



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 The requirements specified here are based on DIN 17 200, which has been superseded by DIN EN 10 083 (also available in English).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.

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:

- the term 'steel';
- the DIN number;
- the material designation or number;
- the symbol denoting degree of hardenability (hardenability band), where applicable;
- 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^{*)} Superseded by DIN EN 10 083.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.

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

No.	1		2	3		4		
	Heat treatment condition		Symbol	Requirements		Steel subject to requirement class H ^{**})		
				3.1	3.2	4.1	4.2	4.3
1	Cold drawn ²⁾		K	Chemical composition as in tables 2 and 3 of DIN 17 200 ^{*)} .	Mechanical properties as a result of tensile testing as in table 2, column 4 ³⁾ , or table 3, column 4 ³⁾ .	As specified in columns 3.1 and 3.2.		Hardenability as in table 4 ⁵⁾ of DIN 17 200 ^{*)} .
2	Peeled ⁴⁾		SH		-			
3	Cold drawn ²⁾	and stress relieved.	K + S		● ● If necessary, the values (or guideline values) shall be agreed upon, based on the specifications given in tables 2 and 3 ³⁾ .			
4	Peeled ⁴⁾		SH + S					
5	Cold drawn ²⁾	and softened.	K + G		Hardness as in table 2, column 5 ³⁾ , or table 3, column 5 ³⁾ .			
6	Peeled ⁴⁾		SH + G					
7	Cold drawn ²⁾	and normalized.	K + N		Mechanical properties in tensile test as in table 2, column 6.			
8	Peeled ⁴⁾		SH + N					
9	Cold drawn ²⁾	and quenched and tempered.	K + V		Mechanical properties in tensile test and, partially, in impact test, as in table 2, column 7, or table 3, column 6.			
10	Peeled ⁴⁾		SH + V					
11	Quenched and tempered	and peeled.	V + SH					

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_s , Z and A_V are about 75 % lower, whilst R_e and R_m increase by about 100 N/mm² 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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