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Bright steel made from steel for quenching and tempering

Technical delivery conditions

DIN 1652 Part 4

Blankstahl; technische Lieferbedingungen;
Blankstahl aus Vergütungsstählen

This standard, together with DIN 1652 Parts 1 to 3, November 1990 editions, supersedes DIN 1652, May 1963 edition.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

See Explanatory notes for connection with International Standard ISO 683-18 : 1976, published by the International Organization for Standardization.

The symbol ● denotes items which shall, the symbol ● ● denoting items which may, be agreed upon at the time of ordering.

Note. The requirements specified here are based on DIN 17 200, which has been superseded by DIN EN 10 083 (also available in English). It can therefore be expected that a revised edition of the present standard will be published in the foreseeable future.

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1 Field of application

This standard specifies requirements for bright steel made from steel for quenching and tempering in accordance with the March 1987 edition of DIN 17 200*). Other requirements with which bright steel is expected to comply are specified in DIN 1652 Part 1.

2 Concepts

See DIN 1652 Part 1 for concepts.

3 Product forms, dimensions and tolerances

Product forms, dimensions and tolerances shall be as specified in DIN 1652 Part 1.

4 Mass

Cf. DIN 1652 Part 1.

5 Designation

See tables 1 to 3 for material designations and numbers, and heat treatment conditions.

The standard designation of steel covered in this standard shall include the following items:

a) the term 'steel';

b) the DIN number;

c) the material designation or number;

d) the symbol denoting degree of hardenability (hardenability band), where applicable;

e) the code letter denoting heat treatment condition.

Examples:

Steel DIN 1652 – 34 Cr 4 K + G

Steel DIN 1652 – 1.7033 K + G

6 Steel grades

The steel grades covered in this standard are given in subclause 6.1 of DIN 17 200*).

*) Superseded by DIN EN 10 083.

7 Requirements

7.1 Manufacturing process

7.1.1 The steelmaking process, the casting process and the process of shaping the product shall be at the manufacturer's discretion.

● ● In special cases, these processes may be the subject of agreement at the time of ordering.

7.1.2 The steel shall be killed (not semi-killed).

7.2 Heat treatment condition

The steel shall be supplied in one of the heat treatment conditions specified in table 1, further requirements being specified in DIN 1652 Part 1.

7.3 Separation by cast

Products belonging to one consignment shall be separated by cast.

7.4 Chemical composition

7.4.1 Chemical composition, as determined by ladle analysis, shall be in compliance with table 2 of DIN 17 200*).

7.4.2 The amounts by which the chemical composition in the product analysis may deviate from the limiting values specified for the ladle analysis (cf. table 2 of DIN 17 200*)) shall be as specified in table 3 of DIN 17 200*).

7.5 Mechanical properties

7.5.1 Table 1 gives a summary of the requirements regarding chemical composition and mechanical properties, as a function of the heat treatment condition, with which steels are expected to comply. Actual values and guideline values for mechanical properties and hardness are specified in tables 2 and 3, those for hardenability of high-grade steel being specified in tables 4 and 5 and figure 1 of DIN 17 200*).

7.5.2 For the steel grades covered in this standard, it may generally be assumed that, under the test conditions specified in table 4, the Rockwell hardness (as determined in the end quench test) is as specified in table 4 of DIN 17 200*).

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7.6 Other properties

7.6.1 Weldability

Cf. subclause 7.4.1 of DIN 17 200*).

7.6.2 Shearability

Where the Brinell hardness exceeds 255 HB, heat treatment (e.g. normalizing or softening) is required. Under suitable conditions, C 22, Ck 22, Cm 22, C 35, Ck 35 and Cm 35 steels are shearable in conditions K and SH.

7.7 Surface condition

The surface condition shall be as specified in subclause 7.7 of DIN 1652 Part 1.

7.7.1 ●● Permissible crack depth and depth of skin decarburization

It may be agreed at the time of ordering that a specified crack depth or depth of skin decarburization is not to be exceeded.

In the case of bars and rod of circular cross section, the requirements regarding permissible crack depth specified in *Stahl-Eisen-Lieferbedingungen* (Technical delivery conditions for iron and steel) 055 (at present at the stage of draft) shall be complied with.

7.8 ●● Grain size

The grain size shall be as specified in subclause 7.5 of DIN 17 200*).

7.9 ●● Non-metallic inclusions

See subclause 7.6 and table 10 of DIN 17 200*) for requirements regarding non-metallic inclusions.

