

Specification for

Carbon steel pipe flanges —

(Over 24 inches nominal size) —

For the petroleum industry

Confirmed December 2011

Co-operating organizations

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

- British Iron & Steel Federation*
- Council of British Manufacturers of Petroleum Equipment*
- Engineering Equipment Users' Association
- 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 30 December 1960

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The following BSI references relate to the work on this standard:
Committee reference PEE/2
Draft for comment CZ(PEE) 9923

ISBN 0 580 03066 0

Amendments issued since publication

Amd. No.	Date of issue	Comments
1004	August 1972	Indicated by a sideline in the margin

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Foreword

This British Standard makes reference to the following British Standards:

BS 1503, *Steels for fired and unfired pressure vessels. Forgings.*

BS 1560, *Steel pipe flanges and flanged fittings (nominal sizes $\frac{1}{2}$ in to 24 in) for the petroleum industry.*

BS 1750, *Bolting for the petroleum industry.*

BS 3351, *Piping systems for petroleum refineries and petrochemical plants.*

and to the following American Standards Association Standard (obtainable through the British Standards Institution):

A.S.A. B16.20, *Ring-joint gaskets and grooves for steel pipe flanges.*

This British Standard is one of a series prepared under the authority of the Petroleum Equipment Industry Standards Committee. It is complementary to BS 1560, “*Steel pipe flanges and flanged fittings (Nominal sizes $\frac{1}{2}$ in to 24 in) for the petroleum industry*”.

In view of the international character of the petroleum industry care has been taken to ensure interchangeability in practice between flanges of the sizes covered which are produced by British and American manufacturers. At present there is no national American standard for steel flanges above 24 in nominal size. The dimensions given herein are, however, in general conformity with the standard practice of the American Manufacturers’ Standardization Society of the Valve and Fittings Industry (SP 44) and with those currently adopted by the principal American flange makers.

Acknowledgment is made to the American Standards Association, the American Society for Testing Materials and to the American Manufacturers’ Standardization Society of the Valve and Fittings Industry for data use.

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 13 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

This British Standard is a material and dimensional standard only and applies to forged carbon steel slip-on and welding neck flanges of nominal sizes 26 in and larger, for use in the petroleum industry. Drilling, bolting, facing and thickness dimensions are applicable also to integral end flanges of valve and fittings.

Four classes of flanges are provided for, namely Classes 150, 300, 400 and 600.

The standard does not include pressure/temperature ratings; the flange designations quoted are for identification purposes only.

2 Designation and pressure temperature ratings

To facilitate ordering and to ensure interchangeability, flanges in this standard are designated as Classes 150, 300, 400 and 600. These class designations, however, do not imply specific pressure/temperature ratings in the same manner as flanges in accordance with BS 1560. Users shall therefore satisfy themselves that the flanges selected are adequate for the intended duty. Where it is required to use the flanges in this standard at temperatures below -20°F reference should be made to BS 3351.

3 Flange facings

For Class 150 flanges, raised facings only are specified. For Classes 300, 400 and 600 flanges, both raised facings and ring-joint facings are specified, and the purchaser shall specify when ordering, which type of facing is required. The $\frac{1}{16}$ in high facing is the regular type of raised facing for flanges of Classes 150 and 300, and the $\frac{1}{4}$ in high facing is the regular type of raised facing for flanges of Classes 400 and 600.

4 Nominal sizes

The nominal size of a flange as shown in the tables is the same as the nominal pipe size.

Section 2. Materials

5 Materials for flanges

Flanges shall be carbon steel forgings to the following specification, full details of which are contained in BS 1503

British Standard	Comparable A.S.T.M. Standard
BS 1503-161 Grade 32 Class A or B.	A105 Grade II

Material to BS 1503-161 Grade 28 Class A or B. (A.S.T.M. A105, Grade I) may be supplied if specified by the purchaser

6 Bolting materials

All bolting material shall comply with BS 1750¹⁾. For pressures and temperatures above 275 psi and 450°F , bolts shall be of alloy steel in conformity with Part 1 of the above standard, and nuts shall be of carbon or alloy steel in conformity with Part 2.

For pressures and temperatures up to and including 275 psi and 450°F , carbon steel bolts and nuts complying with Part 3 of the above standard may be used.

Section 3. Dimensions and tolerances

7 Flanges

a) *Flange dimensions.* Flange dimensions shall conform to those given in Table 1, Table 3, Table 5 and Table 7.

