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BRITISH STANDARD 968:1962

SPECIFICATION FOR

HIGH YIELD STRESS

WELDING QUALITY

STRUCTURAL STEEL

BRITISH STANDARD INSTITUTION

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SPECIFICATION FOR

HIGH YIELD STRESS

(WELDING QUALITY)

STRUCTURAL STEEL

B.S 968 : 1962

Price 4/– net

BRITISH STANDARDS INSTITUTION

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THIS BRITISH STANDARD, having been approved by the Iron and Steel Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 10th April, 1962.

First published, June, 1941.
First revision, April, 1962.

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.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committee charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 4000, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook, price 15s.

This standard makes reference to the following British Standards:

B.S. 4. Structural steel sections
B.S. 18. Tensile testing of metals
B.S. 2642. General requirements for the metal-arc welding of medium tensile weldable structural steels to B.S. 968.
B.S 131. Methods for notched bar tests. Pt. 2. Charpy V-notch impact test.

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 B.S.I. references relate to the work on this standard:
Committee reference ISE/12 Draft for comment AC(ISE)643.

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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:

*Admiralty
Alloy Steels Association
British Bolt, Nut, Screw and Rivet Federation
British Cast Iron Research Association
*British Constructional Steelwork Association
*British Electrical and Allied Manufacturers' Association
*British Engineer's Association
*British Iron and Steel Federation
British Ironfounders' Association
*British Railways, The British Transport Commission
*British Steel Castings Research Association
Council of Ironfoundry Associations
Council of Iron Producers
*Crown Agents for Oversea Governments and Administrations
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 Structural Engineers
Iron and Steel Board
Iron and Steel Institute
Joint Iron Council
*Lloyd's Register of Shipping
*Ministry of Aviation
*Ministry of Labour (Factory Inspectorate)
*Ministry of Transport
National Association of Drop Forgers and Stampers
National Ironfounding Employers' Federation
*National Physical Laboratory (D.S.I.R.)
Oil Companies Materials Association
*Royal Institute of British Architects
Shipbuilding Employers' Federation
Society of British Aircraft Constructors
*Society of Motor Manufacturers and Traders Ltd.
War Office

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:

Air Ministry
British Welding Research Association
High Commission of India
Institute of Welding
Institution of Engineers and Shipbuilders in Scotland
Institution of Municipal Engineers
London County Council
Ministry of Works
National Association of Iron and Steel Stockholders
National Federation of Building Employers
N.E. Coast Institution of Engineers and Shipbuilders
Royal Institution of Naval Architects

BRITISH STANDARD SPECIFICATION FOR

HIGH YIELD STRESS (WELDING QUALITY) STRUCTURAL STEEL

FOREWORD

This British Standard, prepared under the authority of the Iron and Steel Industry Standards Committee, replaces B.S. 968: 1941 which was introduced under wartime conditions to specify what at that time was considered to be a high yield stress steel suitable for fusion welding.

Experience has shown that the maximum alloy content allowed in B.S. 968: 1941, which is necessary to attain the specified mechanical properties, may be too high for satisfactory welding performance, especially in thick material. The mechanical properties, and in particular the yield stress, of B.S. 968: 1941 steel also reduce rapidly as the thickness increases, the yield stress falling from 23 tonf/in² for thin material to 19 tonf/in² for plates over 1 inch or sections over ¾ inch in thickness.

As a result of changes in steelmaking which have been recently introduced it is now possible to produce a steel with specified yield stresses of not less than 22 tonf/in² for all thicknesses up to 2 inches with a reduced alloy content and with carbon contents somewhat lower than for the original B.S. 968: 1941 steel. If required the steel can also be supplied with a specified impact value. As a result of these changes the weldability of this steel has been significantly improved although reasonable precautions should still be taken during welding (see B.S. 2642*). The high yield stresses for steel to this revised specification allow more economical design of steel structures.

NOTE 1. Where metric equivalents are stated the figures in British units are to be regarded as the standard. The metric conversions are approximate. More accurate conversions should be based on the tables in B.S. 350 ' Conversion factors and tables '.