7.10 ●● Soundness

See subclause 7.7 of DIN 17 200*) for requirements regarding soundness.

8 Testing

Testing shall be as specified in DIN 1652 Part 1.

8.1 ●● Tests and inspection documents

The tests to be carried out and the inspection documents to be issued shall be as specified in DIN 1652 Part 1.

8.2 Items to be included in inspection documents

8.2.1 ●● Inspection documents issued by the manufacturer's works

The inspection documents to be issued by the manufacturer's works shall be as specified in subclause 8.2 of DIN 17 200*).

8.2.2 ●● Inspection documents issued by third-party inspectors

The inspection documents to be issued by third-party inspectors shall be as specified in subclause 8.3 of DIN 17 200*).

For *), see page 1.

8.3 Scope of testing, sampling, sample preparation and test methods

8.3.1 Chemical composition, mechanical properties, hardness and hardenability

Where the chemical composition, mechanical properties, hardness and hardenability are to be tested, the test conditions specified in table 4 shall apply.

●● Subsequent testing of the mechanical properties on reference test pieces in the normalized or quenched and tempered condition may be agreed at the time of ordering.

8.3.2 ●● Grain size

Grain size shall be tested in accordance with subclause 8.4.2 of DIN 17 200*).

8.3.3 Non-metallic inclusions

Testing for non-metallic inclusions shall be performed in accordance with DIN 50 602.

8.3.4 ●● Soundness

Subclause 8.4.4 of DIN 17 200*) shall apply for testing the soundness.

8.3.5 ●● Surface defects

Subclause 8.4.5 of DIN 17 200*) shall apply for the check for surface defects.

8.3.6 ●● Skin decarburization

Subclause 8.4.6 of DIN 17 200*) shall apply for the test for skin decarburization.

8.3.7 ●● Visual examination and dimensional check

Subclause 8.4.7 of DIN 17 200*) shall apply for the visual examination and dimensional check.

8.4 Retests

DIN 17 010 shall apply for retests.

9 Marking

Subclauses 9.1 to 9.3 of DIN 17 200*) shall apply for the marking of steel in compliance with this standard.

10 Heat treatment

See table 12 of DIN 17 200*) for guideline values for heat treatment temperatures.

Guideline values showing the influence of the tempering temperature on the characteristics determined in the tensile test are given in figure 6 of DIN 17 200*).

Where the material is to be processed further (e.g. to reduce internal stresses), and where such involves cooling slowly after tempering, the impact energy values may be lower, particularly in the case of steel which does not contain molybdenum.

11 Dispatch

The condition of the steel for dispatching purposes shall be as specified in DIN 1652 Part 1.

12 Complaints

DIN 1652 Part 1 shall apply for complaints.

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Table 1. **Summary of requirements for chemical composition and mechanical properties, as a function of heat treatment condition**

<table>
<tr><td></td><td colspan="2">1</td><td>2</td><td colspan="2">3</td><td colspan="3">4</td></tr>
<tr><td rowspan="3">No.</td><td colspan="2" rowspan="3">Heat treatment condition</td><td rowspan="3">Symbol</td><td colspan="5">Requirements</td></tr>
<tr><td colspan="2">Steel not subject to a requirement class 1)</td><td colspan="3">Steel subject to requirement class H**)</td></tr>
<tr><td>3.1</td><td>3.2</td><td>4.1</td><td>4.2</td><td>4.3</td></tr>
<tr><td>1</td><td colspan="2">Cold drawn 2)</td><td>K</td><td rowspan="11">Chemical composition as in tables 2 and 3 of DIN 17 200*).</td><td>Mechanical properties as a result of tensile testing as in table 2, column 4 3), or table 3, column 4 3).</td><td colspan="2" rowspan="11">As specified in columns 3.1 and 3.2.</td><td rowspan="11">Hardenability as in table 4 5) of DIN 17 200*).</td></tr>
<tr><td>2</td><td colspan="2">Peeled 4)</td><td>SH</td><td>–</td></tr>
<tr><td>3</td><td>Cold drawn 2)</td><td rowspan="2">and stress relieved.</td><td>K + S</td><td rowspan="2">●● If necessary, the values (or guideline values) shall be agreed upon, based on the specifications given in tables 2 and 3 3).</td></tr>
<tr><td>4</td><td>Peeled 4)</td><td>SH + S</td></tr>
<tr><td>5</td><td>Cold drawn 2)</td><td rowspan="2">and softened.</td><td>K + G</td><td rowspan="2">Hardness as in table 2, column 5 3), or table 3, column 5 3).</td></tr>
<tr><td>6</td><td>Peeled 4)</td><td>SH + G</td></tr>
<tr><td>7</td><td>Cold drawn 2)</td><td rowspan="2">and normalized.</td><td>K + N</td><td rowspan="2">Mechanical properties in tensile test as in table 2, column 6.</td></tr>
<tr><td>8</td><td>Peeled 4)</td><td>SH + N</td></tr>
<tr><td>9</td><td>Cold drawn 2)</td><td rowspan="2">and quenched and tempered.</td><td>K + V</td><td rowspan="3">Mechanical properties in tensile test and, partially, in impact test, as in table 2, column 7, or table 3, columen 6.</td></tr>
<tr><td>10</td><td>Peeled 4)</td><td>SH + V</td></tr>
<tr><td>11</td><td>Quenched and tempered</td><td>and peeled.</td><td>V + SH</td></tr>
</table>

