

Specification for

Carbon steel pipes and tubes with specified room temperature properties for pressure purposes

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The preparation of this British Standard was entrusted by the Iron and Steel Standards 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 Shipbuilders
- British Steel Industry
- Electricity Supply Industry in England and Wales
- Engineering Equipment and Materials Users' Association
- High Pressure Pipework Consultative Committee
- Lloyd's Register of Shipping
- Process Plant Association
- Seamless Steel Tube Association
- Water-tube Boilermakers' Association
- Welding Institute
- Coopted members

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

- British Fluid Power Association
- British Forging Industry Association
- British Industrial Truck Association
- British Welded Steel Tube Association
- Confederation of British Industry
- Energy Industries Council
- Coopted member

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Foreword

This British Standard has been prepared under the direction of the Iron and Steel Standards Committee and supersedes BS 3601:1974 which is withdrawn.

The main technical differences between this edition and the previous edition are that changes have been made to the chemical analysis and the mechanical properties to take into account current steelmaking practice.

The specified minimum tensile strength for steel 410 has been increased to 430 N/mm² and the designation has been changed to 430 accordingly. The designations of the other steels remain unchanged from the previous edition.

Changes have been made to the thickness tolerance (excluding weld reinforcement) of submerged arc welded tubes and the length tolerance for cut lengths above 6 m long.

The assessment of the flattening test for welded tubes has been brought into alignment with that for seamless tubes and flattening test constants are specified for welded tubes.

The designation of steel tubes in this specification and their nearest equivalent designations in ISO 2604-2, ISO 2604-3 and ISO 2604-6 are shown in appendix A for information purposes.

This standard is aligned, as far as possible, with the corresponding requirements and test procedures agreed for incorporation in draft ISO standards.

The steels covered by this standard are generally regarded as being weldable. However, care should be taken and welding should be in accordance with the appropriate British Standard for welding, e.g. BS 2633.

This standard is one of a series specifying requirements for steel pipes and tubes for pressure purposes. Other standards in the series are as follows.

BS 3602, *Specification for steel pipes and tubes for pressure purposes: carbon and carbon manganese steel with specified elevated temperature properties;*

BS 3602-1: *Seamless, electric resistance welded and induction welded tubes;*

BS 3602-2: *Submerged arc welded tubes.*

BS 3603, *Specification for steel pipes and tubes for pressure purposes: carbon and alloy steel with specified low temperature properties.*

BS 3604, *Specification for steel pipes and tubes for pressure purposes: ferritic alloy steel with specified elevated temperature properties.*

BS 3605, *Specification for seamless and welded austenitic stainless steel pipes and tubes for pressure purposes.*

Purchasers ordering to this British Standard are advised to specify in their purchasing contract that the supplier operates a quality system in compliance with BS 5750-2 to assure themselves that products claimed to comply with BS 3601 consistently achieve the required level of quality.

It is outside the scope of this standard to specify formal qualifications for personnel engaged in testing but it is emphasized that the operation of all equipment should be supervised by competent, trained personnel.

For the purpose of this standard, no difference is intended in the meaning between “pipe” and “tube” though idiomatic use prefers sometimes the one and sometimes the other.

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 14, 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.

1 Scope

This British Standard specifies requirements for plain end, welded and seamless carbon steel tubes suitable for general pressure purposes. Tubes manufactured in accordance with this standard have specified room temperature properties (see note 1).

In addition to the definitive requirements, this standard requires the items detailed in **2.1** to be documented. It also requires options selected by the purchaser from those detailed in **2.2** to be documented. For compliance with this standard both the definitive requirements and the documented items have to be satisfied.

NOTE 1 Carbon steel tubes with specified elevated temperature properties or for special manipulation such as close bending or other special applications are covered by the requirements of BS 3602-1 and BS 3602-2.

NOTE 2 The range of diameters and thicknesses appropriate to this standard is given in appendix B. However, it may be convenient to select from the discrete sizes given in the following British Standards:

- a) BS 3600:1976, Table 1;
- b) BS 1600-2 (completely interchangeable with ANSI B36.10 and ANSI B36.19);
- c) BS 3600:1976, Table 4 (for use with compression couplings);
- d) BS 1387:1985, Tables 1, 2 and 3 (for butt welded tubes).

Tubes to diameters and thicknesses not covered by the above standards including tubes made to internal diameter requirements are also available.

NOTE 3 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Information to be supplied by the purchaser and options to be documented

2.1 Information to be supplied by the purchaser

The following information shall be supplied by the purchaser and fully documented:

- a) the number of this British Standard, i.e. BS 3601, the method of manufacture of the product and the grade of steel, as expressed by the appropriate designation in clause 3, e.g. BS 3601:ERW 430;
- b) the tube outside diameter and thickness;
- c) the tube length, if exact (see **2.2 i**) and **10.4**);
- d) the quantity in metres or number of lengths.

2.2 Options to be documented

A number of options are permitted by this standard as listed below and where the purchaser identifies the option it shall be fully documented. Both the definitive requirements specified throughout the standard and the following documented items shall be satisfied before a claim of compliance with the standard can be made and verified. In the event that the purchaser does not indicate his requirements at the time of enquiry or order the manufacturer shall select the options.

- a) Whether the steelmaking process used has to be reported [see **4.2** and clause **15 1**].
- b) The type of seam weld, longitudinal or spiral for submerged arc welded tube [see clause **5 d**].
- c) Whether weld repairs on the body of submerged arc welded tubes are not permitted [see clause **5 d**].
- d) Whether a product analysis is required [see **6.2** and clause **15 2**].
- e) Whether selected chemical elements additional to those specified are to be reported [see **6.3** and clause **15 3**].
- f) The final supply condition of electric resistance welded, submerged arc welded and seamless tubes (see clause **7**).
- g) Whether the height of the internal weld bead requires to be reduced [see **10.2 b**].
- h) Whether the tube tolerances are required to suit compression couplings (see **10.3**).
- i) Whether lengths other than random lengths are required (see **10.4**).
- j) Whether random lengths down to 1.8 m are acceptable (see **10.4**).
- k) Whether the method of leak tightness test to be carried out on tubes up to and including 180 mm outside diameter is the hydraulic test or the eddy current test [see **12.3** and clause **15 5**].
- l) Whether the hydraulic test, if specified, is to be carried out at a pressure in excess of 70 bar¹⁾ and the pressure required [see **13.3 b** and clause **15 5**].
- m) Whether the tubes are to be supplied uncoated or with the manufacturer's normal mill coating (see clause **16**).
- n) Whether marking requirements to BS 5383 are required (see **17.1** and **17.4**).

¹⁾ 1 bar = 10⁵ N/m² = 100 kPa.