DIN 17100 STEELS FOR GENERAL STRUCTURAL PURPOSES (DIN17100)

1. Scope

1.1 This Standard applies to steel sections (including wide flange beams), steel bars, wire rod, flat products(strip, plate, wide flats) seamless and welded, square and rectangular hollow sections, forgings and semi-finished products in the general structural steels nemed in Tables 1 to 3 which are delivered in the hot formed or normalized condition after production.

1.2 products from steels according to this Standard are for use in welded (but see Section 834.2), riveted and screwed structural components, They are not intended for heat treatment - apart from stress-reliening heat treatment and normalizing.

1.3 This Standard does not cover the following products from steels for heneral structural purposes : Seamless and welded tubes and precision steel tubes [see DIN 1626 Part 1 to Part 4, DIN 1629 Part 1 to part4, DIN 2391 Part2, DIN 2393 part 2, DIN 2394, DIN 2395 Part 2, DIN 2395 part3).

Steel castings(See DIN 1681).

Cold rolled flat products without coating (see DIN 1623 Part2, new version in preparation).

Flat steel products with coatings(DIN Standards in preparation).

Bright finished steel (see DN 1652).

Cold rolled sections (see DIN 17118).

Cold finished steel hollow sections (DIN Standards in preparation).

For notes on Standards and standard-tupe publications for steels with adjacent fields of application see the end of this Standard.

Chemical composition

<

Steel grade			Type of deoxidation[1])	Chemical compostion in % by wt.										Chemical composition in % by wt.									Steel Grade
Code number	Material number			Ladie analysis						P	S	N[2])	Additional nitrogen combining elements (e. g. at least 0.020% Al total)	Sample analysis						P	S	N[2])	
				C for product thicknesses in mm										C for product thicknesses in mm									
	new	previous		16Max	>16 32Max	>30 40Max	>40 63Max	>63 100Max	>100					16Max	>16 32Max	>30 40Max	>40 63Max	>63 100Max	>100				
St33	**1.0035**	**1.0033**	Optional	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
St37.2	**1.0037**	**-**	Optional	0.17	0.20	0.20	0.20	0.20		0.050	0.050	0.009	-	0.21	0.25	0.25	0.25	0.25		0.065	0.065	0.010	St37.2
USt37.2	**1.0036**	**1.0112**	U	0.17	0.20	0.20	0.20	0.20		0.050	0.050	0.007	-	0.21	0.25	0.25	0.25	0.25		0.065	0.065	0.09	USt37.2
RSt37.2	**1.0038**	**1.0114**	P	0.17	0.17	0.17	0.20	0.20		0.050	0.050	0.009	-	0.19	0.19	0.19	0.22	0.33		0.060	0.060	0.010	RSt37.2
St37.3	**1.0116**	**1.0116**	RR	0.17	0.17	0.17	0.17	0.17		0.040	0.040	-	yes	0.19	0.19	0.19	0.19	0.19		0.050	0.050	-	St37.3
St44.2	**1.0044**	**-**	R	0.21	0.21	0.21	0.22	0.22		0.050	0.050	0.009	-	0.24	0.24	0.24	0.25	0.25		0.060	0.060	0.010	St44.2
St44.3	**1.0144**	**-**	RR	0.20	0.20	0.20	0.20	0.20		0.040	0.040	-	yes	0.23	0.23	0.23	0.23	0.23		0.050	0.050	-	St44.3
St52.3[3])	**1.0570**	**1.0841**	RR	0.20[4])	0.20[4])	0.22	0.22	0.22		0.040	0.040	-	yes	0.22[6])	0.22[6])	0.24	0.24	0.24		0.050	0.060	-	St52.3
St50.2	**1.0050**	**1.0532**	R	-[5])	-[5])	-[5])	-[5])	-[5])	-	0.050	0.050	0.009	-	-	-	-	-	-	-	0.060	0.060	0.010	St50.2
St60.2	**1.0060**	**1.0542**	R	-[5])	-[5])	-[5])	-[5])	-[5])	-	0.050	0.050	0.009	-	-	-	-	-	-	-	0.060	0.060	0.010	St60.2
St70.2	**1.0070**	**1.0632**	R	-[5])	-[5])	-[5])	-[5])	-[5])	-	0.050	0.050	0.009	-	-	-	-	-	-	-	0.060	0.060	0.010	St70.2

[1])U rimming. R killed (including balanced steel), RR special killed

[2])It is permissible to axcased the maximum value indicated, provided a phosphorous content per 0.001% N of 0.005% P below the maximum value indicated is maintained. THe nitrogen content may not, however, exceed a value of 0.0012%N in the ladle analysis and 0.0014%N in the sample analysis.

