...making excellence a habit.™

Please be aware that this PDF has been created from the original hardcopy document, which might not be in good condition and so the PDF might reflect this.

BSI Group
389 Chiswick High Road
London, W4 4AL
United Kingdom

T: +44 20 845 086 9001
F: +44 20 8996 7400
cservices@bsigroup.com
bsigroup.com

British Standards Limited
Registered in England no: 07864997
Registered address: 389 Chiswick High Road
London, W4 4AL, United Kingdom

SPECIFICATION FOR

WROUGHT STEELS

IN THE FORM OF BLOOMS, BILLETS, BARS AND FORGINGS

Part 2. Direct hardening alloy steels, including alloy steels capable of surface hardening by nitriding

BS 970 : Part 2 : 1970 including amendment No. 1 issued 22/4/74 [AMD 1417]

Price £2 net

BRITISH STANDARDS INSTITUTION
Incorporated by Royal Charter
British Standards House, 2 Park Street, London W1Y 4AA
Telegrams: Standards London W1 Telephone: 01-629 9000

THIS BRITISH STANDARD, having been approved by the Iron and Steel Industry Standards Committee, was published under the authority of the Executive Board on 4 September, 1970.

First published July, 1941.
First revision, October, 1942.
Second revision, March, 1947.
Third revision, January, 1955.
Fourth revision, (Part 2) September, 1970.

SBN: 580 06322 4

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

This standard makes reference to the following British Standards:

BS 18. Methods for tensile testing of metals. Part 2. Steel (general)
BS 131. Methods for notched bar tests. Part 1. The Izod impact test on metals.
BS 240. Method for Brinell hardness test.
BS 427. Method for Vickers hardness test.
BS 891. Method for Rockwell hardness test.
~~BS 1121. Methods for the analysis of iron and steel.~~
BS 1837. Methods for the sampling of iron, steel, permanent magnet alloys and ferro-alloys.
BS 4114. Dimensional and quantity tolerances for steel drop and press forgings and for upset forgings made on horizontal forging machines.
BS 4437. Method for the end quench hardenability test for steel (Jominy test).
BS 4490. Methods for the determination of the austenitic grain size of steel.

Handbook No. 19 - Methods for the sampling and analysis of iron, steel and other ferrous metals.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee references ISE/31, ISE/31/2, ISE/31/2/1
Draft for comment 69/7100

CONTENTS

4. SPECIFIC REQUIREMENTS FOR ALLOY STEELS SUPPLIED WITH SPECIFIED MECHANICAL PROPERTIES

(For detailed list of steels contained in this section refer to Table 4)

Page

TABLES—*continued*

CO-OPERATING ORGANIZATIONS

The Iron and Steel Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

*Board of Trade
British Cast Iron Research Association
British Constructional Steelwork Association
British Electrical and Allied Manufacturers' Association
British Ironfounders' Association
British Mechanical Engineering Confederation
*British Railways Board
Steel Castings Research and Trade Association
*British Steel Industry
Council of Iron Producers
Council of Ironfoundry Associations
Crown Agents for Oversea Governments and Administrations
Department of Employment and Productivity
Engineering Equipment Users' Association
Federation of Civil Engineering Contractors
Institute of British Foundrymen
Institute of Iron and Steel Wire Manufacturers
*Institute of Marine Engineers
Institution of Civil Engineers
Institution of Mechanical Engineers (Automobile Division)
Institution of Production Engineers
Institution of Structural Engineers
Joint Iron Council
Lloyd's Register of Shipping
Ministry of Defence
*Ministry of Defence, Army Department
*Ministry of Defence, Navy Department
*National Association of Drop Forgers and Stampers
National Physical Laboratory (Ministry of Technology)
Oil Companies Materials Association
Royal Institute of British Architects
Shipbuilders' and Repairers' National Federation
Society of British Aerospace Companies
*Society of Motor Manufacturers and Traders Ltd.
*Stainless Steel Development Association
Tank and Industrial Plant Association
Tin Research Institute
Water-Tube Boilermakers' Association

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Association of British Railway Carriage & Wagon Manufacturers
British Bolt, Nut, Screw & Rivet Federation
Ministry of Technology
National Coal Board
Spring Research Association
Stainless Steels Fabricators' Association of Great Britain
Individual Companies

BRITISH STANDARD SPECIFICATION FOR

WROUGHT STEELS IN THE FORM OF BLOOMS, BILLETS, BARS AND FORGINGS

Part 2. Direct hardening alloy steels, including alloy steels capable of surface hardening by nitriding

FOREWORD

This British Standard has been prepared under the authority of the Iron and Steel Industry Standards Committee and forms Part 2 of the revision of BS 970. The complete revision of BS 970 is comprised as follows:

Part 1. Carbon and carbon manganese steels, including free cutting steels.

