UDC 669.14.018.29 : 620.1

November 1990

Bright steel

General technical delivery conditions

DIN 1652 Part 1

Blankstahl; technische Lieferbedingungen; Allgemeines

This standard, together with DIN 1652 Parts 2 to 4, November 1990 editions, supersedes DIN 1652, May 1963 edition.

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.

1 Field of application

1.1 This standard specifies technical delivery conditions for bright steel.

1.2 The requirements for the steel grades specified in the November 1990 editions of DIN 1652 Parts 2 to 4 have been brought into line with the specifications of DIN 17 100*), DIN 17 200**) and DIN 17 210.

Note. The above standards will be referred to for certain general specifications.

1.3 In addition to the requirements given here, the specifications given in DIN 17 010 shall also apply, unless otherwise stated.

2 Concepts

2.1 Bright steel

2.1.1 Drawn bright steel

Drawn bright steel is steel produced in various shapes by drawing hot rolled bars or rod on a draw bench after descaling. Regardless of their size, bars are straightened after drawing.

This steelmaking process offers particular characteristics regarding shape, dimensional accuracy and surface condition. The product is work hardened, which can be reversed by means of heat treatment.

Bright steel of small cross section may be supplied in the form of coils.

2.1.2 Peeled bright steel

Peeled bright steel is steel in the form of rounds having the same properties as drawn steel with regard to shape and dimensions (cf. appendix A), the particular surface condition being produced by peeling in a turning machine, and being straightened and polished under pressure after it has been worked. The machining operation produces a surface that is nearly completely smooth (i. e. free from rolling defects and decarburized zones).

The skin of peeled bright steel is hardened.

2.1.3 Ground bright steel

Ground bright steel is steel in the form of drawn or peeled rounds that are given a high degree of surface quality and dimensional accuracy by means of grinding or both grinding and polishing.

2.2 Heat treatment

The concepts associated with heat treatment as defined in DIN 17 014 Part 1 have been used here.

2.3 Thickness

All Parts of this standard refer to nominal sizes, specifically, the diameter of rounds, the side length of squares, the width across flats of hexagons, and the shorter side length of flats.

3 Product forms, dimensions and tolerances

3.1 Bright steel products are generally supplied having a round, square, hexagonal or rectangular cross section, other permissible forms being bars having a cross section other than above, or coils.

3.2 ● The nominal sizes and tolerances shall be agreed at the time of ordering, reference being made to the relevant dimensional standard given in appendix A.

●● Nominal sizes and tolerances not specified in this standard shall be subject to agreement.

4 Mass

The mass of steels covered in this standard shall be calculated taking the density as 7,85 kg/dm^3.

5 Designation

The designation shall be as specified in DIN 1652 Parts 2 to 4.

*) Superseded by DIN EN 10 025.

**) Superseded by DIN EN 10 083 Parts 1 and 2.

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6 Steel grades

See DIN 1652 Parts 2 to 4 for steel grades.

7 Requirements

7.1 Manufacturing process

7.1.1 The requirements specified in subclause 7.1 in Parts 2. to 4 of DIN 1652, regarding the casting and deoxidation of the semifinished product, shall apply.

7.1.2 ●● Unless otherwise agreed, the steelmaking process shall be at the manufacturer's discretion.

7.2 Heat treatment condition

7.2.1 Steel shall normally be supplied in one of the heat treatment conditions specified in table 1 in Parts 2 to 4 of DIN 1652.

Any optional requirements (cf. subclauses 7.7.4 to 7.7.6) shall also be complied with.

7.2.2 ● The condition on supply shall be agreed at the time of ordering, bearing in mind that the various conditions affect the workability of the product (e.g. machinability, bendability), and that peeled material is subject to special thickness requirements (cf. table 1 in Parts 2 to 4 of DIN 1652).

7.3 Separation by cast

See DIN 1652 Parts 2 to 4 for requirements regarding separation by cast.

7.4 Chemical composition

The chemical composition shall be as specified in DIN 1652 Parts 2 to 4.

7.5 Mechanical properties (hardness and hardenability)

Mechanical properties shall be as specified in DIN 1652 Parts 2 to 4.

7.6 Other properties

Other properties shall be as specified in DIN 1652 Parts 2 to 4.

7.7 Surface condition

7.7.1 It should be noted that hexagons, squares, flats, and other sections usually have a darker surface than bright rounds.

7.7.2 It should be noted that the subsequent heat treatment (e.g. stress relieving, softening, normalizing, quenching and tempering) of steel which is drawn, peeled, ground or polished will cause the surface to darken and become rougher.

7.7.3 Minor voids, pits or grooves in the steel shall be permitted. In the case of rounds, the depth of such shall lie within ISO tolerance h11.

