

Specification for

Steel butt-welding pipe fittings —

For the petroleum industry —

**Part 2: Wrought and cast austenitic
chromium-nickel steel fittings**

UDC 621.643.4:621.791.053.6:665.5

Co-operating organizations

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

- British Iron and Steel Federation*
- Council of British Manufacturers of Petroleum Equipment*
- Federation of British Rubber and Allied Manufacturers
- Institute of Petroleum
- Ministry of Power
- Oil Companies Materials Association*

The 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:

- British Valve Manufacturers' Association
- National Association of Drop Forgers and Stampers

This British Standard, having been approved by the Petroleum Equipment Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 12 December 1962

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Foreword

This British Standard makes reference to the following British Standards:

BS 1501-BS 1506, *Steels for use in the chemical, petroleum and allied industries.*

BS 1560, *Steel pipe flanges and flanged fittings (nominal sizes ½ in to 24 in) for the petroleum industry.*

BS 1600, *Dimensions of wrought steel pipe for the petroleum industry.*

BS 2600, *General recommendations for the radiographic examination of fusion welded joints in thicknesses of steel up to 2 inches.*

BS 2910, *General recommendations for the radiographic examination of fusion welded circumferential butt joints in steel pipes.*

BS 2926, *Chromium-nickel austenitic steel electrodes for manual metal-arc welding.*

BS 3351, *Piping systems for the petroleum industry.*

This British Standard is one of a series of standards for fittings prepared under the authority of the Petroleum Equipment Industry Standards Committee. It was first published in 1950, and the first revised edition was published in 1953.

One of the aims of this standard is to ensure interchangeability in service with similar products of American manufacture. Consequently in the present edition due consideration has been given to the latest editions of American Standards ASA.BI6.9, ASA.BI6.28, ASTM.A.234, ASTM.A.351, ASTM.A.403 and ASTM.A.420, and to the American Manufacturers' Standardisation Society of the Valve and Fittings Industry Standard Practice SP.43.

Account has also been taken of the work of the International Organization for Standardization (ISO) on this subject.

The standard no longer provides for cast carbon and cast ferritic alloy steel fittings. Provision is now made for austenitic stainless steel fittings, and also for fittings intended to be used for low temperature service.

The revised edition of BS 1640 is in two parts of which this is Part 2.

Part 1 deals with wrought carbon and ferritic alloy steel fittings.

Acknowledgment is made to the American Standards Association, the American Society for Testing and Materials, and the American Manufacturers' Standardisation Society of the Valve and Fittings Industry for data used in this standard.

NOTE In place of the customary, but incorrect, use of the pound as a unit of force, the unit called a pound-force (abbreviation lbf) has been used in this standard. This is the force which, when acting on a body of mass one pound, gives it an acceleration equal to that of standard gravity.

The unit called ton-force (abbreviation tonf) has also been used where appropriate.

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 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.

Section 1. General

1 Scope

Part 2 of this British Standard specifies requirements for wrought and cast seamless and fabricated austenitic chromium-nickel steel butt-welding pipe fittings for use in the petroleum industry.

The following types of fittings are provided for:

- a) 45° long radius elbows;
- b) 90° long and short radius elbows;
- c) 90° long radius tangent elbows;
- d) long and short radius return bends;
- e) equal and reducing tees;
- f) concentric and eccentric reducers;
- g) caps;
- h) lap-joint stub ends.

Welding-neck flanges are not included. They are included in BS 1560¹⁾.

The purchaser shall specify in his order whether wrought or cast seamless fittings are required, or whether wrought or cast fabricated fittings may be supplied.

Attention is drawn to the Appendix, which lists information to be supplied by the purchaser.

2 Size and size identification

A fitting to this standard shall be identified by the nominal size and wall thickness or schedule number of the pipe (see Table 3) to which it is intended to correspond in strength.

Dimensions are standardized for the sizes and to the extent given in Table 4 to Table 10.

3 Pressure ratings

All fittings shall be so designed that their pressure ratings may be calculated as for straight seamless pipe of the same or equivalent material of the same size and of the same nominal wall thickness.

