
Issued
February 1961

Supplement 1
API STD 6B (Sixth Edition)
SPECIFICATION
for
RING-JOINT FLANGES
for
DRILLING AND PRODUCTION SERVICE
(2000, 3000, and 5000 Lb)



AMERICAN PETROLEUM INSTITUTE
New York, N. Y.

Issued by
AMERICAN PETROLEUM INSTITUTE
Division of Production
Dallas 1, Texas

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Foreword

This supplement covers changes in API Std 6B: *Ring-Joint Flanges for Drilling and Production Service* adopted at the 1960 midyear meeting and reported in Circ PS-1182.

Table 4 and Table 5: Delete the double asterisks in Column 10 on size 2 in. and 2½ in. Also delete the double asterisk footnote under Table 4 and Table 5 reading, "***Flanges in 2-in. and 2½ in. sizes shall be furnished with . . ."

Table 10, Note 3: Delete all reference to gasket number BX-58.

Par. 29: Replace existing paragraph with the following:

29. Test Pressure. Flanges furnished under this specification are not regularly shop tested; however, they shall be capable of withstanding hydrostatic test pressure as given in Table 12.

TABLE 12**STD 6B DRILLING AND PRODUCTION FLANGE
HYDROSTATIC TEST PRESSURE**

1	2	3
Test Pressure, psi		
Maximum Working-Pressure Rating, psi	Flange Size 14 in. and Smaller	Flange Size 16 in. and Larger
720	1100	1100
960	1450	1450
2000	4000	3000
3000	6000	4500
5000	10000	.....

Appendix D: List of Authorized Manufacturers*Under ring-joint flanges add:*

Midwest Piping Company, Inc., St. Louis, Mo.
 Newman, Hender & Co. Ltd., Woodchester,
 Stroud, Glos., England.
 Rector Well Equipment Co., Inc.,
 Ft. Worth, Texas.

Under ring-joint gaskets add:

Southern California Oil Tool Co., Bell, Calif.

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Price: 50 Cents

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TABLE OF CONTENTS

	Page
Suggestions for Ordering.....	2
Foreword	3
Sect. I: Scope	3
Sect. II: Materials	4
Sect. III: Maximum Working Pressure Ratings.....	4
Sect. IV: Design	5
Sect. V: Ring-Joint Gaskets	13
Sect. VI: Marking	16
Sect. VII: Inspection and Rejection.....	16
Appendix A: Method for Calculating Stud Bolt Lengths.....	17
Appendix B: 720-lb Maximum Working Pressure Flanges.....	18
Appendix C: 960-lb Maximum Working Pressure Flanges.....	20
Appendix D: List of Authorized Manufacturers.....	22
Appendix E: Use of API Monogram.....	23

SUGGESTIONS FOR ORDERING

In placing orders for flanges to be manufactured in accordance with API Std 6B, purchasers should specify the following on their purchase orders:

1. Specification.....API Std 6B
2. Quantity.....
3. Size.....Par. c, Foreword
4. Type of flange.....Par. 2
5. Working pressure rating.....Par. 10
6. Thread style and size.....Par. 14
7. Bore diameter (welding-neck flange).....Tables 3, 4, and 5

The purchaser should also state on the purchase order his requirements concerning the following stipulations, which are optional with the purchaser:

8. Bolting.....Par. 3, 9, and 16
9. Bolting lengths (other than standard).....Par. 17
10. Ring gaskets.....Par. 3 and 8
11. Flange facing (raised or full).....Tables 3, 4, and 5
12. Short casing threads.....Par. 14

Note:

This edition supersedes the 5th edition dated September 1953. It includes changes adopted at the 1957, 1958, and 1959 meetings as reported in detail in Circ PS-1105, PS-1134, and PS-1157.

This specification was adopted as "tentative" in May 1936. The first edition was issued in 1937 with revisions in 1940, 1945, 1949, and 1953.

