

Specification for

Seamless and welded steel tubes for automobile, mechanical and general engineering purposes —

**Part 7: Specific requirements for
submerged arc welded steel tubes**

UDC 669.14 – 462.2:621.774.21

Cooperating organizations

The Iron and Steel Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

- British Constructional Steelwork Association
- British Internal Combustion Engine Manufacturers' Association
- British Ironfounders' Association
- British Railways Board
- British Steel Industry*
- British Steel Industry — Wire Section
- Concrete Society Ltd
- Council of Ironfoundry Associations
- Department of Industry (National Physical Laboratory)
- Electricity Supply Industry in England and Wales
- Engineering Equipment Users' Association
- Federation of Civil Engineering Contractors
- Institute of Quality Assurance
- Institution of Production Engineers
- Institution of Structural Engineers
- International Tin Research Institute
- Lloyd's Register of Shipping
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- Society of Motor Manufacturers and Traders Ltd*
- Steel Casting Research and Trade Association
- Water-tube Boilermakers' Association

The organizations marked with an asterisk in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this British Standard:

- Association of Hydraulic Equipment Manufacturers
- British Steel Corporation
- British Welded Steel Tube Manufacturers' Association
- Chartered Institution of Building Services
- Confederation of British Industry
- Mechanical Handling Engineers' Association
- Ministry of Defence
- Motor Cycle Association of Great Britain
- Coopted members

This British Standard, having been prepared under the direction of the Iron and Steel Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 December 1982

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Foreword

This British Standard has been prepared under the direction of the Iron and Steel Standards Committee. It is a combined standard superseding BS 980:1950, BS 1775:1964 and BS 3014:1958 which are withdrawn.

In BS 6323, manufacturing processes have been aligned with current procedures, and processes no longer used, i.e. oxy-acetylene welding and hydraulic lap welding, have been deleted. Terminology relating to the designation of certain manufacturing processes has been updated, i.e. SAW replaces EFW, and CFS replaces CDS. Additionally, in combining the standards, steel grades have been rationalized and aligned, with delivery conditions now being clearly designated by letter codes.

This standard is published in eight separate Parts as follows:

- *Part 1: General requirements;*
- *Part 2: Specific requirements for hot finished welded steel tubes;*
- *Part 3: Specific requirements for hot finished seamless steel tubes;*
- *Part 4: Specific requirements for cold finished seamless steel tubes;*
- *Part 5: Specific requirements for electric resistance welded (including induction welded) steel tubes;*
- *Part 6: Specific requirements for cold finished electric resistance welded (including induction welded) steel tubes;*
- *Part 7: Specific requirements for submerged arc welded steel tubes;*
- *Part 8: Specific requirements for longitudinally welded stainless steel tubes.*

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 and 2, 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 Part of BS 6323, which is used in conjunction with Part 1 of the same standard, covers the specific requirements for submerged arc welded steel tubes for use in the automobile, mechanical and general engineering industries. It specifies the chemical composition, mechanical properties, dimensions, dimensional tolerances and technical delivery condition of the tubes.

NOTE 1 For tubes for pressure purposes, attention is drawn to BS 3601 to BS 3605 and for hollow sections for structural purposes to BS 4360 and BS 4848-2.

NOTE 2 The titles of the publications referred to in this Part of this standard are listed on the inside back cover.

2 General

The tubes shall comply with the general requirements of BS 6323-1 and the specific requirements of this Part of the same standard which covers tubes of 150 mm outside diameter and above.

The tubes shall be of steel grades 4 and 5. The grade required shall be specified in the enquiry and order, together with other details as specified in clause 5 of BS 6323-1:1982 as appropriate.

3 Method of manufacture

The tubes shall be manufactured by longitudinally butt welding preformed steel plate or skelp by an automatic submerged arc welding process.

4 Delivery condition

The tubes shall be supplied in one of the following delivery conditions.

- As-welded;
- Hot sized;
- Cold sized.

NOTE Cold sized tubes may be heat treated at the option of the manufacturer.

5 Chemical composition

The steel shall show on ladle analysis the composition given in Table 1.

6 Mechanical properties

The tensile properties of the tubes, appropriate to their steel grade, determined in accordance with 15.2 of BS 6323-1:1982 shall be as given in Table 1.