●● In the case of bright steel products with a cross section other than those covered here, the supply of reference samples may be agreed.

7.7.4 ●● Where a degree of surface quality higher than that provided by drawing once or peeling is required, additional surface treatment (e.g. several drawing, grinding or polishing passes) may be agreed. This may be necessary where a light bright and very smooth surface is required (e.g. to receive electrolytic coatings).

7.7.5 ●● Since rolled steel, by virtue of the steelmaking process, typically displays longitudinal cracks which are not remedied when the steel is drawn, special agreement may be reached as to their permissible depth and to the check for cracks.

In the case of rounds, the relevant requirements specified in *Stahl-Eisen-Lieferbedingungen* (Technical delivery conditions for iron and steel) 055 (at present at the stage of draft) shall be complied with.

7.7.6 ●● If, in the case of rounds, it has been agreed that a specified crack depth or depth of skin decarburization is not to be exceeded, then the steel shall be peeled or ground to improve its surface condition. Any such requirements shall be agreed at the time of ordering.

7.8 ●● Grain size

The grain size of case hardening steel (cf. DIN 1652 Part 3) shall be as specified in subclause 7.5 of the September 1986 edition of DIN 17 210, that of quenched and tempered steel (cf. DIN 1652 Part 4), as specified in subclause 7.5 of the March 1987 edition of DIN 17 200**).

7.9 Non-metallic inclusions

The non-metallic inclusions in case hardening steel shall be as specified in subclause 7.6 and table 6 of DIN 17 210, that in quenched and tempered steel, as specified in subclause 7.6 and table 10 of DIN 17 200**).

7.10 Soundness

The soundness of case hardening steel shall be as specified in subclause 7.7 of DIN 17 210, that of quenched and tempered steel, as specified in subclause 7.7 of DIN 17 200**).

8 Testing

The manufacturer shall be responsible for production and shall use his best judgment for ensuring that the requirements specified in clause 7 are complied with.

8.1 ●● Tests and inspection documents

The tests to be carried out and the issuing of a DIN 50 049 inspection document may be agreed at the time of ordering.

8.2 Inspection documents and items to be included

As specified in subclause 8.2 in Parts 2 to 4 of DIN 1652.

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

The scope of testing, sampling, sample preparation and test methods shall be as specified in DIN 1652 Parts 2 to 4.

8.4 Retests

DIN 17 010 shall apply for retests.

9 Marking

Marking shall be as specified in DIN 1652 Parts 2 to 4.

For **), see page 1.

10 Heat treatment

Heat treatment shall be as specified in DIN 1652 Parts 2 to 4.

11 Dispatch

11.1 Bright steel shall normally be oiled slightly for dispatch, provided this is in keeping with the regulations of the shipping agency (e.g. railway authorities) regarding the transport of unpacked freight.

11.2 ●● Slightly oiling bright steel for transport does not constitute rust protection (e.g. from condensation). It may be agreed at the time of ordering to use a particular coating or packaging method to protect against rust.

12 Complaints

12.1 Under current law, warranty claims may only be raised against defective products if the defects impair their processing and use to a more than negligible degree. This shall apply unless otherwise agreed at the time of ordering.

12.2 It is normal and practical for the purchaser to give the supplier the opportunity to judge whether the complaints are justified, if possible by submitting the products objected to or samples of the products supplied.

Appendix A

The following dimensional standards apply for the steel products covered in this standard.

DIN	174	Brigth steel flats; dimensions, tolerances and mass
DIN	176	Bright steel hexagons; dimensions, tolerances and mass
DIN	178	Bright steel squares; dimensions, tolerances and mass
DIN	668	Bright steel rounds; dimensions and tolerances in accordance with ISO tolerance h11
DIN	669	Bright polished steel rounds; dimensions and tolerances in accordance with ISO tolerance h9
DIN	670	Bright steel rounds; dimensions and tolerances in accordance with ISO tolerance h8
DIN	671	Bright steel rounds; dimensions and tolerances in accordance with ISO tolerance h9
DIN	6880	Bright key bars; dimensions, tolerances and mass
DIN	7160	ISO tolerances for shafts of nominal sizes from 1 to 500 mm
DIN	59 360	Ground and polished bright round steel products; dimensions and tolerances in accordance with ISO tolerance h7
DIN	59 361	Ground and polished bright round steel products; dimensions and tolerances in accordance with ISO tolerance h6
DIN	59 370	Bright steel angles with equal legs and square edges; dimensions, tolerances and mass

