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

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English Version

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

Blankstahlerzeugnisse - Technische Lieferbedingungen - Teil 3: Automatenstähle

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (prEN 10277-3:2006) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 10277-3:1999.

This European Standard prEN 10277:2006 '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.

1 Scope

1.1 This part of prEN 10277:2006 applies to bright steel bars in the drawn, turned or ground condition, in straight lengths of free-cutting steels.

1.2 This prEN 10277-3:2006 is complemented by prEN 10277-1:2006.

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*

prEN 10277-1:2006, *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 prEN 10277-1:2006 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 prEN 10277-1:2006.

5 Information to be supplied by the purchaser

See prEN 10277-1:2006.

6 Manufacturing process

See prEN 10277-1:2006.

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,

— in Table 4 for case-hardening steels,

— in Table 5 for direct-hardening steels.

7.3 Options

See annex B of prEN 10277-1:2006.

8 Inspection and testing

See prEN 10277-1:2006.

9 Marking

See prEN 10277-1:2006.

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 10087:1998	≤ 0,14	0,05[b]	0,90 to 1,30	0,11	0,27 to 0,33	-
11SMnPb30	1.0718	EN 10087:1998	≤ 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 10087:1998	≤ 0,14	0,05[b]	1,00 to 1,50	0,11	0,34 to 0,40	-
11SMnPb37	1.0737	EN 10087:1998	≤ 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 10087:1998	0,07 to 0,13	0,40	0,70 to 1,10	0,06	0,15 to 0,25	-
10SPb20	1.0722	EN 10087:1998	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 10087:1998	0,12 to 0,18	0,40	0,90 to 1,30	0,06	0,08 to 0,18	-
Direct-hardening steels								
35S20	1.0726	EN 10087:1998	0,32 to 0,39	0,40	0,70 to 1,10	0,06	0,15 to 0,25	-
35SPb20	1.0756	EN 10087:1998	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 10087:1998	0,32 to 0,39	0,40	1,30 to 1,70	0,06	0,10 to 0,18	-
36SMnPb14	1.0765	EN 10087:1998	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 10087:1998	0,35 to 0,40	0,40	1,20 to 1,50	0,06	0,24 to 0,33	-
38SMnPb28	1.0761	EN 10087:1998	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 10087:1998	0,40 to 0,48	0,40	1,30 to 1,70	0,06	0,24 to 0,33	-
44SMnPb28	1.0763	EN 10087:1998	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 10087:1998	0,42 to 0,50	0,40	0,70 to 1,10	0,06	0,15 to 0,25	-
46SPb20	1.0757	EN 10087:1998	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	± 0,02
	> 0,30	≤ 0,50	± 0,03
Si		≤ 0,05	+ 0,01
	> 0,05	≤ 0,40	+ 0,03
Mn		≤ 1,00	± 0,04
	> 1,00	≤ 1,70	± 0,06
P		≤ 0,06	+ 0,008
	> 0,06	≤ 0,11	+ 0,02
S		≤ 0,33	± 0,003
	> 0,33	≤ 0,40	± 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_5 % 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%.

Table 4 — Mechanical properties of free-cutting steels for case hardening

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_5 % min.
10S20	1.0721	≥ 5 ≤ 10	-	-	410	520 to 780	7
10SPb20	1.0722	> 10 ≤ 16	-	-	390	490 to 740	8
		> 16 ≤ 40	107 to 156	360 to 530	360	460 to 720	9
		> 40 ≤ 63	107 to 156	360 to 530	295	410 to 660	10
		> 63 ≤ 100	105 to 146	350 to 490	235	380 to 630	11
15SMn13	1.0725	≥ 5 ≤ 10	-	-	450	560 to 840	6
		> 10 ≤ 16	-	-	430	500 to 800	7
		> 16 ≤ 40	128 to 178	430 to 600	390	470 to 770	8
		> 40 ≤ 63	128 to 172	430 to 580	350	460 to 680	9
		> 63 ≤ 100	125 to 160	420 to 540	265	440 to 650	10

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%.