1) The hardness values specified in table 4 of DIN 17 200*) shall be regarded as guideline values (cf. subclause 7.5.2).
2) Normally, rounds with a diameter exceeding 50 mm are only suitable for peeling.
3) In the case of heat treatment conditions K, SH, K + S, SH + S, K + G and SH + G, it shall be possible, after proper heat treatment, to attain the values for mechanical properties specified in table 2, columns 6 and 7, or table 3, column 6.
4) Peeling is usually suitable where the diameter of the material is more than 16 mm, the supplier being permitted to rough turn the material instead.
5) Cf. footnotes 1 and 2 to table 4 of DIN 17 200*).
For *), see page 1.
**) H = steel subject to particular hardenability requirements.

Footnotes to tables 2 and 3

1) Cf. subclause 2.3 of DIN 1652 Part 1.
2) The values specified do not apply to steel drawn more than once or to cross sections other than those covered here.
3) Cf. subclause 7.6.2 of this standard and subclause 7.2.2 of DIN 1652 Part 1.
4) Heat treatment prior to cold drawing at manufacturer's discretion.
5) In the case of heat treatment condition V + K, the minimum values specified for A_5, Z and A_V are about 75 % lower, whilst R_e and R_m increase by about 100 N/mm^2 where the degree of forging is up to 10 %.
6) ●● The supply of products exceeding 80 mm in thickness shall be the subject of agreement.
7) Provisional values.

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Table 2. **Mechanical properties of bright unalloyed steel for quenching and tempering**

1	2	3		4			5	6			7				
Steel grade / Material		Thickness 1), in mm		Heat treatment condition 2)											
				Cold drawn (K) 3), 4)			Cold drawn and softened (K + G) Peeled and softened (SH + G)	Cold drawn and normalized (K + N) Peeled and normalized (SH + N)			Cold drawn and quenched and tempered (K + V) 5) Peeled and quenched and tempered (SH + V)				
designation	number	From	To	Minimum tensile strength, in N/mm^2	Minimum upper yield strength, in N/mm^2	Minimum elongation at fracture ($L_0 = 5d_0$), as a percentage	Maximum hardness, in HB	Minimum tensile strength, in N/mm^2	Minimum upper yield strength, in N/mm^2	Minimum elongation at fracture ($L_0 = 5d_0$), as a percentage	Minimum upper yield strength, in N/mm^2	Minimum tensile strength, in N/mm^2	Minimum elongation at fracture ($L_0 = 5d_0$), as a percentage	Min. reduction in area after fracture, as a percentage	Impact energy (ISO-V), Ck and Cm grades, in J
			5	580	460	5									
		5	10	540	410	6		430	240	24	340	500 to 650	20	50	50
C 22	1.0402	10	16	500	350	7									
Ck 22	1.1151	16	25	450	320	8	–				290	470 to 620	22	50	50
Cm 22	1.1149	25	40	450	270	9		410	210	25					
		40	100	410	230	11					Subject to agreement.				
		100	160	Subject to agreement.											
			5	680	570	5									
		5	10	640	480	6		550	300	18	430	630 to 780	17	40	35
C 35	1.0501	10	16	580	400	7	–								
Ck 35	1.1181	16	25	550	370	8					380	600 to 750	19	45	35
Cm 35	1.1180	25	40	550	310	8		520	270	19					
		40	100	520	280	9					320	550 to 700	20	50	35
		100	160	Subject to agreement.											

For 1) to 5), see page 3.