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API SPECIFICATION FOR RING-JOINT FLANGES FOR DRILLING AND PRODUCTION SERVICE

Foreword

a. This specification is under the jurisdiction of the API Committee on Standardization of Valves, Fittings, and Flanges.

b. These flanges are intended for use in water, oil, or gas service with valves covered by Std 6C and 6CM and with wellhead fittings covered by Std 6E.

c. Flange sizes as given in Tables 3, 4, and 5 indicate the corresponding size of line pipe. Line pipe sizes, 12 in. and smaller as given therein, are nominal sizes; sizes 14 in. and larger are outside-diameter sizes. All casing and tubing sizes are outside-diameter sizes. Purchasers are cautioned to use care in designating flange and piping sizes in accordance with the above identifications.

d. ASA B16.5: *Steel Pipe Flanges and Flanged Fittings* 300-lb and 400-lb flanges, when used in drilling and production service, are rated at 720-lb and 960-lb WOG respectively. These flanges are described in Appendix B and C.

e. Other specifications under jurisdiction of this committee are:

Std 6A: Specification for Threads in Valves, Fittings, and Flanges.
Covers dimensions for threads (and gages therefor) in valves, fittings, and flanges intended for use with API tubular products.

Std 6BX: Specification for Ring-Joint Flanges for Drilling and Production Service for Extreme Pressures.
Covers materials and dimensions for end flanged connections for wellhead equipment intended for use in drilling and production well control, repressuring, and cycling services in pressure

ranges up to 15,000 psi working pressure at temperatures not exceeding 250 F.

Std 6C: Specification for Flanged Steel Gate and Plug Valves for Drilling and Production Service.
Covers materials, dimension, and pressure ratings for drilling-through and flow-line valves.

Std 6CM: Specification for Flanged Steel Gate and Plug Valves for Multiple Parallel String Completions in Production Service.
Covers flanged steel production flowline valves for multiple completions in production well control, repressuring, and recycling service.

Std 6D: Specification for Steel Gate, Plug, and Check Valves for Pipeline Service.
Covers materials, dimensions, and pressure ratings for flanged and welding-end pipeline valves.

Std 6E: Specification for Flanged Wellhead and Drilling-Through Equipment.
Covers materials, dimensions, and pressure ratings for wellhead fittings.

f. The Institute's Division of Refining has formulated the following:

Std 600: Specification for Flanged and Welding-End Steel Gate and Plug Valves for Refinery Use.
Covers materials, ratings, and dimensions for rising stem, outside screw and yoke, steel gate valves, and for lubricated and non-lubricated plug valves.

NOTE: Copies of API Std 6A, 6B, 6BX, 6C, 6CM, 6D, and 6E are available from American Petroleum Institute, Division of Production, Dallas 1, Texas. Copies of Std 600 are available only from American Petroleum Institute, 1271 Avenue of the Americas, New York 20, N. Y.

SECTION I SCOPE

1. This specification covers materials and dimensions for cast and forged steel flanges for API line pipe, casing, and tubing intended for use in drilling and production well control, repressuring, and cycling service.

2. Flange types covered include threaded flanges (line pipe, casing, and tubing), welding-neck flanges (line pipe), and blind flanges. Also covered are integral flange dimensional requirements for valves, fittings, and wellheads (see Std 6C, 6CM, and 6E).

NOTE: Slip-on flanges are not included in this specification because of limited use in drilling and production service. Purchasers may obtain slip-on flanges by reference to ASA B16.5: *Steel Pipe Flanges and Flanged Fittings*.

3. This standard also covers ring-joint gaskets and flange bolting, but neither shall be furnished unless the purchase order so states.

4. Nothing contained in this specification is to be construed as granting any right, by implication or otherwise, for manufacture, sale, or use in connection with any method, apparatus, or product covered by letters patent, nor as insuring anyone against liability for infringement of letters patent. This specification is for the convenience of purchasers and manufacturers in ordering and producing flanges. It is not intended to inhibit purchasers and producers from purchasing and producing flanges meeting specifications other than those contained herein; nor is it intended in any way to inhibit purchasers from purchasing flanges from companies not authorized to use the API monogram.

