SLOVENSKI STANDARD
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Svetli jekleni izdelki - Tehnični dobavni pogoji - 3. del: Avtomatna jekla

Bright steel products - Technical delivery conditions - Part 3: Free-cutting steels

Blankstahlerzeugnisse - Technische Lieferbedingungen - Teil 3: Automatenstähle

Produits en acier transformés à froid - Conditions techniques de livraison - Partie 3: Aciers de décolletage

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Bright steel products - Technical delivery conditions - Part 3: Free-cutting steels

Produits en acier transformés à froid - Conditions techniques de livraison - Partie 3: Aciers de décolletage

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 10277-3:2008) 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of an identical text or by endorsement, at the latest by September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.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 10277-3:1999.

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 36SMn(PB)14 and 38SMn(Pb)28 in condition +C and for 35S(Pb)20 in condition +QT+C were amended in the table for mechanical properties for steels for quenching and tempering.

1 Scope

This part of EN 10277 applies to bright steel bars in the drawn, turned or ground condition, in straight lengths of free-cutting steels.

This EN 10277-3 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 10087, *Free-cutting steels - Technical delivery conditions for semi-finished products, hot-rolled bars and rods*

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.

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 shall be as specified in:

— Table 3 for steels not intended for heat treatment,

— Table 4 for case-hardening steels,

— Table 5 for steels for quenching and tempering.

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) [a]					
Steel name	Steel number		C	Si max.	Mn	P max.	S	Pb
Steels not intended for heat treatment								
11SMn30	1.0715	EN 10087	≤ 0,14	0,05[b]	0,90 to 1,30	0,11	0,27 to 0,33	-
11SMnPb30	1.0718	EN 10087	≤ 0,14	0,05	0,90 to 1,30	0,11	0,27 to 0,33	0,20 to 0,35
11SMn37	1.0736	EN 10087	≤ 0,14	0,05[b]	1,00 to 1,50	0,11	0,34 to 0,40	-
11SMnPb37	1.0737	EN 10087	≤ 0,14	0,05	1,00 to 1,50	0,11	0,34 to 0,40	0,20 to 0,35
Case hardening steels								
10S20	1.0721	EN 10087	0,07 to 0,13	0,40	0,70 to 1,10	0,06	0,15 to 0,25	-
10SPb20	1.0722	EN 10087	0,07 to 0,13	0,40	0,70 to 1,10	0,06	0,15 to 0,25	0,20 to 0,35
15SMn13	1.0725	EN 10087	0,12 to 0,18	0,40	0,90 to 1,30	0,06	0,08 to 0,18	-
Steels for quenching and tempering								
35S20	1.0726	EN 10087	0,32 to 0,39	0,40	0,70 to 1,10	0,06	0,15 to 0,25	-
35SPb20	1.0756	EN 10087	0,32 to 0,39	0,40	0,70 to 1,10	0,06	0,15 to 0,25	0,15 to 0,35
36SMn14	1.0764	EN 10087	0,32 to 0,39	0,40	1,30 to 1,70	0,06	0,10 to 0,18	-
36SMnPb14	1.0765	EN 10087	0,32 to 0,39	0,40	1,30 to 1,70	0,06	0,10 to 0,18	0,15 to 0,35
38SMn28	1.0760	EN 10087	0,35 to 0,40	0,40	1,20 to 1,50	0,06	0,24 to 0,33	-
38SMnPb28	1.0761	EN 10087	0,35 to 0,40	0,40	1,20 to 1,50	0,06	0,24 to 0,33	0,15 to 0,35
44SMn28	1.0762	EN 10087	0,40 to 0,48	0,40	1,30 to 1,70	0,06	0,24 to 0,33	-
44SMnPb28	1.0763	EN 10087	0,40 to 0,48	0,40	1,30 to 1,70	0,06	0,24 to 0,33	0,15 to 0,35
46S20	1.0727	EN 10087	0,42 to 0,50	0,40	0,70 to 1,10	0,06	0,15 to 0,25	-
46SPb20	1.0757	EN 10087	0,42 to 0,50	0,40	0,70 to 1,10	0,06	0,15 to 0,25	0,15 to 0,35

[a] Elements not quoted in this table shall not be intentionally added to the steel without the agreement of the purchaser, other than for the purpose of finishing the heat. However, elements such as Te, Bi etc., may be added by the manufacturer for improving the machinability, if this has been agreed at the time of enquiry and order.

[b] If, by metallurgical techniques, the formation of special oxides is guaranteed, a Si-content of 0,10 to 0,40 % can be agreed.

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	Permissible deviations[a] % by mass
C	≤ 0,30 > 0,30 ≤ 0,50	± 0,02 ± 0,03
Si	≤ 0,05 > 0,05 ≤ 0,40	+ 0,01 + 0,03
Mn	≤ 1,00 > 1,00 ≤ 1,70	± 0,04 ± 0,06
P	≤ 0,06 > 0,06 ≤ 0,11	+ 0,008 + 0,02
S	≤ 0,33 > 0,33 ≤ 0,40	± 0,03 ± 0,04
Pb	≤ 0,35	+ 0,03 - 0,02

[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.

Table 3 — Mechanical properties of free-cutting steels not intended for heat treatment

Designation		Thickness[a]	Mechanical properties[a]				
			As rolled and turned (+SH)		Cold drawn (+C)		
Steel name	Steel number	mm	Hardness[b] HBW	R_m MPa	$R_{p\,0,2}$[c] MPa min.	R_m[c] MPa	A % min.
11SMn30	1.0715	≥ 5 ≤ 10	-	-	440	510 to 810	6
11SMnPb30	1.0718	> 10 ≤ 16	-	-	410	490 to 760	7
11SMn37	1.0736	> 16 ≤ 40	112 to 169	380 to 570	375	460 to 710	8
11SMnPb37	1.0737	> 40 ≤ 63	112 to 169	370 to 570	305	400 to 650	9
		> 63 ≤ 100	107 to 154	360 to 520	245	360 to 630	9

[a] For thicknesses < 5 mm the mechanical properties may be agreed at the time of enquiry and order.

[b] Only for information.

[c] For flats and special sections the yield strength ($R_{p0,2}$) may deviate by -10 % and the tensile strength (R_m) by ± 10 %.