NOTE 2. In place of the customary, but incorrect use of the ton and kilogramme as units of force, the units called ton-force (abbreviation tonf) and kilogramme-force (abbreviation kgf) have been used in this standard. These are the forces which, when acting on a body of mass one ton or one kilogramme respectively, give it an acceleration equal to that of standard gravity.

* B.S. 2642, ' General requirements for the metal-arc welding of medium tensile weldable structural steels to B.S. 968 '.

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SPECIFICATION

SCOPE

See Adt 2

1. This British Standard applies to structural steel plates, sections and bars suitable for fusion welding, where a specified high yield stress is required.

STEELMAKING PROCESS

2. The steel shall be made by the open hearth process (acid or basic), the acid Bessemer process, the electric process, or any of the oxygen processes*, unless one of these processes is specially required or ordered. In the case of the oxygen processes, the nitrogen content of the steel shall not exceed 0·008 per cent.

* This term includes both top and bottom blown oxygen processes.

CHEMICAL COMPOSITION

3. The ladle analysis shall be in accordance with the requirements of Table 1.

TABLE 1.

Element	Per cent max.
†Carbon	0·20
Silicon	~~0·35~~ 0.50
Manganese	1·50
Chromium	0·50
Sulphur	0·05
Phosphorus	0·05
Manganese plus Chromium	1·60

† For material over ⅝ in (15·9 mm) thickness a maximum carbon content of 0·22 per cent is permitted.

Suitable grain refining elements in total quantity not exceeding 0·1 per cent may be added to give the mechanical properties specified in Clause 11, and, if required by the purchaser, will be reported in the ladle analysis, for information purposes.

Copper may also be present up to 0·50 per cent as mutually agreed between manufacturer and purchaser.

If required by the purchaser, the manufacturer shall supply at the time of the enquiry a complete approximate analysis of the steel he proposes to supply.

HEAT TREATMENT

4. Plates ½ in (12·7 mm) thick and over shall be supplied in the normalized condition.

QUALITY OF FINISHED STEEL

5. All finished steel as sent from the mills shall, subject to the provisions of Clause 6, be well and cleanly rolled to the dimensions, sections and weights specified or required. It shall be sound and free from cracks, surface flaws, laminations and other defects. It shall be finished in a workmanlike manner and shall in all respects comply with the appropriate tests and requirements specified herein.

By agreement between the purchaser or his representative and the supplier, surface defects may be removed by grinding provided that the thickness is in no place reduced to less than 93 per cent of the nominal thickness but in no case by more than ⅛ in (3·2 mm).

Subject to the agreement of the purchaser or his representative, surface defects which cannot be dealt with as above may be repaired by chipping or grinding followed by welding, provided that:

a. after removal of the defect, and before welding, the thickness of the piece is in no place reduced to less than 80 per cent of the nominal thickness.

See Amdt 3

b. ~~the welding is carried out by an approved procedure, by competent~~ operators with ~~approved electrodes~~ and that the weld is ground smooth ~~to the correct nominal thickness.~~

c. subsequent to the finish grinding, plates may be required to be normalized or otherwise heat treated at the discretion of the purchaser or his representative.

MARGINS OVER AND UNDER DIMENSIONS AND WEIGHTS

6. *a. Structural sections.* The margin over and under dimensions, and weights shall comply with the requirements of B.S. 4*.

b. Plates, flat bars, round and square bars.

(i) '*Specified*' *lengths.* When steel in the form of bars is specified to be cut to certain lengths it shall be cut within a margin of 1 in (25·4 mm) under and 1 in over the specified length, but if minimum lengths are specified the margin shall be 2 in (50·8 mm) over.

(ii) '*Exact*' *lengths.* If lengths are specified to be 'exact', the bars shall be cold sawn or machined with a margin of ⅛ in (3·18 mm) over and ⅛ in under the length specified.

(iii) *Weights.* If the specified weight is not stated to be either a maximum or a minimum, the rolling margins shall be as shown in Table 2.

If a minimum weight is specified, the rolling margin shall be wholly over such specified weight and if a maximum weight is specified the rolling margin

* B.S. 4, 'Structural steel sections'.

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