*Available from the American Standards Association, Inc., 10 East 40th Street, New York 16, New York.

SECTION II MATERIALS

5. General. This specification is intended to cover minimum physical requirements. Materials of superior quality may be substituted.

6. Flanges Other Than Welding Neck. Flanges which do not involve welding shall be fabricated from steel having physical properties equal to or exceeding the Type 2 material specified in Table 1.

7. Welding Neck Flanges. Welding-neck flanges shall be fabricated from steel having physical and chemical properties conforming to the Type 4 material specified in Table 1.

NOTE: Flanges made from Type 4 steel are recognized as readily weldable, however, experience indicates that a moderate preheating is desirable under all conditions, and is necessary if welding is done at ambient temperatures below 40 F.

8. Ring-Joint Gaskets. Ring-joint gaskets for flanges specified herein shall be either Type R or Type BX conforming to the requirements of Sect. V. Unless otherwise specified on the purchase order, Type R gaskets shall be furnished.

9. Bolting. Bolting materials shall be of a quality and strength not less than grade BC, ASTM A 354: *Specification for Quenched and Tempered Alloy Steel Bolts and Studs with Suitable Nuts.** Nuts shall be of a quality and strength not less than grade 1, ASTM A 194: *Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.**

*Available from the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

TABLE 1
PHYSICAL AND CHEMICAL
PROPERTIES*

1	2	3
	Type 2 Other Than Welding Neck Flanges	Type 4 Welding Neck Flanges
Property		
Tensile strength, min, psi	90,000	70,000
Yield Strength, min, psi	60,000	45,000
Elongation in 2 in., min, per cent	18	19
Reduction in area, min, per cent	35	32
Carbon, max, per cent	†	0.35
Manganese, max, per cent	†	0.90
Sulfur, max, per cent	†	0.05
Phosphorus, max, per cent	†	0.05

*The designation, Type 2 and Type 4, is a nomenclature selected by the API Committee on Standardization of Valves, Fittings, and Flanges to identify material falling within the ranges of tensile requirements listed above. The nomenclature is also used in other committee publications.

†No chemical properties specified.

SECTION III MAXIMUM WORKING PRESSURE RATINGS¹

10. Except as specified in Table 2, flanges shall be furnished in the maximum working pressure ratings of Table 3, 4, or 5 as specified on the purchase order. However, in view of the complexity of sealing large threaded connections at high pressure in the field without special engineering attention to lubricants, makeup, etc., threaded flanges shall have limited ratings as shown in Table 2. This is not a limitation on flange strength. The limitation applies only to the threaded connection.

¹Maximum working pressure ratings are for atmospheric temperatures (100 F). These ratings should be reduced 1.8 per cent of the original maximum working pressure for each 50-deg rise in operating temperature over 100 F, up to a maximum of 450 F.

TABLE 2
THREADED CONNECTION MAXIMUM
WORKING PRESSURE LIMITATIONS

1	2	3
Thread Type	Thread Size, in.	Maximum Working Pressure, psi
Line pipe	2½ nominal and larger	3000
External-upset tubing	3½ and larger	5000
Non-upset tubing	2½ and larger	3000
Casing	5 to 13¾ incl.	3000
Casing	16 and larger	2000



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SECTION IV DESIGN

11. **Flange Dimensions.** Flanges shall conform to the dimensions specified in Table 3, 4, and 5, except that the inside diameter of integral flanges shall conform to the requirements of Std 6C: *Flanged Steel Gate and Plug Valves for Drilling and Production Service*, Std 6CM: *Flanged Steel Gate and Plug Valves for Multiple Parallel String Completions in Production Service*, or Std 6E: *Well-head and Drilling-Through Equipment*.

12. **Flange Facing.** Flanges shall be fully machined on the ring-joint side. Ring groove contact surfaces shall be free from any objectionable ridges, or tool and chatter marks which may cause leakage.

