SLOVENSKI STANDARD
SIST EN 10277-2:2008

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Svetli jekleni izdelki - Tehnični dobavni pogoji - 2. del: Jekla za splošne tehnične namene

Bright steel products - Technical delivery conditions - Part 2: Steels for general engineering purposes

Blankstahlerzeugnisse - Technische Lieferbedingungen - Teil 2: Stähle für allgemeine technische Verwendung

Produits en acier transformés à froid - Conditions techniques de livraison - Partie 2: Aciers d'usage général

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English Version

Bright steel products - Technical delivery conditions - Part 2: Steels for general engineering purposes

Produits en acier transformés à froid - Conditions techniques de livraison - Partie 2: Aciers d'usage général

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Foreword

This document (EN 10277-2:2008) 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of an identical text or by endorsement, at the latest by September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.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 10277-2:1999.

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 values for the tensile strength of grades S235JRC and S355J2C were adapted to EN 10025-2 in the table for mechanical properties.

1 Scope

This part of EN 10277 applies to bright steel bars for general engineering purposes in the drawn, turned or ground condition and in straight lengths.

This EN 10277-2 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 10025-2, *Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels*

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

4 Classification and designation

4.1 Classification

All steels specified in this European Standard are classified as non-alloy quality steels.

4.2 Designation

See EN 10277-1.

NOTE This Standard does not comprise impact requirements.

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. The values found in EN 10025-2 and EN 10083-2 can be applied for a heat treatment after cold drawing, e.g. +C+N.

7.3 Options

See Annex B of EN 10277-1.

8 Inspection and testing

See EN 10277-1.

9 Marking

See EN 10277-1.

Table 1 — Steel grades and chemical composition (cast analysis)

Designation		Steel grade according to	Chemical composition, % by mass										
Steel name	Steel number		C	Si max.	Mn	P max.	S max.	N[a] max.	Cr max.	Mo max.	Ni max.	Cr+Mo+Ni max.	Others
S235JRC	1.0122	EN 10025-2	≤ 0,17[b]	-[c]	≤ 1,40	0,040	0,040[d]	0,012	-	-	-	-	Cu: [e] ≤ 0,55
E295GC[f]	1.0533[f]	EN 10025-2	-	-[c]	-	0,045	0,045 [d]	0,012	-	-	-	-	-
E335GC	1.0543	EN 10025-2	-	-[c]	-	0,045	0,045 [d]	0,012	-	-	-	-	-
S355J2C[f]	1.0579[f]	EN 10025-2	≤ 0,20[g]	0,55[h]	≤ 1,60	0,030	0,030 [d]	-	-	-	-	-	Cu: [e] ≤ 0,55
C10	1.0301	-	0,07 to 0,13	0,40	0,30 to 0,60	0,045	0,045[i]	-	-	-	-	-	-[j]
C15	1.0401	-	0,12 to 0,18	0,40	0,30 to 0,80	0,045	0,045 [l]	-	-	-	-	-	-[j]
C16	1.0407	-	0,12 to 0,18	0,40	0,60 to 0,90	0,045	0,045 [l]	-	-	-	-	-	-[j]
C35	1.0501	EN 10083-2	0,32 to 0,39	0,40	0,50 to 0,80	0,045	0,045 [l]	-	0,40	0,10	0,40	0,63	-[j]
C40	1.0511	EN 10083-2	0,37 to 0,44	0,40	0,50 to 0,80	0,045	0,045 [l]	-	0,40	0,10	0,40	0,63	-[j]
C45	1.0503	EN 10083-2	0,42 to 0,50	0,40	0,50 to 0,80	0,045	0,045 [l]	-	0,40	0,10	0,40	0,63	-[j]
C55	1.0535	EN 10083-2	0,52 to 0,60	0,40	0,60 to 0,90	0,045	0,045 [l]	-	0,40	0,10	0,40	0,63	-[j]
C60	1.0601	EN 10083-2	0,57 to 0,65	0,40	0,60 to 0,90	0,045	0,045 [i]	-	0,40	0,10	0,40	0,63	-[j]

NOTE Chemical composition is determined by cast analysis.

a The maximum value of nitrogen does not apply if the chemical composition shows a minimum total Al content of 0,020 % or alternatively min. 0,015 % acid soluble Al or if sufficient other N binding elements are present. In this case the N-binding elements shall be mentioned in the inspection document.

b Maximum 0,20 % for C for nominal thickness > 40 mm.

c Rimming steel not permitted.

d For long products the maximum S-content can be increased for improved machinability for steel grades E295GC and E335GC by 0,010 % and for S235JRC and S355J2C by 0,015 % by agreement if the steel is treated to modify the sulphide morphology and the chemical composition shows min. 0,0020 % Ca.

e Cu content above 0,40 % may cause hot shortness during hot forming.

f For applications where weldability is necessary, steel S355J2C (1.0579) should be used instead of E295GC (1.0533).

g Maximum 0,22 % C for nominal thickness > 30 mm.

h Fully killed steel containing nitrogen binding elements in amounts sufficient to bind the available nitrogen (for example min. 0,020 % Al). The usual guideline is a minimum aluminium to nitrogen ratio of 2:1, when no other nitrogen binding elements are present. Such other elements shall be reported in the inspection document.

i 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 %.

j Elements not quoted in this table shall not be added intentionally 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 the manufacture which affect the hardenability, mechanical properties and applicability.

Table 2 — Permissible deviations between the product analysis and the limiting values given in Table 1 for the cast analysis

Element	Specified maximum content in the cast analysis % by mass	Steel grades	Permissible deviations[a] % by mass
C	> 0,17 ≤ 0,17 ≤ 0,20	S235JRC	+ 0,02 + 0,03
	> 0,20 ≤ 0,20 ≤ 0,22	S355J2C	+ 0,03 + 0,02
	> 0,55 ≤ 0,55 ≤ 0,65	C10, C15, C16, C35, C40 C45, C55, C60	± 0,02 ± 0,03
Si	≤ 0,55	S355J2C	+ 0,05
	≤ 0,40	C10 to C60	+ 0,03
Mn	≤ 1,60	S235JRC, S355J2C	+ 0,10
	≤ 0,90	C10 to C60	± 0,04
P and S	≤ 0,045	S235JRC to S355J2C	+ 0,010
	≤ 0,045	C10 to C60	+ 0,005
N	≤ 0,012	S335JRC to E335GC	+ 0,002
Cr	≤ 0,40		+ 0,05
Mo	≤ 0,10	C35 to C60	+ 0,03
Ni	≤ 0,40		+ 0,05
Cu	≤ 0,55	S235JRC, S355J2C	+ 0,05

[a] ± means that in one cast, the deviation may occur over the upper value or under the lower value of the specified range in Table 1, but not both at the same time.