DIN 17100 STEELS FOR GENERAL STRUCTURAL PURPOSES

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 named 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-relieving heat treatment and normalizing.
- 1.3 This Standard does not cover the following products from steels for general 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 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).

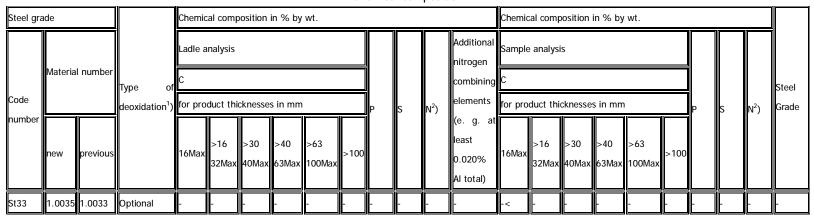
Bright finished steel (see DN 1652).

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



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	Р	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	0.204)	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

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	Chemical composition in % by wt.					Steel Grade
Code number		deoxidation ¹)	Ladle analysis	P	S	IN-)	Additional nitrogen	
	Material number		С				combining	
			for product thicknesses in mm				elements (e.	

²⁾ It is permissible to exceed 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.

⁾ 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

⁾ In the case of steels suitable for bright drawing according to Table 3 the following guide values 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

	new	previous		16Max				>63 100Max	>100				g. at least 0.020% Al total)	
St33	1.0035	1.0033	Optional	-	-	-	-	-	-	-	-	-	-<	-
St37.2 USt37.2 RSt37.2 St37.3	1.0037 1.0036 1.0038 1.0116	1.0112 1.014	Optional U P RR	0.17 0.17	0.20 0.17	0.20 0.17		0.20 0.20 0.20 0.17		0.050 0.050	0.050 0.050	0.009 0.007 0.009 -	-	St37.2 USt37.2 RSt37.2 St37.3
St44.2 St44.3	1.0044 1.0144		R RR				0.22	0.22 0.20			0.050 0.040	0.009 -		St44.2 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

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

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			Sample analysis	P	s	N^2)	
number	Material number						
			С				
			for product thicknesses in mm				

²) It is permissible to exceed 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

⁾ In the case of steels suitable for bright drawing according to Table 3 the following guide values for the carbon content can be assumed:

	new	previous		16Max		>30 40Max	>40 63Max	>63 100Max	>100				
St33	1.0035	1.0033	Optional	-<	-	-	-	-	-	-	-	-	_
St37.2 USt37.2 RSt37.2 St37.3 St44-2 St44-3	1.0037 1.0036 1.0038 1.0116 1.0044 1.0144	- 1.0112 1.014 1.0116 -	P RR R	0.19 0.19	0.19 0.19	0.19 0.19	0.25 0.25 0.22 0.19 0.25 0.23	0.33 0.19	by	0.065 0.060 0.050 0.060	0.065 0.060 0.050 0.060	0.010 0.09 0.010 -	St37.2 USt37.2 RSt37.2 St37.3 St44.2 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

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 condition and/or condition of treatment according to Section 8.4.1.2

		Mechanical and technological properties 1)											
Steel grade accor	ding to Table 1	Tensile strength Rm			Upper yi	eld point ReH.							
		for product thicknesse	es in mm		for product thicknesses in mm								
Code	Material	< 3	≥ 3	> 100	≤16	> 16	≥ 40	≥ 63	>80	> 100			
	number		≤100	> 100	< 10	≤ 40	≤ 63	≤ 80	≤100	> 100			
Humber		N/mm²			N/mm²								
St33	1.0035	310 up to 540	290	-	185	175 5)	-	-	-	-			

²⁾ It is permissible to exceed 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 guide values 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