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Table 2 (concluded).

1	2	3		4			5	6			7				
Steel grade Material		Thickness 1), in mm		Heat treatment condition 2)											
				Cold drawn (K) 3), 4)			Cold drawn and softened (K + G) Peeled and softened (SH + G)	Cold drawn and normalized (K + N) Peeled and normalized (SH + N)			Cold drawn and quenched and tempered (K + V) 5) Peeled and quenched and tempered (SH + V)				
designation	number	From	To	Minimum tensile strength, in N/mm²	Minimum upper yield strength, in N/mm²	Minimum elongation at fracture ($L_0 = 5d_0$), as a percentage	Maximum hardness, in HB	Minimum tensile strength, in N/mm²	Minimum upper yield strength, in N/mm²	Minimum elongation at fracture ($L_0 = 5d_0$), as a percentage	Minimum upper yield strength, in N/mm²	Minimum tensile strength, in N/mm²	Minimum elongation at fracture ($L_0 = 5d_0$), as a percentage	Min. reduction in area after fracture, as a percentage	Impact energy (ISO-V), Ck and Cm grades, in J
			5	770	640	4	207	620	340	14	490	700 to 850	14	35	25
		5	10	730	560	5									
C 45	1.0503	10	16	680	470	6									
Ck 45	1.1191	16	25	630	430	6		580	305	16	430	650 to 800	16	40	25
Cm 45	1.1201	25	40	630	370	7									
		40	100	580	330	8					370	630 to 780	17	45	25
		100	160		Subject to agreement.										
			5	860	700	4	241	710	380	10	580	850 to 1000	11	25	–
		5	10	800	630	5									
C 60	1.0601	10	16	750	520	6									
Ck 60	1.1221	16	25	700	470	6		670	340	11	520	800 to 950	13	30	–
Cm 60	1.1223	25	40	700	410	7									
		40	100	670	380	8					450	750 to 900	14	35	–
		100	160	Subject to agreement.											

For 1) to 5), see page 3.

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Table 3. **Mechanical properties of bright alloy steel for quenching and tempering and of 28 Mn 6 steel**

1	2	3		4	5	6				
Steel grade		Thickness 1), in mm		Heat treatment condition 2)						
				Cold drawn (K) 3), 4)	Cold drawn and softened (K + G) Peeled and softened (SH + G)	Cold drawn and quenched and tempered (K + V) 5) Peeled and quenched and tempered (SH + V) Quenched and tempered and peeled (V + SH)				
Material				R_m	Max. hardness, in HB	R_e	R_m	A_5	Z	A_V (ISO-V)
designation	number	From	To	N/mm² max.		N/mm² min.	N/mm²	% min.	% min.	J min.
28 Mn 6	**1.1170**		16	920	223	590	800 to 950	13	40	35
		16	40	900		490	700 to 850	15	45	40
		40	80 6)	880		440	650 to 800	16	50	40
32 Cr 2 **32 CrS 2**	**1.7020** **1.7021**		16	830	197	450	700 to 850	15	40	35
		16	40	800		350	600 to 750	15	45	35
		40	80 6)	770		300	500 to 650	17	50	35
38 Cr 2 **38 CrS 2**	**1.7003** **1.7023**		16	880	207	550	800 to 950	14	35	35
		16	40	850		450	700 to 850	15	40	35
		40	80 6)	820		350	600 to 750	17	45	35
46 Cr 2 **46 CrS 2**	**1.7006** **1.7025**		16	950	223	650	900 to 1100	12	35	30
		16	40	920		550	800 to 950	14	40	35
		40	80 6)	890		400	650 to 800	15	45	35
28 Cr 4 **28 CrS 4**	**1.7030** **1.7036**		16	950	217	650	850 to 1000	12	40	35
		16	40	880		550	750 to 900	14	45	40
		40	80 6)	860		410	650 to 800	15	50	45
34 Cr 4 **34 CrS 4**	**1.7033** **1.7037**		16	940	223	700	900 to 1100	12	35	35
		16	40	920		590	800 to 950	14	40	40
		40	80 6)	900		460	700 to 850	15	45	40
37 Cr 4 **37 CrS 4**	**1.7034** **1.7038**		16	960	235	750	950 to 1150	11	35	30
		16	40	940		630	850 to 1000	13	40	35
		40	80 6)	920		510	750 to 900	14	40	35
41 Cr 4 **41 CrS 4**	**1.7035** **1.7039**		16	980	241	800	1000 to 1200	11	30	30
		16	40	960		660	900 to 1100	12	35	35
		40	80 6)	940		560	800 to 950	14	40	35
25 CrMo 4 **25 CrMoS 4**	**1.7218** **1.7213**		16	880	212	700	900 to 1100	12	50	45
		16	40	860		600	800 to 950	14	55	50
		40	80 6)	840		450	700 to 850	15	60	50

For 1) to 7), see page 3.