Part 2. Direct hardening alloy steels, including alloy steels capable of surface hardening by nitriding.

Part 3. Steels for case hardening.

Supplement No. 1 to Part 3. Requirements for carbon and carbon manganese steels for case hardening, including free cutting steels.

Part 4. Stainless, heat resisting and valve steels.

Part 5. Carbon and alloy spring steels for the manufacture of hot formed springs.

In addition, Part 6. SI metric values (for use with BS 970 : Parts 1 to 5) has also been published.

This Part of the standard applies to direct hardening wrought alloy steels including alloy steels capable of surface hardening by nitriding. It is presented in four sections: Section 1, 'General requirements', Section 2, 'Specific requirements for steels supplied to close limits of chemical composition', Section 3, 'Specific requirements for steels supplied to hardenability requirements' and Section 4, 'Specific requirements for steels supplied with specified mechanical properties'.

With regard to Section 3 dealing with hardenability requirements, it should be noted that this is the first time that this method for purchasing steel has been included in a British Standard and reference should be made to 1.2.3, and also to the clauses on the purchase of steel to hardenability requirements included at the beginning of Section 3.

In preparing this revision it has been found necessary to abandon the 'En' designation system used in previous editions of BS 970 since it did not possess sufficient flexibility to permit the inclusion of the new steels proposed for the revised standard, nor did it permit the separation of the revised standard into Parts. A new six digit designation system, for which further information regarding alloy steels is given in PD 6431*, has therefore been introduced. For the steels specified in this Part of the standard, and also the alloy steels which will be specified in Parts 3 and 5 of the revision, the series 500–999 has been allocated, in groups of ten or multiples of groups of ten according to alloy type.

* PD 6431, 'New designation system for alloy steels'.

for the first three digits. In all cases the letter A, H or M has been introduced at the fourth digit to indicate if the steel is supplied to analysis, hardenability or mechanical property requirements. The fifth and sixth digits represent 100 times the mean carbon content.

The opportunity has been taken to align the composition of the steels more closely with those demanded in practice, to introduce steels not covered by the previous edition of BS 970 and also to introduce permissible variations on product analysis.

In addition to the previously included tables of tolerances and sizes for bright bar, similar tables have been included for hot rolled material. The inclusion of these latter tables in inch units is considered justified at this time as they are representative of already established practice in industry.

This standard is written in terms of imperial units but it is intended that a metric version of the standard, which will take account of relevant ISO and European work, will be published as soon as possible. In the meantime, as an interim measure, provisions have been published in BS 970 : Part 6 to enable the steels in this and other Parts 1, 3, 4 and 5 of BS 970 to be purchased to SI metric values for limiting ruling section and size (excluding standard bar sizes and tolerances) stress and hardenability requirements.

SPECIFICATION

1. GENERAL REQUIREMENTS

1.1 SCOPE

This Part of BS 970 applies to direct hardening wrought alloy steels, suitable in the heat treated condition, to give minimum tensile strengths of 35–100 tonf/in² for use in the form of blooms, billets, bars and forgings. Steels capable of surface hardening by nitriding are included. Mechanical properties are specified in Section 4 for most of the steels for ruling sections up to 6 in and for certain selected steels up to 10 in.

1.2 GENERAL

1.2.1 Alternative methods of supply. The steel shall be supplied in accordance with the general requirements specified in this section and the specific requirements given in Sections 2, 3 or 4.

When it is required that steel shall be supplied to SI metric values the steel shall also be supplied to the appropriate requirements of BS 970 : Part 6.

The specific requirements given in Sections 2, 3 and 4 cover alternative methods of supply as follows:

Section 2. Close limits of chemical composition where no mechanical properties or hardenability are specified, or

Section 3. A combination of hardenability and chemical composition or

Section 4. A combination of mechanical properties and chemical composition.

NOTE. If ordered to Sections 3 or 4 above, the hardenability or mechanical properties specified should be the governing criteria for acceptance. In such cases the cast composition may deviate slightly from the figures shown in the specification.