St37.2 USt37.2	1.0037 1.0035	360up to 510	340 up to 470		235	225	215	205	195	
RSt37.2 St37.3	1.0038 1.0116	300up to 310	540 up to 470		235	225	215	215	215	
St44-2 St44-3	1.0044 1.0144	430 up to 580	410 up to 540	by agreement	275	265	255	245	235	by agreement
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 \geq 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)

	Mechanical a	nd technological properties 1)		
		Elongation at rupture	Bending test (180°)	ISO V-notch specimens (Longitudinal)
Steel		(Gauge length Lo = (Gauge length Lo = 80mm) do)	(a Thickness of specimer for product thicknesse	for product thicknesses in
grade		for product thicknesses in mm	mm	Condition
	Position of specimen		Position of \$\\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Test
		% min.	Mandrel diameter	J min.

St 33			11 9	12 10		14 12		_	_	-		2.5a 3a	2.5a 3a	-	-	U,N	-	_	_	-	-
St 37.2		_				-						0.5a	1a	1.5a		U,N	+20	27	-	-	-
USt 37.2		17	18	19	20	21	26	25	24			0.5a 1.5a		2.5a		U,N	+20	27	-	-	-
RSt 37.2			16	17			24					1.50	Zu	2.54		U,N	+20	27	27	-	-
St 37.3		10		.,		.,	_ '				Iongitudinal	0.5a	1a	1.5a		U	±0	27	27	23	by
St 67.6											transverse	1a	1.5a	2a	by	N	-20	27	27	23	agreement
St 44.2		14	15	16	17	1Ω	22	21	20	by		2a	2.5a	3a	agreement	U,N	+20	27		-	_
St 44.3	Iongitudinal		13	14			20			agreement		2.5a		3.5a		U	±0	27	27	23	by
	transverse				10		20	.,				2.00	ou	0.00		N	-20	27	27	23	agreement
St 52.3		14	15	16	17	18	22	21	20			2a	2.5a	3a		U	±0	27	27	23	by
31 32.3		12	13	14	15	16	20	19	18			2.5a	3a	3.5a		N	-20	27	27	23	agreement
St 50.2		12	13	14	15	16	20	19	18							U,N					
31 30.2		10	11	12	13	14	18	17	16							0,11					
St 60.2		8	9	10	11	12	16	15	14							U,N					
31 00.2		6	7	8	0	10	14	13	12							0,11					
St 70.2		4	5	6	7	8	11	10	9							U,N					
St 70.2		3	4	5	6	7	10	9	8							U, N					
1), 2), 3)	and 4) see p	age 4	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	Comparable steel grade according		
according to DIN 17 100	Euronorm 25 1)	ISO 630 2)	ISO 1052 3)
St 33	Fe 310 -0	Fe 310-0	-
(St 37-1 4)	Fe 360-A	Fe 360-A	-
St 37-2	-	Fe 360-B 5)	-
USt 37-2	Fe 360-BFU	Fe 360-B	-
RSt 37-2	Fe 360-BFN	Fe 360-B 5)	-
St 37-3 U	Fe 360-C	Fe 360-C	-
St 37-3 N	Fe 360-D	Fe 360-D	-

-	Fe 430-A	Fe 430-A	-
St 44.2	Fe 430-B	Fe 430-B	-
St 44.3 U	Fe 430-C	Fe 430-C	-
St 44.3 N	Fe 430-D	Fe 430-D	-
-	Fe 510-B	Fe 510-B	-
St 52.3 U	Fe 510-C	Fe 510-C	-
St 52.3 N	Fe 510-D	Fe 510-D	-
(St 50.1) 4)	Fe 490-1	-	-
St 50.2	Fe 490-2	-	Fe 490-2
St 60.1) 4)	Fe 590-1	-	-
St 60.2	Fe 590-2	-	Fe 590-2
St 70.2	Fe 690-2	-	Fe 690-2

¹⁾ November 1972 edition

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.

²⁾ Current ISO Draft (ISO DISI February 1976

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

⁴⁾ No longer covered in the present edition of DIN 17 100

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