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Table 3 (concluded).

1	2	3		4	5	6				
Steel grade		Thickness [1]), in mm		Heat treatment condition [2])						
				Cold drawn (K) [3]), [4])	Cold drawn and softened (K + G) Peeled and softened (SH + G)	Cold drawn and quenched and tempered (K + V) [5]) Peeled and quenched and tempered (SH + V) Quenched and tempered and peeled (V + SH)				
Material				R_m		R_e	R_m	A_5	Z	A_V (ISO-V)
designation	number	From	To	N/mm² max.	Max. hardness, in HB	N/mm² min.	N/mm²	% min.	% min.	J min.
34 CrMo 4 34 CrMoS 4	1.7220 1.7226		16	940	223	800	1000 to 1200	11	45	35
		16	40	920		650	900 to 1100	12	50	40
		40	80 [6])	900		550	800 to 950	14	55	45
42 CrMo 4 42 CrMoS 4	1.7225 1.7227		16	980	241	900	1100 to 1300	10	40	30
		16	40	960		750	1000 to 1200	11	45	35
		40	80 [6])	940		650	900 to 1100	12	50	35
50 CrMo 4	1.7228		16	1050	248	900	1100 to 1300	9	40	30 [7])
		16	40	990		780	1000 to 1200	10	45	30 [7])
		40	80 [6])	970		700	900 to 1100	12	50	30 [7])
36 CrNiMo 4	1.6511		16	1000	248	900	1100 to 1300	10	45	35
		16	40	980		800	1000 to 1200	11	50	40
		40	80 [6])	960		700	900 to 1100	12	55	45
34 CrNiMo 6	1.6582		16	1000	248	1000	1200 to 1400	9	40	35
		16	40	980		900	1100 to 1300	10	45	45
		40	80 [6])	960		800	1000 to 1200	11	50	45
30 CrNiMo 8	1.6580		16	1000	248	1050	1250 to 1450	9	40	30
		16	40	980		1050	1250 to 1450	9	40	30
		40	80 [6])	960		900	1100 to 1300	10	45	35
50 CrV 4	1.8159		16	1050	248	900	1100 to 1300	9	40	30 [7])
		16	40	990		800	1000 to 1200	10	45	30 [7])
		40	80 [6])	970		700	900 to 1100	12	50	30 [7])
30 CrMoV 9	1.7707		16	1050	248	1050	1250 to 1450	9	35	25
		16	40	1000		1020	1200 to 1450	9	35	25
		40	80 [6])	970		900	1100 to 1300	10	40	30

For [1]) to [7]), see page 3.

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Table 4. **Test conditions for verifying compliance with requirements**[1])

	1		2	3	4	5	6
No.	Property	See table(s)	Test unit	Number of test pieces per test unit	Number of tests per test piece	Sampling and sample preparation	Test method to be used
1	Chemical composition	2 and 3 of DIN 17 200.	Cf. DIN 17 200*).				
2	Hardenability in the end quench test	4 and 5 of DIN 17 200.	Cf. DIN 17 200*).				
3	Hardness of products in the K + G or SH + G condition	2 and 3.	Cf. DIN 17 200*).				
4 4a	Mechanical properties to be determined on normalized or quenched and tempered reference test pieces in the K + N, SH + N, K + V, SH + V and V + SH conditions	2 and 3.	All products from the same cast.	1	One tensile test and, where impact values for the relevant steel grade have been specified in tables 2 and 3, three impact tests.	Where the mechanical properties of normalized or quenched and tempered reference test pieces are to be determined, test pieces shall be produced and taken as follows. Testing of bars should, and rod shall, be performed on a test bar cut from a sample section with the original cross section of the product. ● ● Subject to agreement, the sample may be worked to have a smaller cross section in the case of bars. Test bars shall be normalized or quenched and tempered at the temperatures specified in table 12 of DIN 17 200*). Sampling and sample preparation shall be in accordance with line 4b of this table.	Tensile testing shall be in accordance with DIN 50 145, on DIN 50 125 test pieces produced from the same semi-finished product, having undergone the same heat treatment. Where the upper yield strength cannot be determined, the 0,2% proof stress shall be determined. ● The test pieces for rod with a diameter of less than 6 mm shall have an original gauge length, L_0, equal to 10 d_0, the values of elongation at fracture being subject to agreement. ISO-V test pieces shall be used for notched bar impact testing, in accordance with DIN 50 115. Impact energy shall be based on the mean from the three test pieces which have been taken next to each other at the same distance from the surface of the sample section or, where such is not possible or practicable, the mean from three tests performed at adjacent points on one test piece.

