Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

BRITISH STANDARD

BS 6323-8: 1982

Incorporating Amendment No. 1 and 2

Specification for

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

Part 8: Specific requirements for longitudinally welded stainless steel tubes

UDC 669.14–462.2:621.774.21

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

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
National Association of Drop Forgers and Stampers
Oil Companies' Materials Association
Process Plant Association
Royal Institute of British Architects
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

© BSI 01-1999

The following BSI references relate to the work on this standard:
Committee reference PSE/8 (formerly ISE/50)
Draft for comment 78/74961 DC

ISBN 0 580 12976 4

Amendments issued since publication

Amd. No.	Date of issue	Comments
AMD 5144	June 1986	
AMD 6027	June 1989	Indicated by a sideline in the margin

Contents

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

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.*

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 and ii, pages 1 to 4, 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.

© BSI 12-1999

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

1 Scope

This Part of BS 6323, which is used in conjunction with Part 1 of the same standard, covers the specific requirements for longitudinally welded stainless 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 cover tubes up to and including 110 mm outside diameter.

The tubes shall be of steel grades 12, 19, 20, 21, 22, 23 and 24. The grade required shall be specified in the enquiry and order, together with other details as specified in clause **5** of BS 6323-1, as appropriate.

If specified in the enquiry and order, tubes in the fully softened or cold finished (fully softened condition) shall be subject to a leak tightness test (see **9.3**).

3 Method of manufacture

The tubes shall be manufactured from flat rolled strip, longitudinally welded across the abutting edges without the addition of filler metal.

NOTE Subsequently they may be cold finished normally on both the inside and outside surfaces.

4 Delivery condition

4.1 The tubes shall be supplied in one of the following delivery conditions (see Table 3 in BS 6323-1:1982):

a) As-welded and sized: KM;

b) Welded and sized (fully softened): GKM(S) (see **4.2**);

c) Welded and sized (fully softened) (including de-scaling): GZF(S) (see **4.2**);

d) Cold finished (fully softened): GBK(S) (see **4.2**);

e) Cold finished (fully softened) (including de-scaling): GZF(S) (see note to **4.2**).

4.2 It is permissible for tubes supplied in the GKM(S) and GBK(S) conditions to be discoloured, but they shall be free from loose scale.

Where tubes in the GKM(S) and GBK(S) conditions are required bright annealed, this shall be the subject of an agreement between the purchaser and the manufacturer.

Where in the GKM(S), GBK(S) and GZF(S) conditions a special surface finish is required, e.g. polishing, this shall be the subject of an agreement between the manufacturer and the purchaser.

5 Chemical composition

The steel shall show on ladle analysis the composition given in Table 1 appropriate to the steel grade specified.

6 Mechanical properties

The tensile properties of the tubes, appropriate to their steel grade and delivery condition, 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

The dimensions of tubes shall be designated by the outside diameter and thickness.

NOTE Cold finished tubes may also be designated by inside diameter and thickness.

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

Designation	BS 1449-2: equivalent[a]	Chemical composition (ladle analysis)														Mechanical properties								
		C	Si	Mn	P	S	Cr		Mo		Ni		N	Ti		KM (as welded)			GKM(S), GZF(S) (welded and sized, fully softened)			GBK(S), GZF(S) (cold finished, fully softened)		
		max.	max.	max.	max.	max.	min.	max.	min.	max.	min.	max.	max.	min.	max.	R_e min.	R_m min.	A min.	R_e min.	R_m min.	A min.	R_e min.	R_m min.	A min.
		%	%	%	%	%	%	%	%	%	%	%	%	%	%	N/mm^2	N/mm^2	%	N/mm^2	N/mm^2	%	N/mm^2	N/mm^2	%
LW 12[b]		0.06	0.90	0.60	0.040	0.020	11.0	13.0	—	—	—	0.50	0.025	5 × C	0.70	300	400	10	—	—	—	—	—	—
LW 19[b]	409S19	0.08	1.00	1.00	0.040	0.030	10.5	12.5	—	—	—	1.00	—	6 × C	1.00	300	400	10	200	350	20	—	—	—
LW 20	304S11	0.03	1.00	2.00	0.045	0.030	17.0	19.0	—	—	9.0	12.0	—	—	—	420	520	25	185	480	30	—	—	—
LWCF 20																						185	480	30
LW 21	304S15	0.06	1.00	2.00	0.045	0.030	17.5	19.0	—	—	8.0	11.0	—	—	—	450	560	25	210	510	30	—	—	—
LWCF 21																						210	510	30
LW 22	316S13	0.03	1.00	2.00	0.045	0.030	16.5	18.5	2.5	3.0	11.5	14.5	—	—	—	420	520	25	185	480	30	—	—	—
LWCF 22																						185	480	30
LW 23	316S33	0.07	1.00	2.00	0.045	0.030	16.5	18.5	2.5	3.0	11.0	14.0	—	—	—	450	560	25	210	510	30	—	—	—
LWCF 23																						210	510	30
LW 24	321S31	0.08	1.00	2.00	0.045	0.030	17.0	19.0	—	—	9.0	12.0	—	5 × C	0.80	450	560	25	210	510	30	—	—	—
LWCF 24																						210	510	30