13. **Spot Facing.** All cast-steel flanges shall be spot faced, or back faced, parallel to the flange face. The spot facing diameter shall be in accordance with MSS Standard Practice SP-9: *Spot Facing for Bronze, Iron, and Steel Flanges*.^{*} The flange thickness after facing shall conform to the minimum dimensions given in the tables, within a plus tolerance of $\frac{1}{8}$ in. for flanges in sizes 16 in. and smaller, and $\frac{1}{4}$ in. for 20-in. flanges. Spot facing or back facing is not required for forged-steel flanges providing the back of the flange is parallel to the flange face, if the fillet and hub do not interfere with full bearing of the nut, and if the flange thickness is within the limits given above for cast-steel flanges.

14. **Threading.** Threaded flanges shall conform to the dimensions specified in Table 3, 4, and 5, for the type and size of thread specified on the purchase order. Casing and tubing sizes which are applicable to the various flange sizes and ratings are shown in Tables 6 and 7. Casing flanges in sizes up to 10 in. when ordered with casing threads in sizes up to 9 $\frac{1}{2}$ in. shall be furnished with long threads except that short casing threads shall be supplied if so specified on the purchase order. Counterbore dimensions, threading, and gaging practice shall conform to the requirements of Std 6A: *Threads in Valves, Fittings, and Flanges*.

NOTE: Std 5A: Casing, Tubing, and Drill Pipe does not provide for long threads for casing in sizes larger than 9 $\frac{1}{2}$ in.

NOTE: The hub lengths stipulated in the tables herein for threaded line-pipe flanges are in agreement with ASA B16.5: *Steel Pipe Flanges and Flanged Fittings*. The hub lengths for threaded casing and tubing flanges are equal to the hub lengths for line-pipe flanges of the same size and series, where these are of sufficient length to provide for a $\frac{1}{2}$ -in. nominal

clearance, plus a depth of counterbore required for valves and fittings, plus an effective thread length as required for the longest thread applying to the particular flange. (See Table 6 and 7.) Where the line-pipe hub length does not provide these dimensions, the hub lengths herein have been established accordingly. Manufacturers may decrease the hub lengths for the tubing and short-thread casing applicable to any particular flange, provided the hub length supplied is not less than for a similar line-pipe flange, and provided also the length is not less than the effective thread length L_e , plus $\frac{1}{2}$ -in. clearance, plus $M - p/2$, as given in Std 6A.

15. **Ring-Joint Gaskets.** Ring-joint gaskets shall conform to dimensions and tolerances specified in Sect. V.

16. **Bolting.** Flange bolts shall be of the stud-bolt type fitted with heavy semifinished hexagon nuts as dimensioned in ASA B18.2: *American Standard Square and Hexagon Bolts and Nuts*.^{**} Stud bolts shall be threaded in accordance with ASA B1.1: *Unified Screw Threads*. Nominal diameters 1 in. and smaller shall be of the coarse thread series; nominal diameters 1 $\frac{1}{4}$ in. and larger shall be of the 8-thread series. External threads shall be class 2A. Internal threads shall be class 2B. Stud-bolt diameters shall be as specified in Table 3, 4, and 5. The ends of all stud bolts shall be pointed.

17. **Bolting Lengths.** Stud bolt lengths shall conform to the L_{stud} dimension given in Table 3, 4, and 5. These stud bolt lengths permit use of either the original API R-series ring-joint gaskets or the API pressure energized BX-series ring-joint gaskets. Dimension L_{stud} includes the thickness of two nuts. Stud bolt lengths given in Table 3, 4, and 5 do not include the height of any point and are calculated by the procedure of Appendix A.