For [1]), see page 9; for *), see page 1.

(Continued on page 9.)

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Table 4 (concluded).

	1		2	3	4	5	6
No.	Property	See table(s)	Test unit)	Number of test pieces per test unit	Number of tests per test piece	Sampling and sample preparation	Test method to be used (continuation of lines 4 and 4a)
4b	to be determined on quenched and tempered products in the as delivered sizes corresponding to the K + V, SH + V and V + SH conditions	2 and 3.	All products from the same cast, heat treatment batch, and of the same size.	1	One tensile test and, where impact values for the relevant steel grade have been specified in tables 2 and 3, three impact tests.	Test pieces for tensile testing and, if performed, impact testing, shall be taken in accordance with figure 2 of DIN 17 200 *) in the case of bars, including reference test bars of suitable shape. Tensile test pieces shall be taken in accordance with DIN 50 125, tensile testing being in accordance with DIN 50 145. Impact test pieces shall be prepared in accordance with DIN 50 115.	One single value may be lower, by not more than 70 %, than the specified minimum value. Where impact energy is to be determined on very narrow test pieces (under 10 mm but not less than 5 mm in width), the minimum values specified in tables 2 and 3 shall be reduced in proportion to the test piece cross section.
4c	to be determined on normalized or cold drawn products in the as delivered sizes corresponding to the K + N, SH + N or K conditions	2 and 3.	All products from the same cast, heat treatment batch, and of the same size.	1	One tensile test.	Tensile test pieces shall be taken and prepared as specified in line 4b.	Tensile testing shall be carried out in accordance with DIN 50 145, on DIN 50 125 test pieces produced from the same semi-finished product, having undergone the same heat treatment. Where the upper yield strength cannot be determined, the 0,2 % proof stress shall be determined.

1) Verification is only necessary if one of the requirements specified in table 1, columns 3 and 4, is to be satisfied, and the relevant test has been agreed.

For *), see page 1.

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Standards and other documents referred to

DIN 1652 Part 1 Bright steel; general technical delivery conditions

DIN 17 010 General technical delivery conditions for steel and steel products

DIN 50 115 Notched bar impact testing of metallic materials using test pieces other than ISO test pieces

DIN 50 125 Test pieces for the tensile testing of metallic materials

DIN 50 145 Tensile testing of metallic materials

DIN 50 602 Microscopic examination of high-grade steel to determine the non-metallic inclusions content

DIN EN 10 083 Part 1 Quenched and tempered steel; technical delivery conditions for special steels

DIN EN 10 083 Part 2 Quenched and tempered steel; technical delivery conditions for unalloyed quality steels

Stahl-Eisen-Lieferbedingungen 055[1]) (at present at the stage of draft) *Warmgewalzter Stabstahl und Walzdraht mit rundem Querschnitt und nicht profillierter Oberfläche; Oberflächen-Güteklassen; Technische Lieferbedingungen* (Hot rolled steel bars and rod of circular cross section and non-profiled surface; surface quality classes; technical delivery conditions).

Previous editions

DIN 1652: 08.44 x, 05.63.

Amendments

In comparison with the May 1963 edition of DIN 1652, the following amendments have been made.

a) The standard has been divided into four Parts.

b) Cm 22, Cm 35, Cm 45, Cm 60 and 28 Mn 6 steels (unalloyed), and all alloy steels as specified in DIN 17 200*), have been included.

c) Rather than repeating relevant requirements, DIN 17 200*) is referred to where such are specified therein.

d) The requirements for mechanical properties have been revised.

e) The scope of testing has been amended.

f) Heat treatment condition V + SH has been included.

Explanatory notes

Cf. DIN 1652 Part 1.

International Patent Classification

C 21 D 9/18

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1) Obtainable from *Verlag Stahleisen mbH,* Postfach 82 29, D-4000 Düsseldorf 1.

For *), see page 1.

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