NOTE Welding of tubes of these steel grades may require special techniques and it should be carried out in accordance with the guidance given in the appropriate British Standard for welding, e.g. BS 4677.

[a] Equivalent to grades listed in BS 1449-2 for chemical composition only.

[b] This is a modification of grade 409S19 in BS 1449-2 with the chemical composition adjusted in order not to be susceptible to the formation of martensite.

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

© BSI 01-1999

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

8 Tolerances

8.1 Diameter

8.1.1 The tolerance on designated diameter, including ovality, for as-welded and sized tube shall be as given in Table 2.

Table 2 — Tolerance on diameter of as-welded and sized tube

Outside diameter		Tolerance
Over	Up to and including	
mm	mm	mm
	30	± 0.15
30	50	± 0.18
50	70	± 0.25
70	110	± 0.35

8.1.2 The tolerance on designated diameter, including ovality, for fully softened tubes the tolerance shall be as given in Table 3.

Table 3 — Tolerance on diameter of fully softened tube

Diameter to thickness ratio D/a		Tolerance
Over	Up to and including	
		mm
—	40	1.5 times value in Table 2
40	60	Twice the value in Table 2
60	—	2.5 times value in Table 2

8.2 Thickness. The tolerance on thickness, including eccentricity but excluding the weld, shall be ± 10 %.

The external weld bead shall be removed or controlled so that the tube is smooth and circular to the eye. Special requirements for the control of the weld bead shall be the subject of agreement between the purchaser and the manufacturer.

The maximum height of the internal weld bead shall be not greater than 60 % of the specified thickness.

8.3 Length. Tubes shall be supplied in either:

a) random lengths of 4 m to 8 m; or

b) specified cut lengths to the tolerances given in Table 4.

Table 4 — Tolerance on specified cut lengths

Specified cut length		Tolerance
Over	Up to and including	
mm	mm	mm
	500	+ 2 – 0
500	2 000	+ 3 – 0
2 000	5 000	+ 5 – 0
5 000	7 000	+ 10 – 0
7 000	—	by agreement

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

9 Tests

9.1 General. In addition to the tensile test specified in clause **6**, each selected tube shall be subjected to a drift expanding test as given in **9.2**. The test shall be carried out in accordance with **15.6** of BS 6323-1:1982.

9.2 Drift expanding test. The percentage increase in outside diameter shall be not less than the following values:

for as welded tubes 12.5 %

for fully softened tubes 20 %

NOTE For grade 12 tubes, the internal weld bead may be removed prior to testing, or the conical plug may be grooved to accommodate the weld bead.

9.3 Leak tightness test. When a leak tightness test is required by the purchaser and specified on his enquiry and order, each tube shall be tested by one of the following methods:

a) hydraulic leak tightness test (see **15.7** of BS 6323-1:1982).

b) eddy current test (see **15.8** of BS 6323-1:1982).

c) any other method giving an equivalent assurance of leak tightness as agreed between the manufacturer and the purchaser.

Selection of the test method shall be at the option of the manufacturer, unless a specific test is required by the purchaser, and specified on his enquiry and order.

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

blank

Publications referred to

BS 1449, *Steel plate, sheet and strip.*

BS 1449-2, *Specification for stainless and heat resisting steel plate, sheet and strip.*

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 4677, *Class I arc welding of austenitic stainless steel pipework for carrying fluids.*

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

BS 4848-2, *Hollow sections.*

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

BS 6323-1, *General requirements.*

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

© BSI 01-1999

Licensed Copy: Institute Of Technology Tallaght, Institute of Technology, Wed Apr 25 13:49:20 GMT+00:00 2007, Uncontrolled Copy, (c) BSI

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager. Tel: 020 8996 7070.

BSI
389 Chiswick High Road
London
W4 4AL