For other mechanical properties, see clause 9.

7 Dimensions and sectional properties

The dimensions of the tubes most commonly used are given in Table 2 and the sectional properties in Appendix B of BS 6323-1:1982.

8 Tolerances

8.1 Outside diameter. The outside diameter of the body of the tube, as calculated from measurement of the circumference, shall not deviate from the specified diameter by more than $\pm 0.75\%$, or ± 10 mm, whichever is the less.

8.2 Thickness. The tolerance on thickness, including eccentricity, shall be: apart from any external reinforcement at the weld: $\begin{smallmatrix} +10 \\ -5 \end{smallmatrix} \%$

8.3 Length. Tubes shall be supplied in either:

- random lengths of 6 m to 9 m; or
- specified cut lengths to the following tolerances:

up to and including 6 000 mm: $\begin{smallmatrix} +10 \\ -5 \end{smallmatrix} \text{ mm}$
over 6 000 mm: $\begin{smallmatrix} +15 \\ -0 \end{smallmatrix} \text{ mm}$

NOTE Closer tolerances may be obtained by agreement between the purchaser and the manufacturer.

Table 1 — Chemical composition and mechanical properties (see note)

Designation	Chemical composition (ladle analysis)					Mechanical properties		
	C max.	Si max.	Mn max.	P max.	S max.	R_e min.	R_m min.	A min.
	%	%	%	%	%	N/mm ²	N/mm ²	%
SAW 4	0.25	0.35	1.20	0.050	0.050	235	410	22
SAW 5 ^a	0.23	0.50	1.50	0.050	0.050	340	490	20

NOTE Welding of tubes of these grades does not require special techniques but care should be taken and welding should be carried out in accordance with the guidance given in the appropriate British Standard for welding, e.g. BS 5135.

^a Grain refining elements may be added to this grade at the option of the manufacturer.

9 Tests

9.1 General. In addition to the tensile test specified in clause 6, the tubes shall be subjected to a bend test (strip) as given in 9.2. The tests shall be carried out in accordance with 15.4 of BS 6323-1:1982.

9.2 Bend test (strip). The diameter of the bar shall be six times the thickness of the test piece. The test piece shall show no significant crack or flaw. The opening out of a slight defect due to incomplete root penetration or lack of root fusion need not be considered a cause for rejection provided the defect has sound metal at the back and on each side of it. In borderline cases further tests shall be made on test pieces from the same weld adjacent to the original test piece.

Table 2 — Dimensions of submerged arc welded steel tubes

Outside diameter	Thicknesses					
	Minimum thickness	Thicknesses in common usage				Maximum thickness
mm	mm	mm	mm	mm	mm	mm
508	6.3	8.0	10	12.5		20
559	6.3	8.0	10	12.5		20
610	6.3	8.0	10	12.5	16	32
660	6.3	8.0	10	12.5	16	32
711	7.1	8.0	10	12.5	16	32
762	7.1	10	12.5	16		32
813	7.1	10	12.5	16	20	32
864	7.1	10	12.5	16	20	32
914	8.0	10	12.5	16	20	45
1 016	8.0	12.5	16	20	25	50
1 220	10	12.5	16	20	25	50
1 420	12.5	12.5	16	20	25	50
1 620	12.5	16	20	25		50
1 820	12.5	16	20	25		50
2 020	12.5	16	20	25		50

NOTE Other outside diameters and thicknesses are available by agreement between the purchaser and the manufacturer. For sectional properties including mass per unit length, see Appendix B of BS 6323-1:1982.

Publications referred to

BS 3601, *Steel pipes and tubes for pressure purposes: carbon steel with specified room temperature properties.*

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

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, *Seamless and welded austenitic stainless steel pipes and tubes for pressure purposes.*

BS 4360, *Specification for weldable structural steels.*

BS 4848, *Hot-rolled structural steel sections.*

BS 4848-2, *Hollow sections.*

BS 5135, *Metal-arc welding of carbon and carbon manganese steels.*

BS 6323, *Specification for seamless and welded steel tubes for automobile, mechanical and general engineering purposes.*

BS 6323-1, *General requirements.*

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