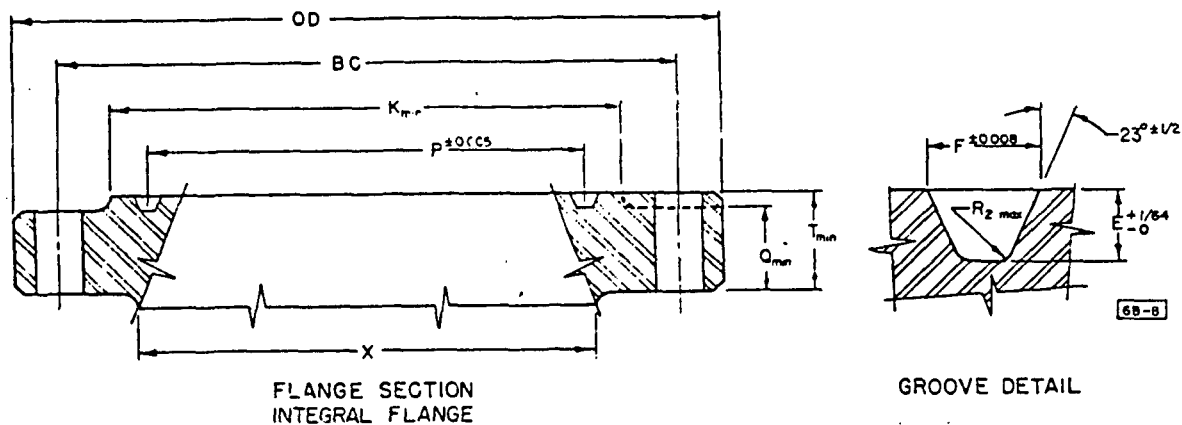
NOTE: These lengths are established as a standard for the convenience of industry to simplify assembly on construction work, but consumers may select bolt lengths to suit their needs.

^{*}Obtainable from the Manufacturers Standardization Society of the Valve and Fitting Industry, 420 Lexington Ave., New York 17, N. Y.

^{**}Obtainable from the American Standards Association, Inc., 10 East 40th Street, New York 16, N. Y.

TABLE 3
FLANGES FOR
2000-LB API MAXIMUM WORKING PRESSURE RATING

All dimensions in inches.



1	2	3	4	5	6	7	8	9	10	11	12	13	14
Basic Flange Dimensions					Bolting Dimensions				Ring-Joint Groove and Flange Facing Dimensions				
Nominal Size of Flange	Outside Diameter of Flange	Total Thickness of Flange	Basic Thickness of Flange	Diameter of Hub	Diameter of Bolt Circle	Number of Bolts	Diameter of Bolts	Length of Stud Bolts	Ring Number R or BX	Pitch Diameter of Type R Ring & Groove	Width of Groove	Depth of Groove	Diameter of Raised Face
	OD	T	Q	X	BC			L _{min}		P	F	E	K
1½*	6½	1½	¾	2¾	4½	4	¾	4¼	20	2½	½	¼	3½
2	6½	1½	1	3½	5	8	¾	4½	23	3¼	½	½	4½
2½	7½	1½	1½	3½	5½	8	¾	5	26	4	½	½	5
3	8½	1½	1½	4½	6½	8	¾	5½	31	4½	½	½	5½
4	10½	1½	1½	6	8½	8	¾	6	37	5½	½	½	6½
5*	13	2½	1½	7½	10½	9	1	6½	41	7½	½	½	8½
6	14	2½	1½	8½	11½	12	1	7	45	8½	½	½	9½
8	16½	2½	2½	10½	13½	12	1½	8	49	10½	½	½	11½
10	20	2½	2½	13½	17	16	1½	8½	53	12½	½	½	14
12	22	2½	2½	15½	19½	20	1½	9	57	15	½	½	16½
16	27	3½	3	19½	23½	20	1½	10½	65	18½	½	½	20
20	32	3½	3½	24	28½	24	1½	11½	73	23	½	½	25

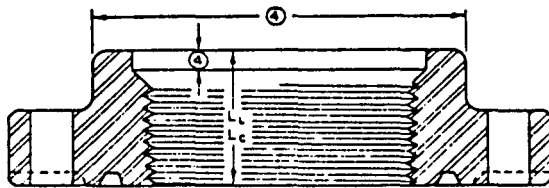
*These sizes inactive; available on special order only.