[3])The content may not exceed 0.55%Si and 1.60% Mn in the ladle analysis or 0.60%Si and 1.70% Mn in the sample analysis.

[4])Maximum 0.22% C for steels KSt 52-3 and RoSt 52-3 according to Table 3

[5])In the case of steels suitable for bright drawing according to Table 3 the following gulde vatues for the carbon content can be assumed:

0.30% C for Z St 50-2, 0.40% C for ZSt 60-2, 0.50% C for Z St 70-2

[6]Maximum 0.24% C for steels KSt 52-3 and RoSt 52-3 according to Table3

Table 1. Grade classification and chemical composition of the steels

<

Steel grade			Type of deoxidation[1])	Chemical compostion in % by wt.										Steel Grade
Code number	Material number			Ladie analysis						P	S	N[2])	Additional nitrogen combining elements (e. g. at least 0.020% Al total)	
				C										
				for product thicknesses in mm										
	new	previous		16Max	>16 32Max	>30 40Max	>40 63Max	>63 100Max	>100					
St33	1.0035	1.0033	Optional	-	-	-	-	-	-	-	-	-	-	-
St37.2	1.0037	-	Optional	0.17	0.20	0.20	0.20	0.20		0.050	0.050	0.009	-	St37.2
USt37.2	1.0036	1.0112	U	0.17	0.20	0.20	0.20	0.20		0.050	0.050	0.007	-	USt37.2
RSt37.2	1.0038	1.014	P	0.17	0.17	0.17	0.20	0.20		0.050	0.050	0.009	-	RSt37.2
St37.3	1.0116	1.0116	RR	0.17	0.17	0.17	0.17	0.17	by agree -ment	0.040	0.040	-	yes	St37.3
St44.2	1.0044	-	R	0.21	0.21	0.21	0.22	0.22		0.050	0.050	0.009	-	St44.2
St44.3	1.0144	-	RR	0.20	0.20	0.20	0.20	0.20		0.040	0.040	-	yes	St44.3
St52.3[3])	1.0570	1.0841	RR	0.20[4])	0.20[4])	0.22	0.22	0.22		0.040	0.040	-	yes	St52.3
St50.2	1.0050	1.0532	R	-[5])	-[5])	-[5])	-[5])	-[5])	-	0.050	0.050	0.009	-	St50.2
St60.2	1.0060	1.0542	R	-[5])	-[5])	-[5])	-[5])	-[5])	-	0.050	0.050	0.009	-	St60.2
St70.2	1.0070	1.0632	R	-[5])	-[5])	-[5])	-[5])	-[5])	-	0.050	0.050	0.009	-	St70.2

[1])U rimming. R killed (including balanced steel), RR special killed

[2])It is permissible to axcased the maximum value indicated, provided a phosphorous content per 0.001% N of 0.005% P below the maximum value indicated is maintained. THe nitrogen content may not, however, exceed a value of 0.0012%N in the ladle analysis and 0.0014%N in the sample analysis.

[3])The content may not exceed 0.55%Si and 1.60% Mn in the ladle analysis or 0.60%Si and 1.70% Mn in the sample analysis.

[4])Maximum 0.22% C for steels KSt 52-3 and RoSt 52-3 according to Table 3

[5])In the case of steels suitable for bright drawing according to Table 3 the following gulde vatues for the carbon content can be assumed:

0.30% C for Z St 50-2, 0.40% C for ZSt 60-2, 0.50% C for Z St 70-2

[6]Maximum 0.24% C for steels KSt 52-3 and RoSt 52-3 according to Table3

<

Steel grade			Type of deoxidation[1])	Chemical composition in % by wt.									Steel Grade
Code number	Material number			Sample analysis						P	S	N[2])	
				C									
				for product thicknesses in mm									
	new	previous		16Max	>16 32Max	>30 40Max	>40 63Max	>63 100Max	>100				
St33	1.0035	1.0033	Optional	-	-	-	-	-	-	-	-	-	-
St37.2	1.0037	-	Optional	0.21	0.25	0.25	0.25	0.25		0.065	0.065	0.010	St37.2
USt37.2	1.0036	1.0112	U	0.21	0.25	0.25	0.25	0.25		0.065	0.065	0.09	USt37.2
RSt37.2	1.0038	1.014	P	0.19	0.19	0.19	0.22	0.33	by	0.060	0.060	0.010	RSt37.2
St37.3	1.0116	1.0116	RR	0.19	0.19	0.19	0.19	0.19	agree	0.050	0.050	-	St37.3
St44-2	1.0044	-	R	0.24	0.24	0.24	0.25	0.25	-ment	0.060	0.060	0.010	St44.2
St44-3	1.0144	-	RR	0.23	0.23	0.23	0.23	0.23		0.050	0.050	-	St44.3
St52-3[3])	1.0570	1.0841	RR	0.22[6])	0.22[6])	0.24	0.24	0.24		0.050	0.060	-	St52.3
St50-2	1.0050	1.0532	R	-	-	-	-	-	-	0.060	0.060	0.010	St50.2
St60-2	1.0060	1.0542	R	-	-	-	-	-	-	0.060	0.060	0.010	St60.2
St70-2	1.0070	1.0632	R	-	-	-	-	-	-	0.060	0.060	0.010	St70.2

[1])U rimming. R killed (including balanced steel), RR special killed

[2])It is permissible to axcased the maximum value indicated, provided a phosphorous content per 0.001% N of 0.005% P below the maximum value indicated is maintained. THe nitrogen content may not, however, exceed a value of 0.0012%N in the ladle analysis and 0.0014%N in the sample analysis.

[3])The content may not exceed 0.55%Si and 1.60% Mn in the ladle analysis or 0.60%Si and 1.70% Mn in the sample analysis.

[4])Maximum 0.22% C for steels KSt 52-3 and RoSt 52-3 according to Table 3

[5])In the case of steels suitable for bright drawing according to Table 3 the following gulde vatues for the carbon content can be assumed:

0.30% C for Z St 50-2, 0.40% C for ZSt 60-2, 0.50% C for Z St 70-2

[6]Maximum 0.24% C for steels KSt 52-3 and RoSt 52-3 according to Table3

Table 2. Mechanical and technological properties of the steels in the as-delivered condlition and/or condition of treatment according to Section 8.4.1.2

Steel grade according to Table 1		Mechanical and technological properties 1)								
		Tensile strength Rm for product thicknesses in mm			Upper yield point ReH. for pruduct thicknesses in mm					
Code number	Material number	< 3	≥ 3 ≤100	> 100	≤16	> 16 ≤ 40	≥ 40 ≤ 63	≥ 63 ≤ 80	>80 ≤100	> 100
		N/㎟			N/㎟					
St33	1.0035	310 up to 540	290	-	185	175 5)	-	-	-	-
St37.2	1.0037	360up to 510	340 up to 470	by agree -ment	235	225	215	205	195	by agree -ment
USt37.2	1.0035									
RSt37.2	1.0038				235	225	215	215	215	
St37.3	1.0116									
St44-2	1.0044	430 up to 580	410 up to 540		275	265	255	245	235	
St44-3	1.0144									
St52-3	1.0570	510 up to 680	490 up to 630		355	345	335	325	315	
St50-2	1.0050	490 up to 660	470 up to 610		295	285	275	265	255	
St60-2	1.0060	590 up to 770	570 up to 710		335	325	315	305	295	
St70-2	1.0070	690 up to 900	670 up to 830		365	355	345	335	325	

1) The values of the tensile test and the bending test apply to longitudinal specimens apart from flat products ≥ 600mm width from which transverse specimens are to be taken.

2) U hot formed, untreated, N normalized. Section 8.4.1.2 applies also.

3) For notched-bar impact specimens with a width of less than 10mm the specifications according to Section 8.4.1.4 and Fig. 1 apply.

4) The test result is the average value from three tests. Only one individual value may be lower than the minimum average value of 23 or 27J, and then only by a maximum of 30%.

5) This value applies only to thicknesses up to 25mm.

