



SLOVENSKI STANDARD

SIST EN 10277-5:2008

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Nadomešča:

SIST EN 10277-5:2000

Svetli jekleni izdelki - Tehnični dobavni pogoji - 5. del: Jekla za poboljšanje

Bright steel products - Technical delivery conditions - Part 5: Steels for quenching and tempering

Blankstahlerzeugnisse - Technische Lieferbedingungen - Teil 5: Vergütungsstähle

Produits en acier transformés à froid - Conditions techniques de livraison - Partie 5: Aciers pour trempe et revenu

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77.140.01	Železni in jekleni izdelki na splošno	Iron and steel products in general
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 10277-5

March 2008

ICS 77.140.20; 77.140.60

Supersedes EN 10277-5:1999

English Version

Bright steel products - Technical delivery conditions - Part 5: Steels for quenching and tempering

Produits en acier transformés à froid - Conditions
techniques de livraison - Partie 5: Aciers pour trempe et
revenu

Blankstahlerzeugnisse - Technische Lieferbedingungen -
Teil 5: Vergütungsstähle

This European Standard was approved by CEN on 4 February 2008.

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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 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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Foreword

This document (EN 10277-5:2008) 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of an identical text or by endorsement, at the latest by September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.

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 10277-5:1999.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

This European Standard EN 10277 'Bright steel products - Technical delivery conditions' is subdivided as follows:

Part 1: General;

Part 2: Steels for general engineering purposes;

Part 3: Free-cutting steels;

Part 4: Case hardening steels;

Part 5: Steels for quenching and tempering.

During the preparation of the first edition of this European Standard there were not enough statistical data available concerning mechanical properties of bright bar products. Since then it has been recognized that the proof strength values in the cold drawn condition were too high. In addition, cyclic stresses that occur during straightening can reduce the proof strength (Bauschinger's effect), which was not taken into account when drafting the first edition of this standard. In this second edition the proof strength values of non-alloy and alloy grades in condition +QT+C in parts 3 and 5 have been adjusted downwards compared to the first edition.

Furthermore for this part the tensile strength values of different grades were amended in the condition +QT+C in the tables for the mechanical properties for non alloy and alloy steels.

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EN 10277-5:2008 (E)

1 Scope

This part of EN 10277 applies to bright steel bars in the drawn, turned or ground condition, in straight lengths of steels for quenching and tempering.

This EN 10277-5 is complemented by EN 10277-1.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10083-2, *Steels for quenching and tempering - Part 2: Technical delivery conditions for non alloy steels*

EN 10083-3, *Steels for quenching and tempering - Part 3: Technical delivery conditions for alloy steels*

EN 10277-1, *Bright steel products - Technical delivery conditions - Part 1: General*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 10277-1 and the following apply.

3.1 steels for quenching and tempering
engineering steels which because of their chemical composition are suitable for hardening and in the quenched and tempered condition have good toughness at a given tensile strength.

4 Classification and designation

4.1 Classification

Steel grades C35E, C35R, C40E, C40R, C45E, C45R, C50E, C50R, C60E and C60R are non-alloy special steels. All other steel grades covered by this European Standard are alloy special steels.

4.2 Designation

See EN 10277-1.

5 Information to be supplied by the purchaser

See EN 10277-1.

6 Manufacturing process

See EN 10277-1.

7 Requirements

7.1 Chemical composition

7.1.1 Cast analysis

The chemical composition of the steel according to the cast analysis shall be as specified in Table 1.

7.1.2 Product analysis

The permissible deviations from the chemical composition as specified in Table 1 for cast analysis and the product analysis of the steel shall be as specified in Table 2.

7.2 Mechanical properties

The mechanical properties of the steels shall be as specified in Table 3, Table 4 and Table 5.

7.3 Hardenability

Where steels are ordered with hardenability requirements, the requirements of EN 10083-2 shall apply for non alloyed steels and EN 10083-3 shall apply for alloyed steels.

7.4 Grain size

Unless otherwise agreed at the time of ordering the grain size of non-alloy steels shall be left to the discretion of the manufacturer. If a fine grain structure is required in accordance with a reference treatment, option B.2 of EN 10277-1 shall be ordered.

All alloy steels shall show an austenitic grain size of 5 or finer. Only for verification see B.2 of EN 10277-1.

7.5 Non-metallic inclusions

7.5.1 Microscopic inclusions

The steels shall have a cleanliness corresponding to special steel quality. For details of the requirements for the verification of non-alloy steels see EN 10083-2, A.4 for and of alloy steels see EN 10083-3, A.3.

7.5.2 Macroscopic inclusions

As freedom from macroscopic inclusions cannot be guaranteed in any steel, any requirement to verify the level present shall be agreed at the time of enquiry and order (see EN 10277-1, 7.5.2 and B.3.2).