NOTE

All dimensions for line-pipe flanges and the facing dimensions for all casing flanges are in agreement with ASA B16.5 600-lb steel flange dimensions. However, ASA flanges are made of lower strength steel, which limits their working pressure to 1440 psi.

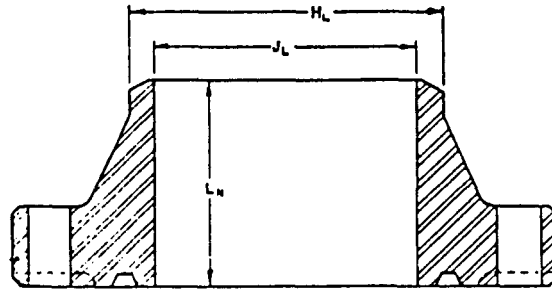
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TABLE 3—Continued
FLANGES FOR
2000-LB API MAXIMUM WORKING PRESSURE RATING



THREADED FLANGE

(6B-9)

WELDING-NECK
LINE-PIPE FLANGE

(6B-10)

1	15	16	17	18	19
HUB AND BORE DIMENSIONS					
Nominal Size of Flange	Hub Length Threaded Line-Pipe Flange	Hub Length Casing Flange	Hub Length Welding-Neck Line-Pipe Flange	Neck Diameter Welding-Neck Line-Pipe Flange	Maximum Bore of Welding Neck Flange
	L_t	L_c	L_w	H_L	J_L
1½*	1½	.....	3	1.90	1.610
2	1¾	.....	3½	2.38	2.067
2½	1⅞	.....	3¾	2.88	2.469
3	2	.....	4	3.50	3.068
4	2½	3½	4½	4.50	4.026
5*	2⅞	4	4⅞	5.56	4.813
6	3	4½	5	6.63	5.761
8	3½	5½	5½	8.63	7.813
10	3⅞	5¾	6	10.75	9.750
12	4	6	.....	.....	.....
16	4½	6½	.....	.....	.....
20	5	7	.....	.....	.....

REQUIREMENTS

- Bolt holes shall be drilled ¼ in. larger in diameter than the bolt diameter.
- The contour of the flange face outside the K diameter is optional with the manufacturer unless raised or full face is specified on the purchase order.
- Ring-groove radius R_t shall be ⅜ in. for groove widths ⅜ and ⅞; ⅝ in. for width 1.
- The diameter and depth of counterbore of threaded flanges shall be as specified in API Std 6A for the particular flange.
- The tolerance on dimension L_w shall be $\pm \frac{1}{16}$ in.
- The tolerance on dimension H_L shall be

5 in. and smaller	$\pm \frac{1}{16}$, $-\frac{1}{16}$
6 in. and larger	$\pm \frac{1}{8}$, $-\frac{1}{8}$
- The tolerance on dimension J_L shall be $\pm \frac{1}{16}$ in.
- The bore diameter of welding-neck flanges shall be as specified on the purchase order.
NOTE: Bore diameter should be the same as the ID of pipe to be used, but shall not exceed values of J_L shown in Column 19.
- The wall thickness of welding-neck flanges shall be not less than 87½ per cent of the nominal wall thickness of the pipe to which the flange is to be attached.
- The welding end of welding-neck flanges shall be cylindrical or shall have a maximum draft of 7 deg. The length shall be sufficient to insure a sound weld, but in no case shall be less than ¼ in. See Fig. 1.
- The welding bevel of welding-neck flanges shall be as follows:
 - For wall thicknesses ⅜ to ¾ in., inclusive, see Fig. 1, Detail A.
 - For wall thicknesses greater than ¾ in., see Fig. 1, Detail B.
 - Welding ends having thicknesses less than ⅜ in. shall be prepared with a slight chamfer or square in accordance with manufacturer's practice.