Standards and other documents referred to

DIN	1652 Part 2	Bright steel made from structural steel; technical delivery conditions
DIN	1652 Part 3	Bright steel made from case hardening steel; technical delivery conditions
DIN	1652 Part 4	Bright steel made from steel for quenching and tempering; technical delivery conditions
DIN	17 010	General technical delivery conditions for steel and steel products
DIN	17 014 Part 1	Heat treatment of ferrous materials; terminology
DIN	17 210	Case hardening steel; technical delivery conditions
DIN	50 049	Inspection documents for the delivery of metallic materials
DIN EN	10 025	Hot rolled unalloyed structural steel products
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
ISO	683-18:1976	Heat-treated steels, alloy steels and free-cutting steels; wrought unalloyed steels in the normalized, or normalized and cold-drawn, or hot-rolled and cold-drawn condition

Stahl-Eisen-Lieferbedingungen 055***) (at present at the stage of draft) *Warmgewalzter Stabstahl und Walzdraht mit rundem Querschnitt und nicht profilierter 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: 08.44x, 05.63.

***) Obtainable from *Verlag Stahleisen mbH*, Postfach 8229, D-4000 Düsseldorf 1.

Amendments

In comparison with the May 1963 edition of DIN 1652, the following amendments have been made (cf. DIN 1652 Parts 2 to 4 for more specific amendments).

a) The standard has been divided into four Parts.

b) The concepts have been defined in more detail.

Explanatory notes

General

The decision to include bright steel made from case hardening steel and steel for quenching and tempering necessitated dividing this standard into four Parts. Part 1 gives general specifications, Part 2 deals with more specific requirements for bright steel made from structural steel, Part 3, from case hardening steel, and Part 4, from steel for quenching and tempering. The numbering of subclauses is consistent throughout all Parts. To avoid repetition and to make the standards shorter, the basic standards DIN 17 100*), DIN 17 200**) and DIN 17 210 are referred to.

The specifications given in DIN 1652 Parts 2 to 4 are largely in agreement with those given in ISO 683-18:1976, which covers only unalloyed case hardening steel and unalloyed steel for quenching and tempering, and many more grades than DIN 1652 Parts 3 and 4. A revised edition of the ISO Standard is currently in preparation and is to include alloy case hardening steel and alloy steel for quenching and tempering. Since it has not yet been published, no further reference has been made to it in the DIN 1652 series of standards.

Part 2

The steel grades (including material designations and numbers) have been brought into line with those specified in DIN 17 100*), the basic standard on structural steel, which now eliminates the contradictions present in the May 1963 edition of DIN 1652.

The requirements for mechanical properties, as a function of heat treatment condition, have been revised, and the previous thickness range from 40 mm to less than 80 mm has been divided into two ranges. It has been specified that the mechanical properties of products over 80 mm in thickness shall be the subject of agreement. In the case of products supplied in the peeled and untreated condition, values have only been specified where the thickness is at least 16 mm, since peeling is usually only possible for products of that size or larger. The values specified for the SH, K + N and SH + N conditions are identical to those specified in DIN EN 10 025. Only a maximum tensile strength has been specified for products in the softened condition. Minimum values of upper yield strength have been deleted, but should this be of relevance to users, peeled or normalized products should be ordered.

Part 3

Since the steel grades covered here are identical to those specified in DIN 17 210, the latter is referred to with regard to requirements for chemical composition, hardenability, and heat treatment condition. Likewise, where DIN 17 210 already specifies other relevant requirements (e.g. for weldability, grain size, non-metallic inclusions, soundness, inspection documents and marking), it is referred to, rather than repeating the requirements.

In the case of unalloyed steel over 100 mm thick, the values of mechanical properties shall be the subject of agreement. In the case of unalloyed steel in the cold drawn condition, the minimum values specified for tensile strength, upper yield strength and elongation at fracture are no longer meant for guidance, but are mandatory (certain amendments having been made to tensile strength and upper yield strength values).

Part 4

Where relevant requirements have already been specified in DIN 17 200**) (e.g. for chemical composition, hardenability, heat treatment condition, weldability, grain size, non-metallic inclusions, soundness and inspection documents), that standard ist referred to, rather than repeating the requirements.

The required mechanical properties of unalloyed steel for quenching and tempering have been revised as compared to the May 1963 edition of DIN 1652, and, in particular, the requirements for

a) the cold drawn condition are now to be complied with, except for thicknesses over 100 mm, where the values shall be the subject of agreement;

b) cold drawn, softened, normalized, and quenched and tempered products have been completely revised;

c) cold drawn products are different from those specified in ISO 683-18;

d) normalized products are different from those specified in ISO 683-18 and in DIN 17 200**);

e) softened and quenched and tempered products are the same as those specified in DIN 17 200**).

Where relevant steel grades are dealt with in DIN EN 10 083, the requirements for the softened, normalized and quenched and tempered conditions have been taken from that standard.

For *) and **), see page 1.

International Patent Classification

C 21 D 9/06 G 01 B G 01 N