

Steels for pressure purposes —

Part 3: Specification for corrosion-and heat-resisting steels: plates, sheet and strip

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Iron and Steel Standards Policy Committee (ISM/-) to Technical Committee ISM/73, upon which the following bodies were represented:

- Associated Offices Technical Committee
- BEAMA Ltd. (Power Generation Association)
- British Compressed Air Society
- British Gas plc
- British Steel Industry
- Electricity Supply Industry in England and Wales
- Engineering Equipment and Materials Users' Association
- High Integrity Pipework Group, Power Plant Contractors' Association
- Lloyd's Register of Shipping
- Process Plant Association
- Seamless Steel Tube Association
- Water Tube Boiler Group, Power Plant Contractors' Association
- Welding Institute

The following bodies were also represented in the drafting of the standard through subcommittees and panels:

- British Industrial Fasteners Federation
- Institute of Metals
- National Association of Steel Stockholders

This British Standard, having been prepared under the direction of the Iron and Steel Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 28 February 1990

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Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
Section 1. General requirements	
1 Scope	1
2 Designation	1
3 Material compliance	1
4 Information to be supplied by the purchaser	1
5 Manufacture of the steel	1
6 Supply condition	1
7 Chemical composition	4
8 Freedom from defects	4
9 Dimensions and tolerances	4
10 Mechanical properties and intergranular corrosion tests	5
11 Test certificate	5
12 Marking	5
Section 2. Tolerances on dimensions and shape	
13 General	6
14 Hot rolled products	6
15 Cold rolled products	6
16 Clause deleted	6
Section 3. Sampling and testing	
17 Testing	7
18 Number, position, and identification of test samples	7
19 Heat treatment of test samples	7
20 Preparation of test pieces	7
21 Test methods	7
22 Retests	8
Appendix A Steel numbers comparison	9
Appendix B Options	9
Appendix C Estimated average stress rupture values	13
Appendix D Request for room and elevated temperature property information	17
Figure 3 — Impact test piece	8
Table 1 — Chemical composition (cast analysis), mechanical properties at ambient temperature and heat treatment	3
Table 2 — Mill finishes	4
Table 3 — Permissible variations of product analysis from the specified composition range	4
Table 12 — Comparisons between the steel numbers in the 1973 edition of this Part of BS 1501 and their nearest equivalents in this edition	9
Table 13 — Minimum proof stress ($R_{p0.2}$) at elevated temperatures	11
Table 14 — Minimum proof stress ($R_{p1.0}$) at elevated temperatures	12
Table 15 — Estimated average stress rupture values	14
Publications referred to	Inside back cover

Foreword

This Part of BS 1501 has been prepared under the direction of the Iron and Steel Standards Policy Committee and supersedes BS 1501-3:1973, which is withdrawn.

The scope has been extended to include sheet and strip.

The main technical differences between this edition and the previous edition are that some steel types, included in the 1973 edition, have been deleted and that a number of new steel types have been incorporated in this edition. A comparison between the steel type numbers in the 1973 edition with their nearest equivalent numbers in this edition is given in Appendix A for information.

Changes have also been made to the chemical analyses and mechanical properties in alignment with international agreements, and maximum sulphur contents have been lowered to reflect current steel making practices. The format of this edition has also been changed to provide a basic specification together with a series of options in Appendix B which the purchaser may invoke when ordering. The opportunity has also been taken to metricate the specification.

The previous edition contained a number of clauses concerned with the inspection or witness of inspection by the purchaser or his agent. The clauses are not included in this edition as they are considered to be purely contractual arrangements. It is recommended that the purchaser discusses details and arrangements for the witness of sampling, testing and inspection with the manufacturer at the time of enquiry and order.

Estimated average stress rupture values are given in Appendix C and have been established from test data upon a large number of steel samples representative of commercial production. It is considered that these values may be reliably used for design purposes.

The appropriate British Standard for the design and construction of pressure vessels should be consulted for requirements relating to the application and permissible design stress for products made to this Part of BS 1501. This Part of BS 1501 is one of three Parts of BS 1501 specifying requirements for steel plates for pressure purposes. The other two Parts are as follows:

- *Part 1: Specification for carbon and carbon manganese steels: plates;*
- *Part 2: Specification for alloy steels: plates.*

Related standards are as follows:

BS 1502, *Specification for steels for fired and unfired pressure vessels: sections and bars.*

BS 1503, *Specification for steel forgings (including semi-finished forged products) for pressure purposes.*

BS 1506, *Specification for carbon, low alloy and stainless steel bars and billets for bolting material to be used in pressure retaining applications.*

This Part of BS 1501 has been amended to take into account the publication of the following European Standards:

EN 10029, *Hot rolled steel plates 3 mm thick or above — Tolerances on dimensions, shape and mass.*

EN 10048, *Hot rolled narrow steel strip — Tolerances on dimensions and shape.*

EN 10051, *Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels — Tolerances on dimensions and shape.*

EN 10258, *Cold-rolled stainless steel and narrow strip and cut lengths — Tolerances on dimensions and shape.*

EN 10259, *Cold-rolled stainless steel wide strip and plate/sheet — Tolerances on dimensions and shape.*

As further European Standards are produced this British Standard will eventually be withdrawn.