In no case, regardless of the type of facing provided and the tolerances referred to in Clause 7 b), shall the minimum thickness of a flange, as specified in the tables listed above, be reduced in order to provide adequate height for a raised facing or adequate depth for a ring groove, except where a Class 150 or a Class 300 flange is provided with a $\frac{1}{16}$ in raised facing, when the height of the facing is included in the minimum flange thickness specified.

b) *Tolerances on flange dimensions.* The following are the tolerances permitted on flange dimensions:

i) *Slip-on welding flanges* (Table 1, Table 3, Table 5 and Table 7).

On flange bore Dimension B_1 $+\frac{1}{16}$ in
 -0 in

On flange thickness Dimension C $+\frac{3}{16}$ in
 -0 in

¹⁾ "Bolting for the petroleum industry".

On overall length through hub	Dimension Y ₁ (Table 1) Dimension Y (Table 3, Table 5, Table 7)	} ± 1/8 in
ii) <i>Welding-neck flanges</i> (Table 1, Table 3, Table 5 and Table 7).		
^a On flange bore	Dimension B ₂	+ 1/8 in − 1/16 in
On flange thickness	Dimension C	+ 3/16 in − 0 in
On overall length through hub	Dimension Y ₂ (Table 1) Dimension Y (Table 3, Table 5, Table 7)	} ± 1/8 in
^a Outside diameter of welding end of hub	Dimension A (Table 1) Dimension A ₂ (Table 3, Table 5, Table 7)	+ 5/32 in − 1/32 in

^a In no case, regardless of the tolerances permitted on flange bore (B₂) and outside hub diameter (A and A₂), shall the thickness of the welding end of a welding-neck flange be less than 87 1/2 per cent of the nominal thickness of the pipe to which it is to be attached.

8 Flange facings and gaskets

a) *Flange facing dimensions*. Flange facing dimensions shall conform to those given in Table 2, Table 4, Table 6 and Table 8.

Raised facings shall be finished in accordance with the requirements of BS 1560²⁾. Ring-joint grooves shall be machined true with the face and concentric with the bolt circle and the bore of the flanges. Grooves shall be finished smooth and shall be free from ridges and chatter marks.

b) *Tolerances on flange facing dimensions*. The following are the tolerances permitted on flange facing dimensions:

i) *Raised facings* (Table 2, Table 4, Table 6 and Table 8).

On outside diameter of raised face	Dimension R	± 1/64 in
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ii) *Ring-joint facings* (Table 4, Table 6 and Table 8).

On pitch diameter of groove	Dimension P	± 0.005 in
On width of groove	Dimension F	± 0.008 in
On depth of groove	Dimension E	+ 1/64 in − 0 in
On 23° flank angle of groove		± 1/2°

c) *Gasket dimensions*. Dimensions of compressed asbestos fibre gaskets for use with raised facings are given in Table 9. Dimensions of ring-joint gaskets are given in Table 10.

d) *Tolerances on gasket dimensions*. The following are the tolerances permitted on gasket dimensions:

i) *Compressed asbestos fibre gaskets* (Table 9). Tolerances on these gaskets are not specified.

ii) *Ring-joint gaskets* (Table 10)³⁾.

On average pitch diameter of ring	Dimension P	± 0.007 in
On width of ring	Dimension A	± 0.008 in
On height of ring	Dimension H ^a	± 1/64 in.
On width of flat	Dimension C	± 0.008 in
On corner radius	Dimension R	± 1/64 in
On 23° flank angle of ring		± 1/2°

^a A plus tolerance of 3/64 inch on height is permitted provided that the variation in the height of any given ring does not exceed 1/64 inch throughout its entire circumference.

9 Flange bolting dimensions

The number of bolts, their size and the bolt circle diameter for each class and size of flange shall be as given in Table 2, Table 4, Table 6 and Table 8.

Bolt holes shall be pitched evenly around the bolt circle.

10 Spot-facing and back-facing of flanges

Flanges need not be spot-faced or back-faced provided that their backs are parallel, within 1°, to their faces and the fillets of their hubs do not interfere with the full bearing of the fastening nuts.

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

³⁾ Extracted from A.S.A. Std. B 16.20, "Ring-joint gaskets and grooves for steel pipe flanges" (obtainable from the British Standards Institution).