For information regarding design stresses at given temperatures for seamless pipe, reference should be made to Table 3 in BS 3351²⁾.

4 Materials

Fittings to this standard shall be made of material complying with one of the standards given in Table 1. By agreement between purchaser and manufacturer other types of austenitic chromium-nickel steel may be used.

NOTE Fittings ordered for use in low-temperature services shall be subject to the requirements specified in BS 3351²⁾, Clause 18 and Table 2.

¹⁾ BS 1560, "Steel pipe flanges and flanged fittings (nominal sizes 1/2 in to 24 in) for the petroleum industry".

²⁾ BS 3351, "Piping systems for the petroleum industry".

Table 1 — Materials and material identification symbols

A. Wrought materials

Material	Material standards			
	Identification symbol ^d	Seamless pipe	Rolled plate	Forgings
		Comparable ASTM specification		
18 per cent chromium, 8 per cent nickel steel	WP 304	A312 — grade TP304	BS 1501-801 ^b Grade B	BS 1503-801
18 per cent chromium, 8 per cent nickel steel LC ^a	WP 304 L	A312 — grade TP304 L	BS 1501-801 Grade C	—
18 per cent chromium, 8 per cent nickel, 2½ per cent molybdenum steel	WP 3166	A312 — grade TP316	BS 1501-845 Grade B	BS 1503-845 Grade B
18 per cent chromium, 10 per cent nickel, 2½ per cent molybdenum steel, LC ^a	WP 316 L	A312 — grade TP316 L	—	—
18 per cent chromium, 10 per cent nickel, 2½ per cent molybdenum steel, titanium stabilized	WP 316 Ti	—	BS 1501-845 Grade Ti	BS 1503-845 Grade Ti
18 per cent chromium, 12 per cent nickel, 3½ per cent molybdenum steel	WP 317	A312 — grade TP317	BS 1501-846	BS 1503-846
18 per cent chromium, 12 per cent nickel, 3½ per cent molybdenum steel, titanium stabilized	WP 317 Ti	—	—	—
18 per cent chromium, 8 per cent nickel steel, titanium stabilized	WP 321	A312 — grade TP321	BS 1501-821 Grade Ti	BS 1503-821 Grade Ti
18 per cent chromium, 8 per cent nickel steel, niobium stabilized	WP 347	A312 — grade TP347	BS 1501-821 Grade Nb	BS 1503-821 Grade Nb

B. Castings

Material	Identification symbol	Material standards
18 per cent chromium, 8 per cent nickel steel	CF8	BS 1504-801
18 per cent chromium, 8 per cent nickel steel, titanium stabilized	CF8T	BS 1504-821 Grade Ti
18 per cent chromium, 8 per cent nickel steel, niobium stabilized	CF8C	BS 1504-821 Grade Nb
18 per cent chromium, 8 per cent nickel steel, LC ^a	CF3	BS 1504-801 ^c
18 per cent chromium, 10 per cent nickel 2½ per cent molybdenum steel	CF8M	BS 1504-845 Grade B
18 per cent chromium, 10 per cent nickel, 2½ per cent molybdenum steel, LC ^a	CF3M	BS 1504-845 ^c Grade B
18 per cent chromium, 10 per cent nickel, 2½ per cent molybdenum steel, niobium stabilized	CF8MC	BS 1504-845 Grade Nb
18 per cent chromium, 12 per cent nickel, 3½ per cent molybdenum steel	CF8MM	BS 1504-846
NOTE A comprehensive series of British Standards for steel pipe for pressure purposes is in course of preparation. Pending publication of these standards reference is made here to comparable ASTM specifications. For dimensions of pipe, see Table 3, extracted from BS 1600, “ <i>Dimensions of wrought steel pipe for the petroleum industry</i> ”. ^a LC — Low carbon. ^b BS 1501, “ <i>Steels for use in the chemical, petroleum and allied industries</i> ”. ^c Carbon content limited to 0.03 per cent; 0.5 per cent proof stress, 12.0 tonf/in ² minimum, and a minimum tensile strength of 28 tonf/in ² . ^d When fittings are of welded construction the symbols shown in this column shall be supplemented by the suffix letter “W”.		