It has been assumed in the drafting of this Part of BS 1501 that the execution of its provisions is entrusted to appropriately qualified and experienced people.

Request for elevated temperature property information. Elevated temperature values in this Part of BS 1501 represent the results of the most recent assessments. In keeping with the established practice for updating the mechanical properties, work continues on the collection and assessment of relevant data. Any resulting new values will be considered for future revisions of this Part of BS 1501 or equivalent standards.

Users of this Part of BS 1501 are invited to assist by sending relevant data to the Secretary of ISM/73/-/1, British Standards Institution, 3 York Street, Manchester M2 2AT (see Appendix D for pro forma).

Product certification. Users of this Part of BS 1501 are advised to consider the desirability of third party certification of product conformity with this Part of BS 1501 based on testing and continuing surveillance, which may be coupled with assessment of a supplier's quality systems against the appropriate Part of BS 5750.

Enquiries as to the availability of third party certification schemes will be forwarded by BSI to the Association of Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching an appropriate body from the list of Association members.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 18, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General requirements

1 Scope

This Part of BS 1501 specifies requirements for corrosion-and heat-resisting steel, in the form of plates 3 mm to 100 mm thick, wide strip and sheet 0.30 mm to less than 3 mm thick and narrow strip 0.050 mm to less than 3 mm thick, for pressure purposes, for use at ambient, elevated and low service temperatures.

Provision has been made for certain steels to meet properties at different combinations of temperature, and where appropriate, requirements are specified for ambient temperature properties only, and ambient temperature and elevated temperature properties.

With the exception of the duplex grade 318S13, the steels included in this Part of BS 1501 are not notch sensitive at ambient temperature nor at temperatures down to -196°C . Impact values are not specified, but see options **B.8** and **B.9**.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Designation

The steels shall be designated by the number of this British Standard, the steel type number and a suffix when appropriate.

For material supplied to specified ambient temperature properties only, no suffix shall be used.

The suffix "E" shall be used for material supplied and verified to specified elevated temperature properties in addition to specified ambient temperature properties (see **4.2**).

The suffix "LT" shall be used for material verified to low temperature impact requirements in addition to specified ambient temperature properties (see **4.2**).

Example. BS 1501-3, 316S51-E refers to steel type 316S51 with verified elevated temperature properties and ambient temperature properties.

NOTE A comparison between the designations for steels in the 1973 edition of BS 1501-3 and their nearest equivalents in this edition is given in Appendix A.

3 Material compliance

The steel products shall comply with the general requirements of this standard and with the specific requirements applicable to the grade concerned. Where any of the options given in Appendix B are called up at the time of the enquiry and order, the steel products shall comply with the requirements of any such options, in addition to the basic requirements.

4 Information to be supplied by the purchaser

4.1 General

The following information shall be supplied by the purchaser at the time of the enquiry and order:

- the full material designation;
- the product form (plate, coil or sheet), dimensions and quantity;
- the details of any selected options and any special requirements that are additional to the basic requirements of this Part of BS 1501 (see **4.2**).

4.2 Options

If the purchaser does not indicate his wish to implement any of the options given in Appendix B and indicated below and does not specify his requirements at the time of the enquiry or order, the manufacturer or merchant shall supply in accordance with the basic requirements.

- B.1** Steelmaking process
- B.2** Supply condition
- B.3** Cast analysis
- B.4** Product analysis
- B.5** Incidental elements
- B.6** Special requirements
- B.7** Elevated temperature tensile tests
- B.8** Room temperature impact tests
- B.9** Low temperature impact tests
- B.10** Intergranular corrosion tests
- B.11** Purchaser's or agent's witness of manufacturer's inspection and testing
- B.12** Marking
- B.13** Supply of plates with 0.3 mm under-thickness tolerance

5 Manufacture of the steel

The steel shall be made by an electric process and shall be fully killed.

NOTE 1 Unless a special electric steel making process has been agreed when ordering (see option **B.1**) the process is at the manufacturer's discretion.

NOTE 2 The further processing in the manufacture of the steel is at the manufacturer's discretion.

6 Supply condition

The material shall be supplied heat treated to the appropriate condition stated in Table 1 (see note 1). It shall be supplied free from scale unless ordered to finish number 0 in Table 2 and finally flattened when appropriate.

NOTE 1 For certain steel grades it is conditionally permissible for plates to be supplied hot rolled, without further heat treatment (see notes 2 and 3 to Table 1).

NOTE 2 Mill finishes are described in Table 2. When available and required by the order, plates may be supplied after the application of overall surface grinding or polishing processes (see option **B.2**).