Table 2. (continued)

Steel	Mechanical and technological properties 1)			
	Eiongation at rupture		Bending test (180 °)	ISO V-notch specimens (Irongitudinal)

grade Code-number	Position of specimen	(Gauge length Lo = 80mm) for product thicknesses in mm					(Gauge length Lo = 5 do) for product thicknesses in mm			Position of specimen	(a Thickness of specimen) for product thicknesses in mm				Condition of treatment 2)	Test tem-pera-ture ℃	for product thicknesses in mm			
		≥0.5 <1	≥1<1.5	≥1.5 <2	≥2 <2.5	≥2.5 <3	≥ 3 ≤40	≥ 40 ≤63	≥ 63 ≤100	>100		<3	≥ 3 ≤63	≥63 ≤100	>100			≥ 10 ≤16 3)	≥ 16 ≤63	≥ 63 ≤100	>100
		% min.										Mandrel diameter						J min.			
St 33	longitu-dinal tran-sverse	10 8	11 9	12 10	13 11	14 12	18 16	-	-	-	longitudinal transverse	2.5a 3a	2.5a 3a	-	-	U,N	-	-	-	-	-
St 37.2 USt 37.2 RSt 37.2		17 15	18 16	19 17	20 18	21 19	26 24	25 23	24 22	by agree-ment		0.5a 1.5a	1a 2a	1.5a 2.5a	by agree-ment	U,N U,N U,N	+20 +20 +20	27 27 27	- - 27	- - -	- - -
St 37.3												0.5a 1a	1a 1.5a	1.5a 2a		U N	±0 -20	27 27	27 27	23 23	by agree-ment
St 44.2		14 12	15 13	16 14	17 15	18 16	22 20	21 19	20 18			2a 2.5a	2.5a 3a	3a 3.5a		U,N	+20	27		-	-
St 44.3																U N	±0 -20	27 27	27 27	23 23	by agree-ment
St 52.3		14 12	15 13	16 14	17 15	18 16	22 20	21 19	20 18			2a 2.5a	2.5a 3a	3a 3.5a		U N	±0 -20	27 27	27 27	23 23	by agree-ment
St 50.2		12 10	13 11	14 12	15 13	16 14	20 18	19 17	18 16		-	-	-	-	-	U,N	-	-	-	-	-
St 60.2		8 6	9 7	10 8	11 0	12 10	16 14	15 13	14 12		-	-	-	-	-	U,N	-	-	-	-	-
St 70.2		4 3	5 4	6 5	7 6	8 7	11 10	10 9	9 8		-	-	-	-	-	U,N	-	-	-	-	-

1), 2), 3) and 4) see page 4

Table 6. Comparison of steel grades according to DIN 17 100 with the steels for general structural purposes covered in the Euronom and in the ISO Standards.

Steel grade according to DIN 17 100	Comparabte steel grade according		
	Eurronorm 25 1)	ISO 630 2)	ISO 1052 3)
St 33	Fe 310 -0	Fe 310-0	-

(St 37-1 4) St 37-2 USt 37-2 RSt 37-2 St 37-3 U St 37-3 N	Fe 360-A - Fe 360-BFU Fe 360-BFN Fe 360-C Fe 360-D	Fe 360-A Fe 360-B 5) Fe 360-B Fe 360-B 5) Fe 360-C Fe 360-D	- - - - - -
- St 44.2 St 44.3 U St 44.3 N	Fe 430-A Fe 430-B Fe 430-C Fe 430-D	Fe 430-A Fe 430-B Fe 430-C Fe 430-D	- - - -
- St 52.3 U St 52.3 N	Fe 510-B Fe 510-C Fe 510-D	Fe 510-B Fe 510-C Fe 510-D	- - -
(St 50.1) 4) St 50.2	Fe 490-1 Fe 490-2	- -	- Fe 490-2
St 60.1) 4) St 60.2	Fe 590-1 Fe 590-2	- -	- Fe 590-2
St 70.2	Fe 690-2	-	Fe 690-2

1) November 1972 edition

2) Curent ISO Draft (ISO DISI Feruary 1976

3) New version of ISO/R 1052 - 1969, curtent document 1713 N 307 of September 1977

4) No longer cccooered in the pretent edition of DIN 17 100

5) The type of caoxication can be agreed at the time of ordering

Table 3 gives a survey of the steel grades with special service properties (see also Section 5.4.3).

By comparison with the September 1965 edition of the DIN Standard, this edition also contains the grades which are suitable for rolled section shapling and for the manufacture of cold forming hollow sections with their own code letter (k) and their own material number.