7.6 Options

See Annex B of EN 10277-1.

8 Inspection and testing

8.1 Types and contents of inspection documents

See EN 10277-1.

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8.2 Specific inspection

See EN 10277-1.

8.3 Verification of hardenability

See 10.3.2 of EN 10083-2 and EN 10083-3.

9 Marking

See EN 10277-1.

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Table 1 — Chemical composition (cast analysis) of steels for quenching and tempering

Designation		Steel grade according to	Chemical composition, % by mass ^{a,b,c}									
Steel name	Steel number		C ^d	Si max.	Mn	P max.	S	Cr	Mo	Ni	V	Cr+Mo+Ni max. ^d
C35E	1.1181	EN 10083-2	0,32 to 0,39	0,40	0,50 to 0,80	0,030	≤ 0,035	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C35R	1.1180	EN 10083-2	0,32 to 0,39	0,40	0,50 to 0,80	0,030	0,020 to 0,040	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C40E	1.1186	EN 10083-2	0,37 to 0,44	0,40	0,50 to 0,80	0,030	≤ 0,035	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C40R	1.1189	EN 10083-2	0,37 to 0,44	0,40	0,50 to 0,80	0,030	0,020 to 0,040	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C45E	1.1191	EN 10083-2	0,42 to 0,50	0,40	0,50 to 0,80	0,030	≤ 0,035	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C45R	1.1201	EN 10083-2	0,42 to 0,50	0,40	0,50 to 0,80	0,030	0,020 to 0,040	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C50E	1.1206	EN 10083-2	0,47 to 0,55	0,40	0,60 to 0,90	0,030	≤ 0,035	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C50R	1.1241	EN 10083-2	0,47 to 0,55	0,40	0,60 to 0,90	0,030	0,020 to 0,040	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C60E	1.1221	EN 10083-2	0,57 to 0,65	0,40	0,60 to 0,90	0,030	≤ 0,035	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
C60R	1.1223	EN 10083-2	0,57 to 0,65	0,40	0,60 to 0,90	0,030	0,020 to 0,040	≤ 0,40	≤ 0,10	≤ 0,40	-	0,63
34CrS4	1.7037	EN 10083-3	0,30 to 0,37	0,40	0,60 to 0,90	0,025	0,020 to 0,040	0,90 to 1,20	-	-	-	-
41CrS4	1.7039	EN 10083-3	0,38 to 0,45	0,40	0,60 to 0,90	0,025	0,020 to 0,040	0,90 to 1,20	-	-	-	-
25CrMoS4	1.7213	EN 10083-3	0,22 to 0,29	0,40	0,60 to 0,90	0,025	0,020 to 0,040	0,90 to 1,20	0,15 to 0,30	-	-	-
42CrMoS4	1.7227	EN 10083-3	0,38 to 0,45	0,40	0,60 to 0,90	0,025	0,020 to 0,040	0,90 to 1,20	0,15 to 0,30	-	-	-
34CrNiMo6	1.6582	EN 10083-3	0,30 to 0,38	0,40	0,50 to 0,80	0,025	≤ 0,035	1,30 to 1,70	0,15 to 0,30	1,30 to 1,70	-	-
39NiCrMo3	1.6510	EN 10083-3	0,35 to 0,43	0,40	0,50 to 0,80	0,025	≤ 0,035	0,60 to 1,00	0,15 to 0,25	0,70 to 1,00	-	-
51CrV4	1.8159	EN 10083-3	0,47 to 0,55	0,40	0,70 to 1,10	0,025	≤ 0,025	0,90 to 1,20	-	-	0,10 to 0,25	-

^a Elements not quoted shall not be intentionally added to the steel without the agreement of the purchaser, other than for the purpose of finishing the heat. All reasonable precautions shall be taken to prevent the addition of such elements from scrap or other material used in manufacture, which affect the hardenability, mechanical properties and applicability.

^b Where requirements are made on hardenability (see 7.3) slight deviations from the limits for the cast analysis are permissible, except for the elements, carbon (see footnote d), phosphorus and sulphur; the deviations shall not exceed the specifications of Table 2.

^c Steels with improved machinability as a result of the addition of higher sulphur contents up to around 0,10 % S (including resulphurized steels with controlled inclusion content (e.g. Ca-treatment) (modern method) or lead may be supplied on request. In the first case the upper limit for the manganese content may be increased by 0,15 %.

^d If the unalloyed steels are ordered without hardenability requirements (symbols +H, +HH, +HL) or without requirements on the mechanical properties in the quenched and tempered condition restriction in the carbon range to 0,05 % and/or the total sum of the elements Cr, Mo and Ni to ≤ 0,45 % may be agreed at the time of ordering.