition at delivery

#### 6.2.1 Normal condition at delivery

Unless otherwise agreed at the time of enquiry and order, the products shall be delivered in the untreated, i. e. as rolled condition (see Table 2, NOTE a).

#### 6.2.2 Particular heat-treatment condition

If so agreed at the time of enquiry and order, the products shall be delivered in one of the heat-treatment conditions given in Table 1, lines 2 to 4.

#### 6.2.3 Particular surface condition

If so agreed at the time of enquiry and order, the products shall be delivered in one of the particular surface conditions given in Table 2, lines 3 to 6.

### 6.3 Cast separation

The steels shall be delivered separated by casts.

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## 7 Requirements

### 7.1 Chemical composition, hardness and mechanical properties

The requirements for chemical composition, hardness and mechanical properties cited in Table 1, column 9, apply as appropriate for the particular heat-treatment condition.

The requirements for mechanical properties given in this European Standard are restricted to the sizes given in Table 6.

### 7.2 Shearability

Under suitable shearing conditions (avoiding local stress peaks, preheating, application of blades with a profile adapted to that of the product etc.) all steels are shearable in the condition “soft annealed”.

### 7.3 Structure

**7.3.1** Unless otherwise agreed, the steel when tested in accordance with one of the methods described in EURONORM 103 shall show an austenitic grain size of 5 or finer.

**7.3.2** Requirements for the ferrite content in the core may be agreed at the time of enquiry and order.

## 7.4 Internal soundness

The steel shall be free from internal defects likely to have an adverse effect (see B.3).

## 7.5 Surface quality and decarburization

**7.5.1** All products shall have a workmanlike finish.

**7.5.2** Minor surface imperfections, which may occur under normal manufacturing conditions, such as scores originating from rolled-in scale in the case of hot-rolled products, shall not be regarded as defects.

**7.5.3** Where appropriate, requirements relating to surface quality of the products shall be agreed on at the time of enquiry and order, if possible with reference to European Standards.

EN 10163-2 specifies requirements for the surface quality of hot-rolled sheet/plate and wide flats. EN 10221 contains surface quality classification for hot-rolled bars and rods.

NOTE It is more difficult to detect and eliminate surface discontinuities from coiled products than from cut lengths. This should be taken into account when agreements on surface quality are made.

**7.5.4** Requirements may be specified at the time of enquiry and order regarding the permissible depth of decarburization.

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The depth of decarburization shall be determined in accordance with the micrographic method specified in EURONORM 104.

**7.5.5** Repair of surface discontinuities by welding is not permitted.

If surface discontinuities are to be repaired, the method and permissible maximum depth of removal should be agreed at the time of enquiry and order.

## 7.6 Dimensions, tolerances on dimensions and shape

The nominal dimensions, tolerances on dimensions and shape for the product shall be agreed at the time of enquiry and order, if possible, with reference to the dimensional standards applicable (see annex D).

## 8 Inspection and testing

### 8.1 Types and contents of inspection documents

**8.1.1** For each delivery, the issue of any inspection document according to EN 10204 may be agreed upon at the time of enquiry and order.

**8.1.2** If, in accordance with the agreements made at the time of enquiry and order, a test report is to be provided, this shall cover: