ASME

FLANGES · FLANSCHE

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Flanschen und Fitting

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Appendix
Anhang

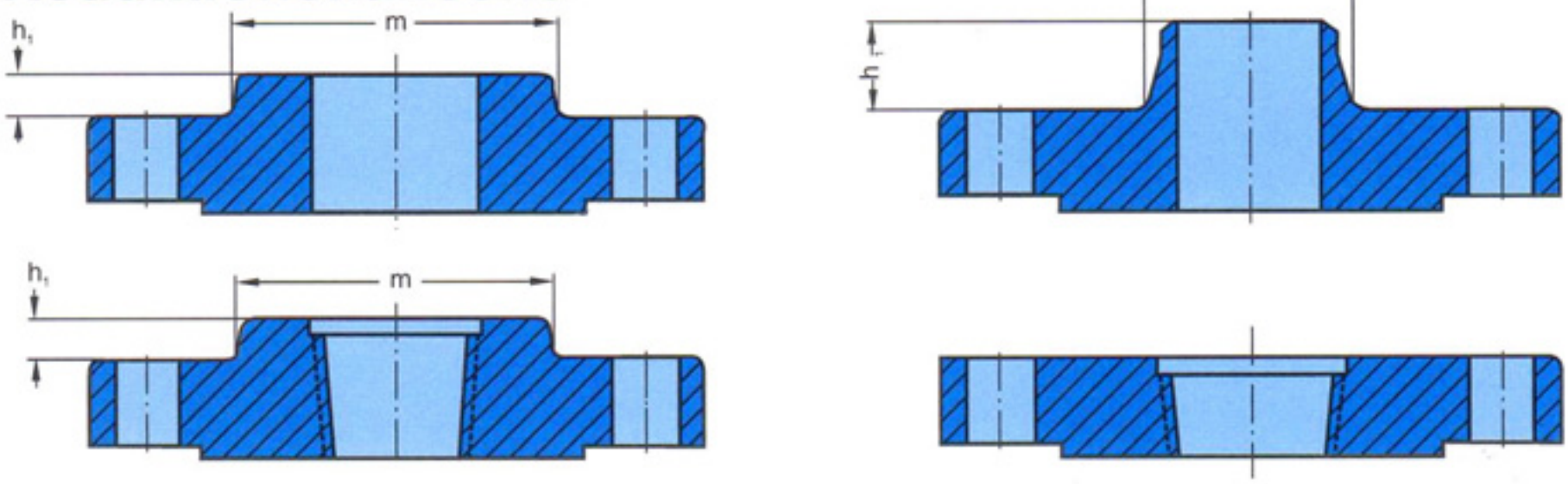
Reducing Flanges
Reduktionsflansche

Orifice-Flanges
Meßscheibenflansche

Materials for Flanges
Werkstoffe für Flansche

150-2500 lb/sq.in.

Reducing Flanges
Reduktionsflansche



ANSI B 16.5

Nominal Pipe Size	Minimum Bore or Tapping of Hub Flange	Nominal Pipe Size	Minimum Bore or Tapping of Hub Flange	Nominal Pipe Size	Minimum Bore of Tapping of Hub Flange
DN	*kleinster Mittelloch-durchmesser (nominell) o. kleinstes Gewindemaß für Flansch mit Ansatz*	DN	*kleinster Mittelloch-durchmesser (nominell) o. kleinstes Gewindemaß für Flansch mit Ansatz*	DN	*kleinster Mittelloch-durchmesser (nominell) o. kleinstes Gewindemaß für Flansch mit Ansatz*
		3 1/2"	1 1/2"		
1"	1/2"	4"	1 1/2"	14"	3 1/2"
1 1/4"	1/2"	5"	1 1/2"	16"	4"
1 1/2"	1/2"	6"	2 1/2"	18"	4"
2"	1"	8"	3"	20"	4"
2 1/2"	1 1/4"	10"	3 1/2"		
3"	1 1/4"	12"	3 1/2"	24"	4"

Dimensional References

Outside Diameter, Thickness, Facing and Drilling Template:
All these dimensions correspond exactly with those of the full size flange of the nominal pipe size from which the reduction is being made.
As in the case of regular full size flanges, the 1/16" Raised Face on 150 lb. and 300 lb. reducing flanges is included in thickness. The 1/4" Raised Face on flanges in the 400 lb. and higher Pressure Standards is not included in thicknesses. Any other facing can be furnished.

Hub Diameter and Height:
For Reducing Slip-on and Threaded flanges, regardless of the amount of reduction,the hub diameter at base(m) and height of hub (h_1) are the same as those of a full size flange of the same type and Pressure Standard, but one nominal pipe size smaller than the size from which the reduction is being made. For Reducing Welding Neck flanges hub dimensions are the same as those of a full size flange of the nominal pipe size (and Pressure Standard) to which the reduction is being made.

Bore:
Reducing Slip-on flanges are bored to the same diameters as full size flanges of the size(and Pressure Standard) to which the reduction is made. Reducing Threaded flanges in the 150 lb. Standard do not require a counterbore. On 300 lb. and higher Pressure Standards depth of counterbore is 1/4" for tappings 2" and smaller and 3/8" for tappings 2 1/2" and larger. Counterbore diameters are the same as for full size flanges of identical tapping.

Minimum Bores:
The smallest sizes to which hubbed flanges can be bored are listed in the above table. For reductions to sizes smaller than listed, BLIND FLANGES are furnished bored or tapped to required nominal pipe size.

Hinweise für Abmessungen

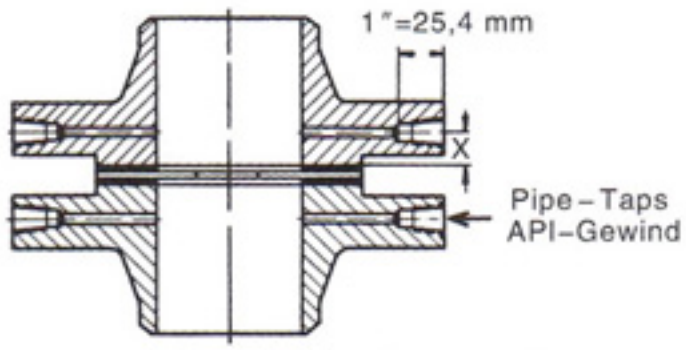
Bestimmung des äußeren Durchmessers, der Stärke, der Flächenbearbeitung und der Bohrung:
Alle diese Abmessungen entsprechen genau denen der Nennweite des normalen Flansches, von dem die Reduktion vorgenommen wird.
Wie bei normalen Flanschen ist die Dichtleiste von 1,6 mm bei 150 lb. und 300 lb. in der Blattstärke bei Reduktionsflanschen enthalten. Die 6,4 mm Dichtleiste für Flansche von 400 lb. und höhere Drücke ist nicht in den Stärken eingeschlossen. Jede andere Art von Flächenbearbeitung kann geliefert werden.

Ansatzdurchmesser und Höhe:
Für Reduktions-Überschieb-und Gewindeflansche sind, ungeachtet der Größe der Reduktion, der Ansatzdurchmesser unten (m) und die Höhe des Ansatzes (h_1) die gleichen, wie die für einen normalen Flansch derselben Type und Druckstufe, jedoch um eine Nennweite kleiner als die Nennweite, von der die Reduktion erfolgen soll.
Für Reduktions-Vorschweißflansche sind die Abmessungen des Ansatzes dieselben, wie die für den normalen Flansch der Nennweite (und Druckstufe), auf die die Reduktion erfolgen soll.

Mittelloch:
Reduktions-Überschiebflansche werden im Mittelloch auf denselben Durchmesser gedreht, wie die normalen Flansche der Nennweite (und Druckstufe), auf die die Reduktion erfolgen soll.
Reduktions-Gewindeflansche der Druckstufe 150 lb. erhalten keine Eindrehung. Bei 300 lb. und höheren Druckstufen ist die Tiefe der Eindrehung 6,4 mm für Gewinde 2" und kleiner und 9,5 mm für Gewinde 2 1/2" und größer. Die Durchmesser der Eindrehung sind dieselben, wie die für die normalen Flansche des entsprechenden Gewindes.

Mindest–Mittellochmaße:
Die kleinsten Maße für das Mittelloch für Flansche mit Ansatz sind in der obigen Tabelle angegeben. Für Reduktionen auf kleinere Maße als in der Liste angeführt, werden Blindflansche geliefert mit einem Mittelloch oder mit einem Gewinde entsprechend der gewünschten Nennweite.

300-2500 lb/sq.in
Orifice Flanges
Meßscheibenflansche



Orifice Flanges are ruled in ASME/ANSI B 16.36.
In various fields (facing, marking etc.) they are in accordance with ASME/ANSI B 16.5.

Meßscheibenflansche sind genormt in ASME/ANSI B 16.36. Sie entsprechen in weiten Teilen (Dichtflächenbearbeitung, Markierung usw.) den Regelungen der ASME/ANSI B 16.5.

sizes:

Threaded Orifice Flange:
300 lbs 1"–8"
Slip-on Orifice Flange:
300 lbs 1"–24"
Welding Neck Orifice Flange:
300 lbs 1"–24"
400 lbs 4"–24"
600 lbs 1"–24"
900 lbs 3"–24"
1500 lbs 1"–24"
2500 lbs 1"–12"

Abmessungen:

Gewindemeßscheibenflansch:
300 lbs 1"–8"
Überschiebmeßscheibenflansch:
300 lbs 1"–24"
Vorschweißmeßscheibenflansch:
300 lbs 1"–24"
400 lbs 4"–24"
600 lbs 1"–24"
900 lbs 3"–24"
1500 lbs 1"–24"
2500 lbs 1"–12"

The minimum flange thickness is 38.1 mm. The overall length of hub increases in the same way as the flange thickness.
Tolerances on all dimensions shall be as shown in ASME/ANSI B 16.5 except for:

Die Mindestblattstärke der Meßscheibenflansche beträgt 38,1 mm. Die Gesamthöhe nimmt im gleichen Maße zu wie die Blattstärke.
Die Toleranzen entsprechen der ASME/ANSI B.16.5 mit Ausnahme von:

1. Pressure tap location:
   Tolerance on location of centre of pressure tap hole from flange faces shall be:
a. flange smaller than 4" ± 0.02"
b. flange 4" and larger ± 0.03"
2. Inside diameter:
   Bore diameter tolerance (welding neck flanges only) is ±0,5% of nominal value.

1. *seitlichen Gewindelöchern:*
   Toleranz Mitte Gewindeloch zur Dichtleiste gemessen im Mittelloch soll sein
a. *Flansch kleiner 4" ± 0,5 mm*
b. *Flansch 4" und größer ± 0,8 mm*
2. *Innendurchmesser:*
   Toleranz des Innendurchmessers (gilt nur für Vorschweißfl.) beträgt ± 0,5 % der Nennabmessung.

Height of RF-Orifice Flanges 600 lbs 1"–3" is 0,06".
Each Orifice Flange is Provided with 2 Pressure tap holes 1/2" NPT, displaced by 180°.
Each hole shall be equipped with a pipe plug.
Tap hole diameters are:

Meßscheibenflansche 600 lbs 1"–3" haben eine Dichtleistenhöhe von 1,5 mm.
Jeder Meßscheibenflansch ist mit 2 seitlichen Gewindelöchern 1/2" NPT versehen.
Diese liegen um 180° versetzt und sind mit Stopfen verschlossen. Die Bohrungsdurchmesser der Durchgangsbohrung betragen:

Orifice Flanges	
1"-2 1/2"	6,4 mm
3"	9,5 mm
4" and larger	12,7 mm

Meßscheibenflansche	
1"-2 1/2"	*6,4 mm*
3"	*9,5 mm*
4" und größer	*12,7 mm*

The distance x from the centre line of the hole to the face is for RF-Flanges 23.8 mm and for all RTJ-Flanges 19.1 mm and shall be measured at the bore. For depth of groove 11.1 mm or larger there are due to insufficient material between groove and pressure tap hole modifications of diameter of hole or type of hole necessary.

Der Lochabstand x beträgt 23,8 mm für alle RF-Flansche und 19,1 mm für RTJ-Flansche und wird im Innendurchmesser gemessen. Ist die Nuttiefe 11,1 mm oder größer, so sind aufgrund von zu wenig Material zwischen Nutgrund und NPT- Bohrung
Änderungen des Durchmessers der Bohrung oder Art der Anbohrung notwendig.

Each Flange shall have a machine bolt mounted in a hole drilled on the flange centre line at 90° from the pressure taps, for use as jackscrew. Machine bolt shall be regular with one heavy hex nut.

Jeder Meßscheibenflansch erhält eine Abdrückschraube mit Sechskant- Mutter in einer zusätzlichen Bohrung, die 90° versetzt von der seitlichen NPT- Bohrung angebracht wird.

The depth of the slot shall admit the nut so that there is no interference with the joining of the flanges when bolted together without orifice plate.

Die Tiefe der Ausfräsung für die Mutter muß so ausgelegt sein, daß keine Behinderung beim Zusammenschrauben der Flansche ohne Meßblende besteht.

Materials for Flanges

Werkstoffe für Flansche

Designation *Bezeichnung*	Tensile strength *Zugfestigkeit*		Yield strength *Streckgrenze*		Impact properties *Kerbschlagarbeit* Average at / *Mittelwert bei*				Chemical composition, weight % *Chemische Zusammensetzung, Massenanteil %*															
ASTM	KSI	N/mm²	KSI	N/mm²	°F	ft. lbf	°C	Joule		C	Si	Mn	P	S	Cr	Mo	Ni	AL	Ti	Cu	V	Nb	N
C21	≥70	≥485	≥36	≥250					min. max.	0, 180 0, 230	0, 150 0, 350	0, 800 1, 350	0, 035	0, 030	0, 300	0, 120	0, 400	0, 015		0, 400	0, 030	0. 020	
A 105-97	Carbon steel for ambient and higher temperature service								– *Kohlenstoffstahl für die Anwendung bei Raum – und höheren Temperaturen*															
A 105	≥70	≥485	≥36	≥250					min. max.	 0, 350	0, 100 0, 350	0, 600 1, 050	 0, 035	 0, 040	 0, 300	 0, 120	 0, 400			0, 400	0, 050	0, 020	
A 181-95b	Carbon steels for general service								– *Kohlenstoffstähle für allgemeine Verwendung*															
Class 60	≥60	≥415	≥30	≥205					min. max.	 0, 350	0, 100 0, 350	 1, 100	 0, 050	 0, 050										
Class 70	≥70	≥485	≥36	≥250					min. max.	 0, 360	0, 100 0, 350	 1, 100	 0, 050	 0, 050										
A182-97c	Low alloy steels for high temperature service								– *Legierte Stähle für die Anwendung bei hohen Temperaturen*															
Grade F1	≥70	≥485	≥40	≥275					min. max.	 0, 280	0, 150 0, 350	0, 600 0. 900	 0, 045	 0, 045		0, 440 0, 650								
Grade F2	≥70	≥485	≥40	≥275					min. max.	0, 050 0, 210	0, 100 0, 600	0, 300 0, 800	 0, 040	 0, 040	0, 500 0, 810	0, 440 0, 650								
Grade F5	≥70	≥485	≥40	≥275					min. max.	 0, 150	 0, 500	0, 300 0, 600	 0, 030	 0, 030	4, 000 6, 000	0, 440 0, 650	0, 500							
Grade F5a	≥90	≥620	≥65	≥450					min. max.	 0, 250	 0, 500	 0, 600	 0, 040	 0, 030	4, 000 6, 000	0, 440 0, 650	 0, 500							
Grade F9	≥85	≥585	≥55	≥380					min. max.	 0, 150	0, 500 1, 000	0, 300 0, 600	 0, 030	 0, 030	8, 000 10, 000	0, 900 1, 100								
Grade F11, Cl. 1	≥60	≥415	≥30	≥205					min. max.	0, 050 0, 150	0, 500 1, 000	0, 300 0, 600	 0, 030	 0, 030	1, 000 1, 500	0, 440 0, 650								
Grade F11, Cl. 2	≥70	≥485	≥40	≥275					min. max.	0, 100 0, 200	0, 500 1, 000	0, 300 0, 800	 0, 040	 0, 040	1, 000 1, 500	0, 440 0, 650								
Grade F11, Cl. 3	≥75	≥515	≥45	≥310					min. max.	0, 100 0, 200	0, 500 1, 000	0, 300 0, 800	 0, 040	 0, 040	1, 000 1, 500	0, 440 0, 650								
Grade F12, Cl. 1	≥60	≥415	≥32	≥220					min. max.	0, 050 0, 150	 0, 500	0, 300 0, 600	 0, 045	 0, 045	0, 800 1, 250	0, 440 0, 650								
Grade F12, Cl. 2	≥70	≥485	≥40	≥275					min. max.	0, 100 0, 200	0, 100 0, 600	0, 300 0, 800	 0, 040	 0, 040	0, 800 1, 250	0, 440 0, 650								

Materials for Flanges — *Werkstoffe für Flansche*

Designation *Bezeichnung*	Tensile strength *Zugfestigkeit*		Yield strength *Streckgrenze*		Impact properties *Kerbschlagarbeit*				Chemical composition, weight % *Chemische Zusammensetzung, Massenanteil %*															
					Average at		*Mittelwert bei*																	
ASTM	KSI	N/mm²	KSI	N/mm²	°F	ft. lbf	°C	Joule		C	Si	Mn	P	S	Cr	Mo	Ni	AL	Ti	Cu	V	Nb	N	
Grade F22, Cl. 1	≥60	≥415	≥30	≥205					min. max.	0, 050 0, 150	0, 500	0, 300 0, 600	0, 040	0, 040	2, 000 2, 500	0, 870 1, 130								
Grade F22, Cl. 3	≥75	≥515	≥45	≥310					min. max.	0, 050 0, 150	0, 500	0, 300 0, 600	0, 040	0, 040	2, 000 2, 500	0, 870 1, 130								
Grade F22V	85-110	585-780	≥60	≥415					min. max.	0, 110 0, 150	0, 100	0, 300 0, 600	0, 015	0, 010	2, 000 2, 500	0, 900 1, 100	0, 250		0, 030	0, 200	0, 250 0, 350	0, 070		1)
Grade F91	≥85	≥585	≥60	≥415					min. max.	0, 080 0, 120	0, 200 0, 500	0, 300 0, 600	0, 020	0, 010	8, 000 9, 500	0, 850 1, 050	0, 400	0, 040			0, 180 0, 250	0, 060 0, 100	0, 030 0, 070	
A 182-97c	Austenitic stainless steels for high temperature service – *Austenitische rostfreie Stähle für die Anwendung bei hohen Temperaturen*																							
Grade F304	≥75	≥515	≥30	≥205					min. max.	0, 080	1, 000	2, 000	0, 045	0, 030	18, 000 20, 000		8, 000 11, 000							
Grade F304H	≥75	≥515	≥30	≥205					min. max.	0, 040 0, 100	1, 000	2, 000	0, 045	0, 030	18, 000 20, 000		8, 000 11, 000							
Grade F304L	≥70	≥485	≥25	≥170					min. max.	0, 035	1, 000	2, 000	0, 045	0, 030	18, 000 20, 000		8, 000 13, 000							
Grade F310	≥75	≥515	≥30	≥205					min. max.	0, 150	1, 000	2, 000	0, 045	0, 030	24, 000 26, 000		19, 000 22, 000							
Grade F316	≥75	≥515	≥30	≥205					min. max.	0, 080	1, 000	2, 000	0, 045	0, 030	16, 000 18, 000	2, 000 3, 000	10, 000 14, 000							
Grade F316H	≥75	≥515	≥30	≥205					min. max.	0, 040 0, 100	1, 000	2, 000	0, 045	0, 030	16, 000 18, 000	2, 000 3, 000	10, 000 14, 000							
Grade F316L	≥70	≥485	≥25	≥170					min. max.	0, 035	1, 000	2, 000	0, 045	0, 030	16, 000 18, 000	2, 000 3, 000	10, 000 15, 000							
Grade F321	≥75	≥515	≥30	≥205					min. max.	0, 080	1, 000	2, 000	0, 045	0, 030	17, 000		9, 000 12, 000		2)					
Grade F321H	≥75	≥515	≥30	≥205					min. max.	0, 040 0, 100	1, 000	2, 000	0, 045	0, 030	17, 000		9, 000 12, 000		3)					
Grade F347	≥75	≥515	≥30	≥205					min. max.	0, 080	1, 000	2, 000	0, 045	0, 030	17, 000 20, 000		9, 000 13, 000					4)		
Grade F347H	≥75	≥515	≥30	≥205					min. max.	0, 040 0, 100	1, 000	2, 000	0, 045	0, 030	17, 000 20, 000		9, 000 13, 000					5)		

Materials for Flanges

Werkstoffe für Flansche

Designation *Bezeichnung*	Tensile strength *Zugfestigkeit*		Yield strength *Streckgrenze*		Impact properties *Kerbschlagarbeit* Average at		*Mittelwert bei*		Chemical composition, weight % *Chemische Zusammensetzung, Massenanteil %*															
ASTM	KSI	N/mm²	KSI	N/mm²	°F	ft. lbf	°C	Joule		C	Si	Mn	P	S	Cr	Mo	Ni	AL	Ti	Cu	V	Nb	N
A 350-97	Carbon and low alloy steels for low temperature service – *Kohlenstoff-und Legierte Stähle für die Anwendung bei tiefen Temperaturen*																							
Grade LF1	60-85	415-585	≥30	≥205	–20	≥13	–28, 9	≥18	min. max.	 0, 350	0, 150 0, 300	0, 600 1, 350	0, 035	0, 040	0, 300	0, 120	0, 400			0, 400	0, 050	0, 020	
Grade LF2, Cl. 1	70-95	485-655	≥36	≥250	–50	≥15	–45, 6	≥20	min. max.	 0, 350	0, 150 0, 300	0, 600 1, 350	0, 035	0, 040	0, 300	0, 120	0, 400			0, 400	0, 050	0, 020	
Grade LF2, Cl. 2	70-95	485-655	≥36	≥250	0	≥20	–18, 0	≥27	min. max.	 0, 350	0, 150 0, 300	0, 600 1, 350	0, 035	0, 040	0, 300	0, 120	0, 400			0, 400	0, 050	0, 020	
Grade LF3	70-95	485-655	≥37, 5	≥260	–150	≥15	–101, 1	≥20	min. max.	 0, 200	0, 200 0, 350	 0, 900	0, 035	0, 040	0, 300	0, 120	3, 300 3, 700			0, 400	0, 030	0, 020	
Grade LF3, Cl. 2	70-95	485-655	≥37, 5	≥260	–150	≥20	–101, 1	≥27	min. max.	 0, 200	0, 200 0, 350	 0, 900	0, 035	0, 040	0, 300	0, 120	3, 300 3, 700			0, 400	0, 030	0, 020	

1) B = 0, 0002 max.
Ca = 0, 0150 max.

2) 5xC% ≤ Ti% ≤ 0, 70%

3) 4xC% ≤ Ti% ≤ 0, 70%

4) 10xC% ≤ Nb ≤ 1, 10%

5) 8xC% ≤ Nb ≤ 1, 10%

Add. required limits concerning the sum of single elements shall be learned from the relevant original ASTM standards.

Zusätzliche Grenzen bzgl. der Summe einzelner Elemente sind den jeweiligen originalen ASTM-Standards zu entnehmen.

CLASS 150 PIPE FLANGES, AND FLANGED FITTINGS

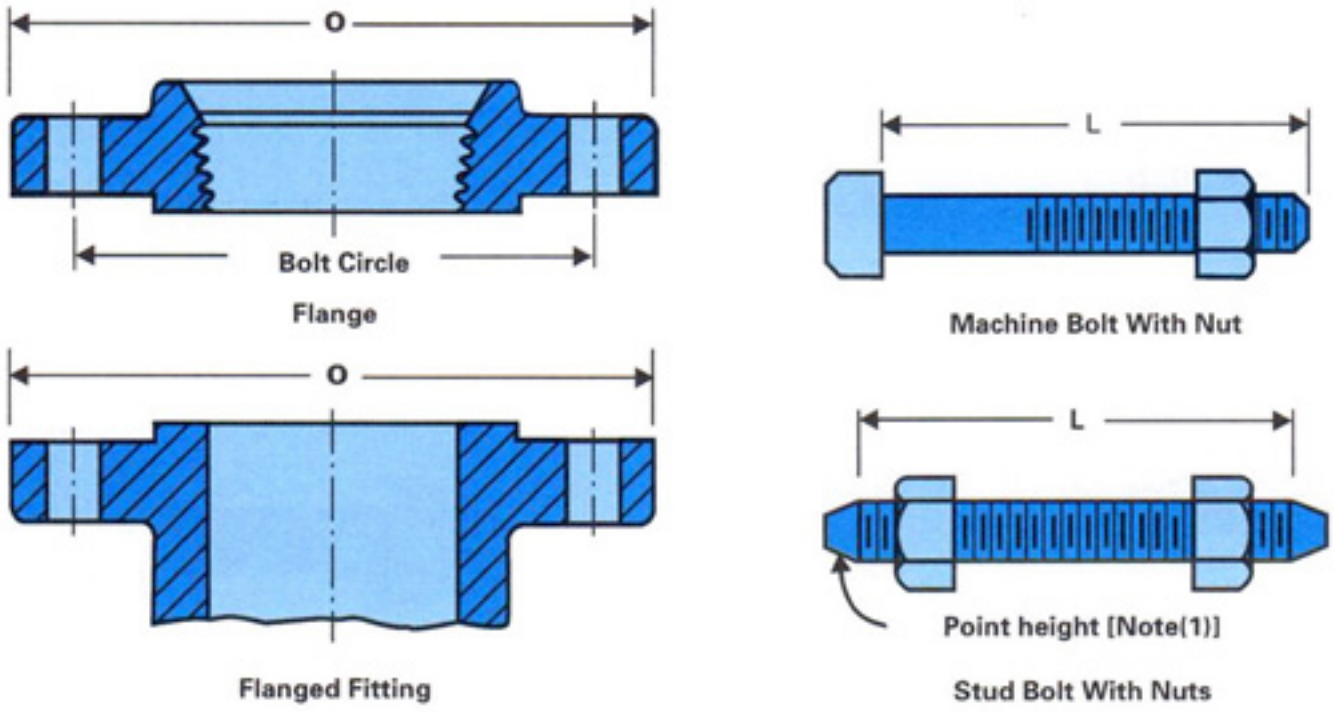


TABLE 8 TEMPLATES FOR DRILLING CLASS 150 FLANGES[2]

1	2	3	4	5	6	7	8	9
		Drilling [(3), (4)]				Length of Bolts (5) L		
						Stud Bolts (1)		Machine Bolts
Nominal Pipe Size	Outside Diameter of Flange O	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	0.06 in. Raised Face	Ring Joint	0.06 in. Raised Face
1/2	3.50	2.38	0.62	4	1/2	2.25	...	2.00
3/4	3.88	2.75	0.62	4	1/2	2.50	...	2.00
1	4.25	3.12	0.62	4	1/2	2.50	3.00	2.25
1 1/4	4.62	3.50	0.62	4	1/2	2.75	3.25	2.25
1 1/2	5.00	3.88	0.62	4	1/2	2.75	3.25	2.50
2	6.00	4.75	0.75	4	5/8	3.25	3.75	2.75
2 1/2	7.00	5.50	0.75	4	5/8	3.50	4.00	3.00
3	7.50	6.00	0.75	4	5/8	3.50	4.00	3.00
3 1/2	8.50	7.00	0.75	8	5/8	3.50	4.00	3.00
4	9.00	7.50	0.75	8	5/8	3.50	4.00	3.00
5	10.00	8.50	0.88	8	3/4	3.75	4.25	3.25
6	11.00	9.50	0.88	8	3/4	4.00	4.50	3.25
8	13.50	11.75	0.88	8	3/4	4.25	4.75	3.50
10	16.00	14.25	1.00	12	7/8	4.50	5.00	4.00
12	19.00	17.00	1.00	12	7/8	4.75	5.25	4.00
14	21.00	18.75	1.12	12	1	5.25	5.75	4.50
16	23.50	21.25	1.12	16	1	5.25	5.75	4.50
18	25.00	22.75	1.25	16	1 1/8	5.75	6.25	5.00
20	27.50	25.00	1.25	20	1 1/8	6.25	6.75	5.50
24	32.00	29.50	1.38	20	1 1/4	6.75	7.25	6.00

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Length of stud bolt does not include the height of the points. See para. 6.10.2.
(2) For other dimensions, see Tables 9 and 10.
(3) For flange bolt holes, see para. 6.5.
(4) For spot facing, see para. 6.6.
(5) Bolt lengths not shown in Table are determined in accordance with Annex F. See para. 6.10.2.

CLASS 300 PIPE FLANGES, AND FLANGED FITTINGS

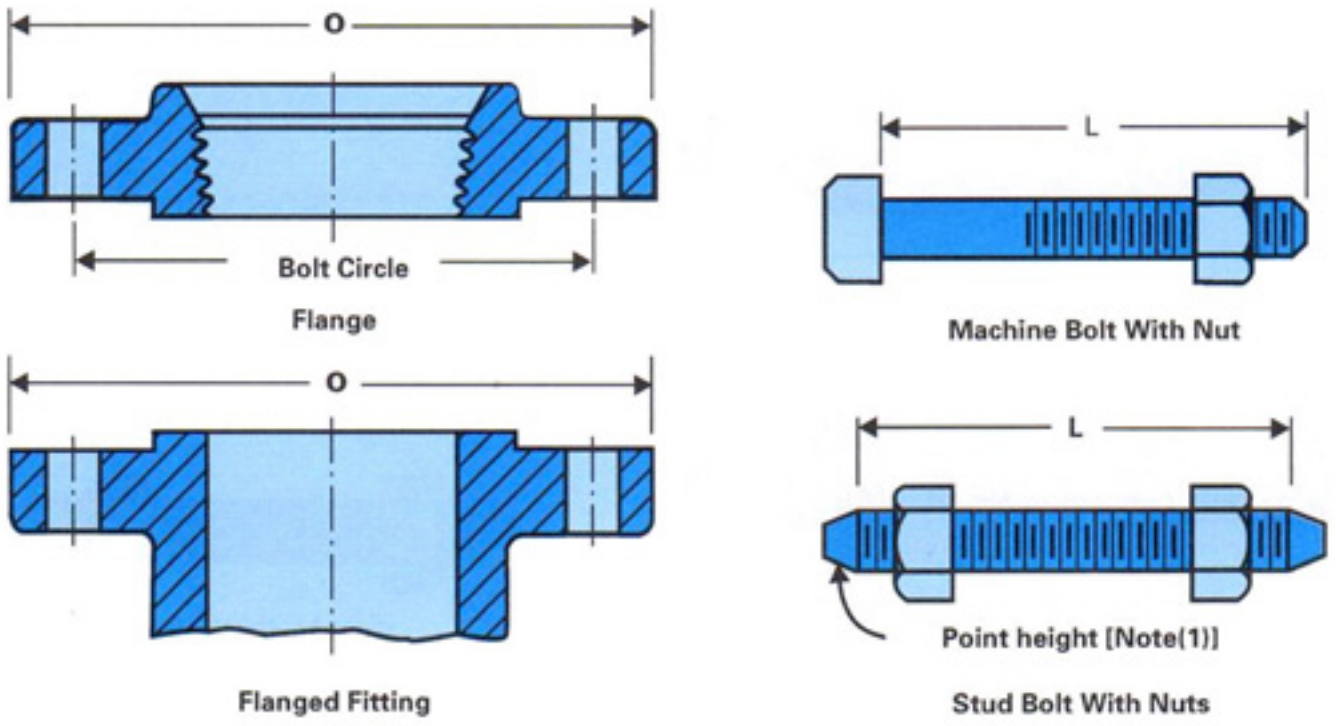


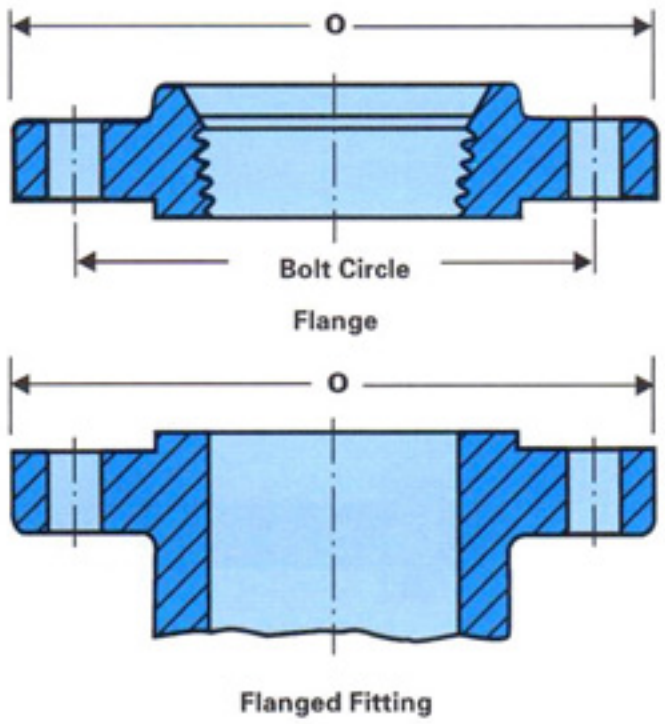
TABLE 11 TEMPLATES FOR DRILLING CLASS 300 FLANGES[2]

1	2	3	4	5	6	7	8	9
		Drilling [(3), (4)]				Length of Bolts (5) L		
						Stud Bolts (1)		Machine Bolts
Nominal Pipe Size	Outside Diameter of Flange O	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	0.06 in. Raised Face	Ring Joint	0.06 in. Raised Face
1/2	3.75	2.62	0.62	4	1/2	2.50	3.00	2.25
3/4	4.62	3.25	0.75	4	5/8	3.00	3.50	2.50
1	4.88	3.50	0.75	4	5/8	3.00	3.50	2.50
1 1/4	5.25	3.88	0.75	4	5/8	3.25	3.75	2.75
1 1/2	6.12	4.50	0.88	4	3/4	3.50	4.00	3.00
2	6.50	5.00	0.75	8	5/8	3.50	4.00	3.00
2 1/2	7.50	5.88	0.88	8	3/4	4.00	4.50	3.25
3	8.25	6.62	0.88	8	3/4	4.25	4.75	3.50
3 1/2	9.00	7.25	0.88	8	3/4	4.25	5.00	3.75
4	10.00	7.88	0.88	8	3/4	4.50	5.00	3.75
5	11.00	9.25	0.88	8	3/4	4.75	5.25	4.25
6	12.50	10.62	0.88	12	3/4	4.75	5.50	4.25
8	15.00	13.00	1.00	12	7/8	5.50	6.00	4.75
10	17.50	15.25	1.12	16	1	6.25	6.75	5.50
12	20.50	17.75	1.25	16	1 1/8	6.75	7.25	5.75
14	23.00	20.25	1.25	20	1 1/8	7.00	7.50	6.25
16	25.50	22.50	1.38	20	1 1/4	7.50	8.00	6.50
18	28.00	24.75	1.38	24	1 1/4	7.75	8.25	6.75
20	30.50	27.00	1.38	24	1 1/4	8.00	8.75	7.25
24	36.00	32.00	1.62	24	1 1/2	9.00	10.00	8.00

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Length of stud bolt does not include the height of the points. See para. 6.10.2.
(2) For other dimensions, see Tables 12 and 13.
(3) For flange bolt holes, see para. 6.5.
(4) For spot facing, see para. 6.6.
(5) Bolt lengths not shown in Table are determined in accordance with Annex F. See para. 6.10.2.

CLASS 400 PIPE FLANGES, AND FLANGED FITTINGS



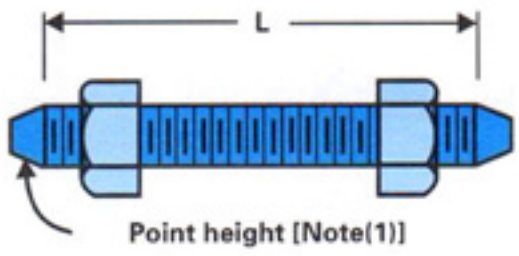


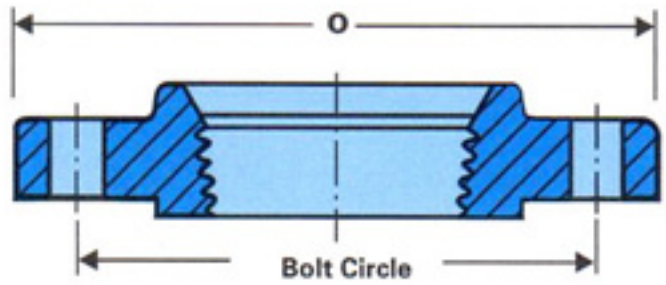
TABLE 14 TEMPLATES FOR DRILLING CLASS 400 FLANGES[2]

1	2	3	4	5	6	7	8	9
		Drilling [(3), (4)]				Length of Stud Bolts [(1), (5)] L		
Nominal Pipe Size	Outside Diameter of Flange O	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	0.25 in. Raised Face	Male and Female; also Tongue and Groove	Ring Joint
1/2 3/4 1 1 1/4 1 1/2 2 2 1/2 3 3 1/2	Use Class 600 dimensions in these sizes.							
4	10.00	7.88	1.00	8	7/8	5.50	5.25	5.50
5	11.00	9.25	1.00	8	7/8	5.75	5.50	5.75
6	12.50	10.62	1.00	12	7/8	6.00	5.75	6.00
8	15.00	13.00	1.12	12	1	6.75	6.50	6.75
10	17.50	15.25	1.25	16	1 1/8	7.50	7.25	7.50
12	20.50	17.75	1.38	16	1 1/4	8.00	7.75	8.00
14	23.00	20.25	1.38	20	1 1/4	8.25	8.00	8.25
16	25.50	22.50	1.50	20	1 3/8	8.75	8.50	8.75
18	28.00	24.75	1.50	24	1 3/8	9.00	8.75	9.00
20	30.50	27.00	1.62	24	1 1/2	9.50	9.25	9.75
24	36.00	32.00	1.88	24	1 3/4	10.50	10.25	11.00

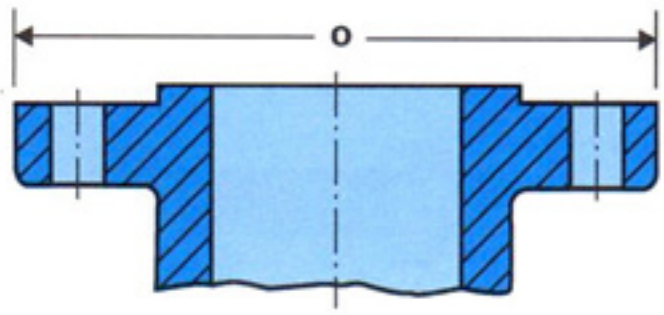
GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Length of stud bolt does not include the height of the points. See para. 6.10.2.
(2) For other dimensions, see Tables 15 and 16.
(3) For flange bolt holes, see para. 6.5.
(4) For spot facing, see para. 6.6.
(5) Bolt lengths not shown in Table are determined in accordance with Annex F. See para. 6.10.2.

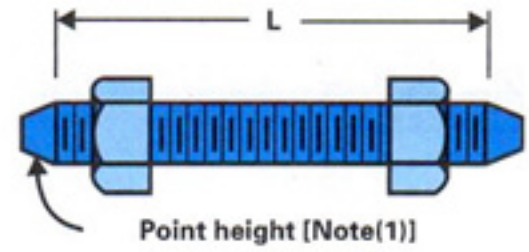
CLASS 600 PIPE FLANGES, AND FLANGED FITTINGS



Flange



Flanged Fitting



Stud Bolt With Nuts

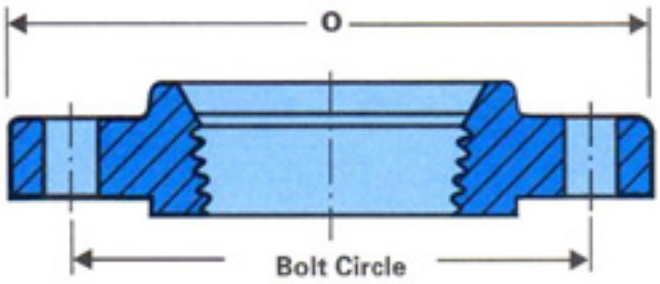
TABLE 17 TEMPLATES FOR DRILLING CLASS 600 FLANGES[2]

1	2	3	4	5	6	7	8	9
		Drilling [(3), (4)]				Length of Stud Bolts [(1), (5)] L		
Nominal Pipe Size	Outside Diameter of Flange O	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	0.25 in. Raised Face	Male and Female; also Tongue and Groove	Ring Joint
1/2	3.75	2.62	0.62	4	1/2	3.00	2.75	3.00
3/4	4.62	3.25	0.75	4	5/8	3.50	3.25	3.50
1	4.88	3.50	0.75	4	5/8	3.50	3.25	3.50
1 1/4	5.25	3.88	0.75	4	5/8	3.75	3.50	3.75
1 1/2	6.12	4.50	0.88	4	3/4	4.25	4.00	4.25
2	6.50	5.00	0.75	8	5/8	4.25	4.00	4.25
2 1/2	7.50	5.88	0.88	8	3/4	4.75	4.50	4.75
3	8.25	6.62	0.88	8	3/4	5.00	4.75	5.00
3 1/2	9.00	7.25	1.00	8	7/8	5.50	5.25	5.50
4	10.75	8.50	1.00	8	7/8	5.75	5.50	5.75
5	13.00	10.50	1.12	8	1	6.50	6.25	6.50
6	14.00	11.50	1.12	12	1	6.75	6.50	6.75
8	16.50	13.75	1.25	12	1 1/8	7.50	7.25	7.75
10	20.00	17.00	1.38	16	1 1/4	8.50	8.25	8.50
12	22.00	19.25	1.38	20	1 1/4	8.75	8.50	8.75
14	23.75	20.75	1.50	20	1 3/8	9.25	9.00	9.25
16	27.00	23.75	1.62	20	1 1/2	10.00	9.75	10.00
18	29.25	25.75	1.75	20	1 5/8	10.75	10.50	10.75
20	32.00	28.50	1.75	24	1 5/8	11.25	11.00	11.50
24	37.00	33.00	2.00	24	1 7/8	13.00	12.75	13.25

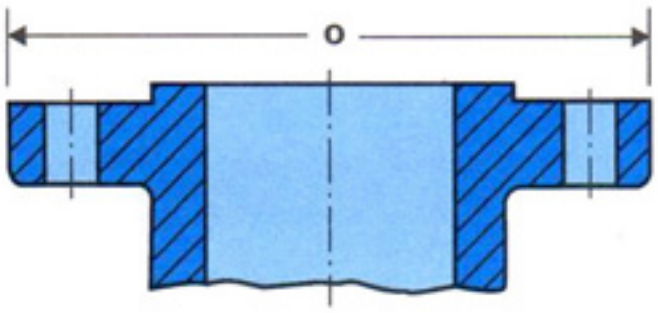
GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Length of stud bolt does not include the height of the points. See para. 6.10.2.
(2) For other dimensions, see Tables 18 and 19.
(3) For flange bolt holes, see para. 6.5.
(4) For spot facing, see para. 6.6.
(5) Bolt lengths not shown in Table are determined in accordance with Annex F. See para. 6.10.2.

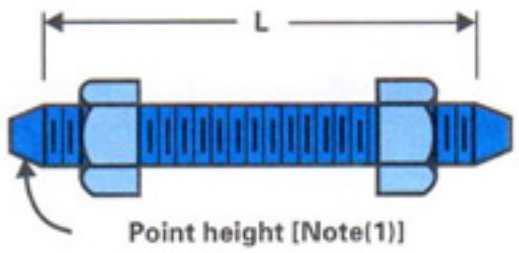
CLASS 900 PIPE FLANGES, AND FLANGED FITTINGS



Flange



Flanged Fitting



Stud Bolt With Nuts

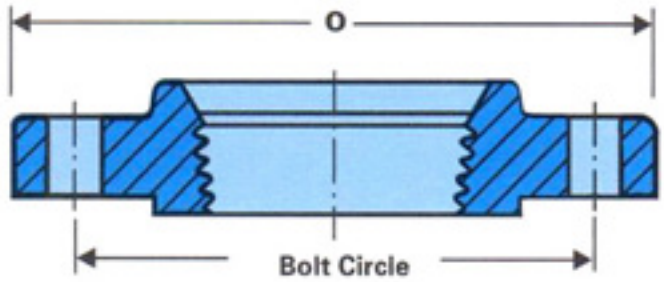
TABLE 20 TEMPLATES FOR DRILLING CLASS 900 FLANGES[2]

1	2	3	4	5	6	7	8	9
Nominal Pipe Size	Outside Diameter of Flange O	Drilling [(3), (4)]				Length of Stud Bolts [(1), (5)] L		
		Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	0.25 in. Raised Face	Male and Female; also Tongue and Groove	Ring Joint
1/2 3/4 1 1 1/4 1 1/2 2 2 1/2	Use Class 1500 dimensions in these sizes.							
3	9.50	7.50	1.00	8	7/8	5.75	5.50	5.75
4	11.50	9.25	1.25	8	1 1/8	6.75	6.50	6.75
5	13.75	11.00	1.38	8	1 1/4	7.50	7.25	7.50
6	15.00	12.50	1.25	12	1 1/8	7.50	7.25	7.75
8	18.50	15.50	1.50	12	1 3/8	8.75	8.50	8.75
10	21.50	18.50	1.50	16	1 3/8	9.25	9.00	9.25
12	24.00	21.00	1.50	20	1 3/8	10.00	9.75	10.00
14	25.25	22.00	1.62	20	1 1/2	10.75	10.50	11.00
16	27.75	24.25	1.75	20	1 5/8	11.25	11.00	11.50
18	31.00	27.00	2.00	20	1 7/8	12.75	12.50	13.25
20	33.75	29.50	2.12	20	2	13.75	13.50	14.25
24	41.00	35.50	2.62	20	2 1/2	17.25	17.00	18.00

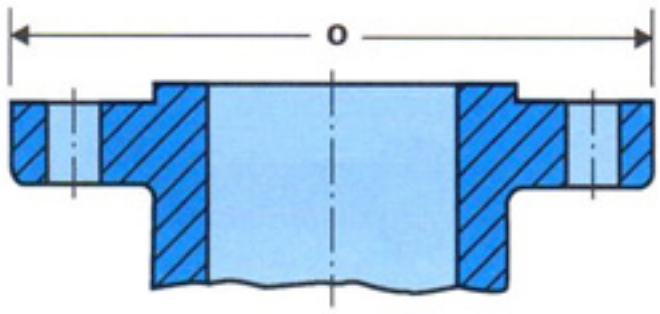
GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Length of stud bolt does not include the height of the points. See para. 6.10.2.
(2) For other dimensions, see Tables 21 and 22.
(3) For flange bolt holes, see para. 6.5.
(4) For spot facing, see para. 6.6.
(5) Bolt lengths not shown in Table are determined in accordance with Annex F. See para. 6.10.2.

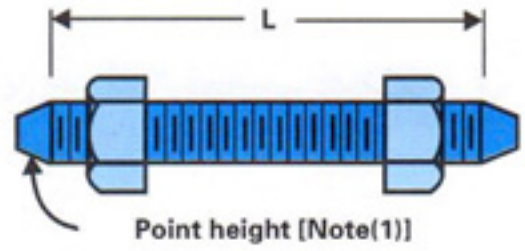
CLASS 1500 PIPE FLANGES, AND FLANGED FITTINGS



Flange



Flanged Fitting



Stud Bolt With Nuts

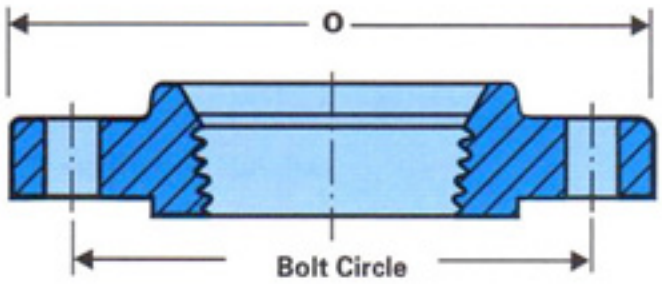
TABLE 23 TEMPLATES FOR DRILLING CLASS 1500 FLANGES[2]

1	2	3	4	5	6	7	8	9
		Drilling [(3), (4)]				Length of Stud Bolts [(1), (5)] L		
Nominal Pipe Size	Outside Diameter of Flange O	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	0.25 in. Raised Face	Male and Female; also Tongue and Groove	Ring Joint
1/2	4.75	3.25	0.88	4	3/4	4.25	4.00	4.25
3/4	5.12	3.50	0.88	4	3/4	4.50	4.25	4.50
1	5.88	4.00	1.00	4	7/8	5.00	4.75	5.00
1 1/4	6.25	4.38	1.00	4	7/8	5.00	4.75	5.00
1 1/2	7.00	4.88	1.12	4	1	5.50	5.25	5.50
2	8.50	6.50	1.00	8	7/8	5.75	5.50	5.75
2 1/2	9.62	7.50	1.12	8	1	6.25	6.00	6.25
3	10.50	8.00	1.25	8	1 1/8	7.00	6.75	7.00
4	12.25	9.50	1.38	8	1 1/4	7.75	7.50	7.75
5	14.75	11.50	1.62	8	1 1/2	9.75	9.50	9.75
6	15.50	12.50	1.50	12	1 3/8	10.25	10.00	10.50
8	19.00	15.50	1.75	12	1 5/8	11.50	11.25	12.75
10	23.00	19.00	2.00	12	1 7/8	13.25	13.00	13.50
12	26.50	22.50	2.12	16	2	14.75	14.50	15.25
14	29.50	25.00	2.38	16	2 1/4	16.00	15.75	16.75
16	32.50	27.75	2.62	16	2 1/2	17.50	17.25	18.50
18	36.00	30.50	2.88	16	2 3/4	19.50	19.25	20.75
20	38.75	32.75	3.12	16	3	21.25	21.00	22.25
24	46.00	39.00	3.62	16	3 1/2	24.25	24.00	25.50

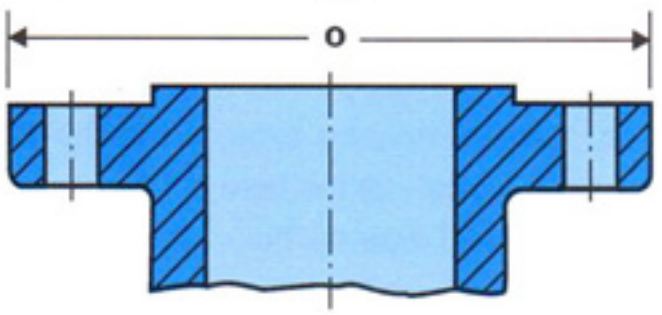
GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Length of stud bolt does not include the height of the points. See para. 6.10.2.
(2) For other dimensions, see Tables 24 and 25.
(3) For flange bolt holes, see para. 6.5.
(4) For spot facing, see para. 6.6.
(5) Bolt lengths not shown in Table are determined in accordance with Annex F. See para. 6.10.2.

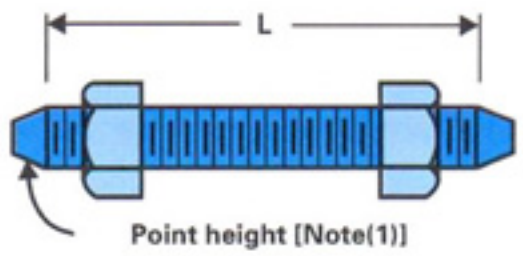
CLASS 2500 PIPE FLANGES, AND FLANGED FITTINGS



Flange



Flanged Fitting



Stud Bolt With Nuts

TABLE 26 TEMPLATES FOR DRILLING CLASS 2500 FLANGES[2]

1	2	3	4	5	6	7	8	9
		Drilling [(3), (4)]				Length Stud Bolts [(1), (5)] L		
Nominal Pipe Size	Outside Diameter of Flange O	Diameter of Bolt Circle	Diameter of Bolt Holes	Number of Bolts	Diameter of Bolts	0.25 in. Raised Face	Male and Female; also Tongue and Groove	Ring Joint
1/2	5.25	3.50	0.88	4	3/4	4.75	4.50	4.75
3/4	5.50	3.75	0.88	4	3/4	5.00	4.75	5.00
1	6.25	4.25	1.00	4	7/8	5.50	5.25	5.50
1 1/4	7.25	5.12	1.12	4	1	6.00	5.75	6.00
1 1/2	8.00	5.75	1.25	4	1 1/8	6.75	6.50	6.75
2	9.25	6.75	1.12	8	1	7.00	6.75	7.00
2 1/2	10.50	7.75	1.25	8	1 1/8	7.75	7.50	8.00
3	12.00	9.00	1.38	8	1 1/4	8.75	8.50	9.00
4	14.00	10.75	1.62	8	1 1/2	10.00	9.75	10.25
5	16.50	12.75	1.88	8	1 3/4	11.75	11.50	12.25
6	19.00	14.50	2.12	8	2	13.50	13.25	14.00
8	21.75	17.25	2.12	12	2	15.00	14.75	15.50
10	26.50	21.25	2.62	12	2 1/2	19.25	19.00	20.00
12	30.00	24.38	2.88	12	2 3/4	21.25	21.00	22.00

GENERAL NOTE: Dimensions are in inches.

NOTES:
(1) Length of stud bolt does not include the height of the points. See para. 6.10.2.
(2) For other dimensions, see Tables 27 and 28.
(3) For flange bolt holes, see para. 6.5.
(4) For spot facing, see para. 6.6.
(5) Bolt lengths not shown in Table are determined in accordance with Annex F. See para. 6.10.2.

ANNEX E
LIMITING DIMENSIONS OF GASKETS
Other than Ring Joint

(This Annex is an integral part of ASME/ANSI B16.5-1988 and is placed after the main text for convenience.)

E1 SCOPE

This Annex covers gasket characteristics.

E2 GASKET MATERIALS AND CONSTRUCTION

Classification of gasket materials and types is shown in Fig. E1. Other gaskets, which result in no increase in both loads or flange moment over those resulting from the gaskets included in the respective groups in this Appendix, may be used and warrant the ratings of this Standard with the limiting dimensions of the applicable group. See also para. 5.4 for application of gaskets.

E3 GASKET DIMENSIONS

(*a*) The actual dimensions of a gasket must be established by the user. Reference to a dimensional standard for gaskets, such as ANSI B16.21, is recommended. In any case, selected dimensions should be based on the type of gasket and its characteristics. These characteristics include its density, flexibility, resistance to the fluid and its temperature, and the necessity for satisfactorily compressing the gasket on its inside diameter, its outside diameter, or both. Also to be considered is the question of allowing a "pocket" at the gasket inside diameter (between the flange facings), or of allowing any intrusion of the gasket into the flange bore. Consideration should be given to the service fluid as well as to the possibility of damage which might result from partially disintegrated gaskets.

(*b*) Limiting gasket dimensions are given in Tables E1, E2, and E3. These dimensions represent approximately the maximum combinations of widths and diameters of the different types of gaskets covered which meet rating requirements. Variations which tend to reduce bolt loads and flange moments (e.g., reducing the gasket width) may be made; however, in departing from the tabulated dimensions, consideration should be given to the stability of the gasket under high bolt loads. As a general rule, the area of unconfined nonmetallic gaskets should not be less than the total bolt area.

(*c*) Gaskets are divided into three groups based on their gasket loading factors as shown in the ASME Boiler and Pressure Vessel Code, Section \Ⅷ, Division 1, Pressure Vessels.

(*d*) Gasket contact widths for the three groups are as follows:

Group No. Ⅰ Slip-on flange raised face width

Group No. Ⅱ Large tongue width

Group No. Ⅲ Small tongue width minus 0.03 in., but not less than 0.18 in.

(*e*) Gaskets of Group No. Ⅰ have inside diameters equal to the outside diameter of the corresponding pipe, which follows the principle established in ANSI B16.21. In order to avoid pocketing of fluid handled, Group No. Ⅰ gaskets may be extended to the inside diameter of valves, pipe, or the bore of integral, welding neck, or socket weld type flanges. Group No. Ⅰ gaskets have outside contact diameters equal to the outside diameter of the raised face.

(*f*) Gaskets of Group Nos. Ⅱa and Ⅲa also have inside diameters equal to the outside diameter of the corresponding pipe. It may be desirable under some conditions to make the inside diameter of these gaskets equal to the inside diameter of valves, pipe, or the bore of integral, welding neck, or socket weld type flanges, and this is permissible provided the gasket contact width does not exceed that shown. This provision affects gaskets shown in Figs. E4, E5, E8, and E9 and requires a reduction in gasket outside diameters as well as inside diameters.

Additional provisions for varying gasket widths in contact with raised face are covered in para. E3 (b). Group Nos. Ⅱb and Ⅲb have outside contact diameters equal to the outside diameter of the raised face.

(*g*) The outside diameter of gaskets or centering rings extending beyond the raised face is equal to the bolt circle minus one bolt diameter. This type gasket is designed to be aligned by the flange bolts.

(*h*) Group Nos. Ⅱa and Ⅲa gaskets are designed for those users who prefer that narrow gaskets be located close to the bore, thereby keeping the pressure area to a minimum and giving maximum flexibility to the flanged joint. See para. E3(f). Group Nos. Ⅱb and Ⅲb gaskets are to be located at the outside of the raised face for ease in aligning the gaskets without a centering ring.

(*i*) Group No. Ⅰ gaskets with edges extending to the bolts (see Fig. E3) are dimensionally the same as the corresponding flat ring gaskets given in ANSI B16.21. See para E3(c).

E4 TOLERANCES

Gasket contact widths for Group Nos. Ⅱ and Ⅲ shall not exceed specified contact width by more than 10%.

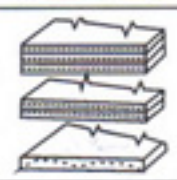
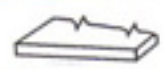
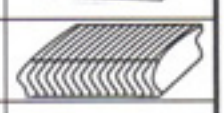
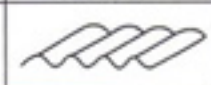
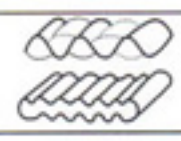
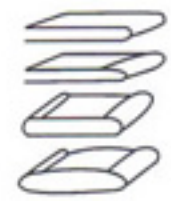
Gasket Group Number	Gasket Material		Gasket Factor m	Minimum Design Seating Stress y, psi	Sketches
Ia	Self-energizing types: O rings, metallic, elastomer, other gasket types considered as self-sealing		0	0	–
	Elastomer without fabric or a high percentage of asbestos fiber: Below 75 Shore durometer 75 or higher Shore durometer		 0.50 1.00	 0 200	
	Compressed sheet suitable for the operating conditions	0.12 in. thick 0.06 in. thick	2.00 2.75	1,600 3,700	
	Elastomer with cotton fabric insertion		1.25	400	
	Elastomer with asbestos fabric insertion, with or without wire reinforcement	3 ply 2 ply 1 ply	2.25 2.50 2.75	2,200 2,900 3,700	
	Vegetable fiber		1.75	1,100	
Ib	Spiral-wound metal, with asbestos or other nonmetallic filler	Carbon steel Stainless steel or Monel	2.50 3.00	10,000 10,000	
	Corrugated metal or corrugated metal double jacketed with nonmetallic filler	Soft aluminum Soft copper or brass Iron or soft steel	2.50 2.75 3.00	2,900 3,700 4,500	
	Corrugated metal	Soft aluminum Soft copper or brass	2.75 3.00	3,700 4,500	
IIa and IIb	Compressed sheet suitable for the operating conditions	0.03 in. thick	3.50	6,500	
	Corrugated metal or corrugated metal double jacketed with nonmetallic filler	Monel or 4% – 6% chrome Stainless steels	3.25 3.50	5,500 6,500	
	Corrugated metal	Iron or soft steel Monel or 4% – 6% chrome Stainless steels	3.25 3.50 3.75	5,500 6,500 7,600	
	Flat metal jacketed with nonmetallic filler	Soft aluminum Soft copper or brass Iron or soft steel Monel 4% – 6% chrome Stainless steels	3.25 3.50 3.75 3.50 3.75 3.75	5,500 6,500 7,600 8,000 9,000 9,000	
	Grooved metal	Soft aluminum Soft copper or brass Iron or soft steel Monel or 4% – 6% chrome Stainless steels	3.25 3.50 3.75 3.75 4.25	5,500 6,500 7,600 9,000 10,100	
	Solid flat metal	Soft aluminum	4.00	8,800	
IIIa and IIIb	Solid flat metal	Soft copper or brass Iron or soft stell Monel or 4% – 6% chrome Stainless steels	4.75 5.50 6.00 6.50	13,000 18,000 21,800 26,000	
	Ring joint	Iron or soft steel Monel or 4% – 6% Chrome Stainless steels	5.50 6.00 6.50	18,000 21,800 26,000	

FIG.E1 GASKET MATERIALS AND CONSTRUCTION

Based upon the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1.

The details given in this Table are suggested only and are not mandatory.

TABLE E1 GROUP NOS. Ia AND Ib GASKETS

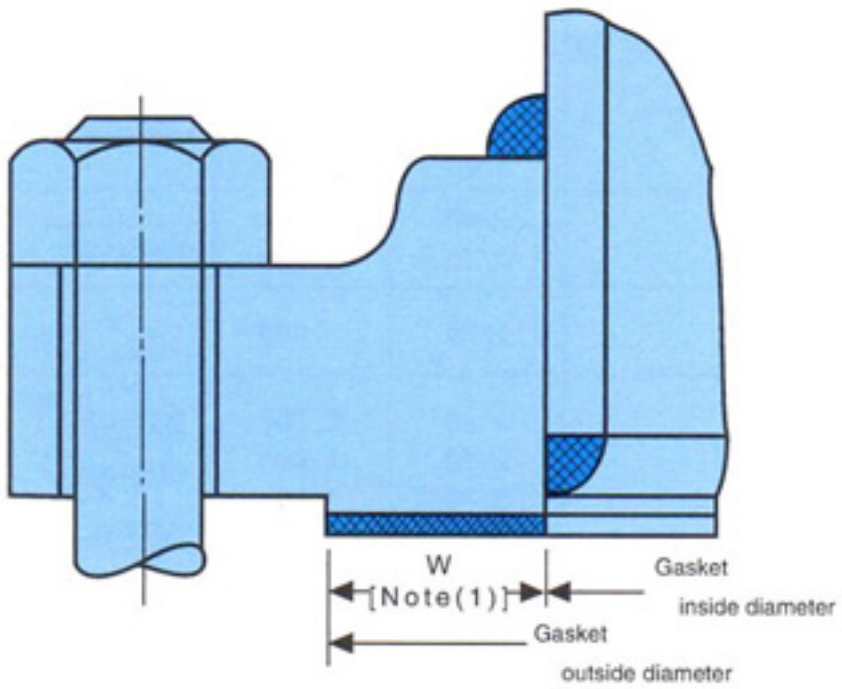


FIG. E2[3]

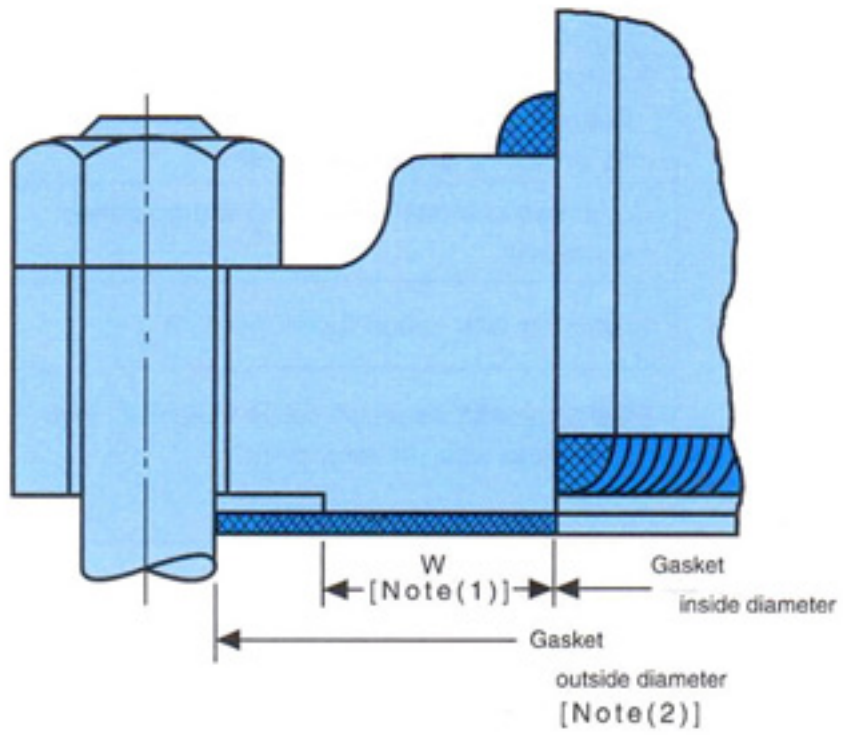


FIG. E3[3]

Nominal Size	Gasket Contact Width (1) W	Fig. E2		Fig. E3						
		Inside Diameter	Outside Diameter	Inside Diameter	Outside Diameter (2)					
					150	300	400	600	900	1500	2500
1/2	0.27	0.84	1.38	0.84	1.88	2.12	2.12	2.12	2.50	2.50	2.75
3/4	0.31	1.06	1.69	1.06	2.25	2.62	2.62	2.62	2.75	2.75	3.00
1	0.34	1.31	2.00	1.31	2.62	2.88	2.88	2.88	3.12	3.12	3.38
1 1/4	0.42	1.66	2.50	1.66	3.00	3.25	3.25	3.25	3.50	3.50	4.12
1 1/2	0.48	1.91	2.88	1.91	3.38	3.75	3.75	3.75	3.88	3.88	4.62
2	0.62	2.38	3.62	2.38	4.12	4.38	4.38	4.38	5.62	5.62	5.75
2 1/2	0.62	2.88	4.12	2.88	4.88	5.12	5.12	5.12	6.50	6.50	6.62
3	0.75	3.50	5.00	3.50	5.38	5.88	5.88	5.88	6.62	6.88	7.75
3 1/2	0.75	4.00	5.50	4.00	6.38	6.50	6.38	6.38	...	...	...
4	0.84	4.50	6.19	4.50	6.88	7.12	7.00	7.62	8.12	8.25	9.25
5	0.88	5.56	7.31	5.56	7.75	8.50	8.38	9.50	9.75	10.00	11.00
6	0.94	6.62	8.50	6.62	8.75	9.88	9.75	10.50	11.38	11.12	12.50
8	1.00	8.62	10.62	8.62	11.00	12.12	12.00	12.62	14.12	13.88	15.25
10	1.00	10.75	12.75	10.75	13.38	14.25	14.12	15.75	17.12	17.12	18.75
12	1.12	12.75	15.00	12.75	16.12	16.62	16.50	18.00	19.62	20.50	21.62
14	1.12	14.00	16.25	14.00	17.75	19.12	19.00	19.38	20.50	22.75	...
16	1.25	16.00	18.50	16.00	20.25	21.25	21.12	22.25	22.62	25.25	...
18	1.50	18.00	21.00	18.00	21.62	23.50	23.38	24.12	25.12	27.75	...
20	1.50	20.00	23.00	20.00	23.88	25.75	25.50	26.88	27.50	29.75	...
24	1.62	24.00	27.25	24.00	28.25	30.50	30.25	31.12	33.00	35.50	...

GENERAL NOTE: Dimensions are in inches.

NOTES:

(1) Applies to both Figs. E2 and E3. Gasket diameters may be varied. In no case, however, should the area of unconfined nonmetallic gaskets be less than that of the bolt. See para. E3(b).

(2) Gasket outside diameter may be extended, or an attached centering service may be used. The outside diameter of extended metallic gaskets or of any centering ring may be 0.12 in. less than specified.

(3) Slip–on type flange is shown for illustration purposes only. Gaskets may be used with other types of flange. See para. E3 (e).

TABLE E2A GROUP NO. IIa GASKETS

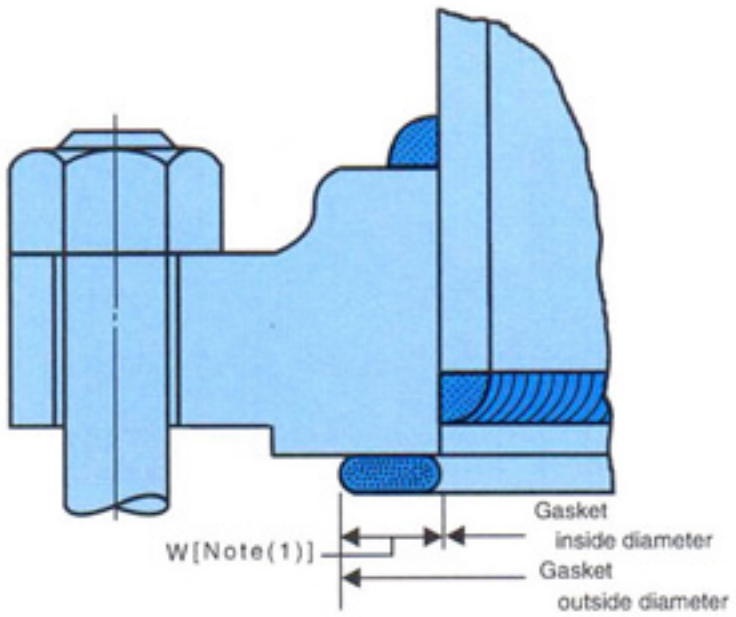


FIG. E4[3]

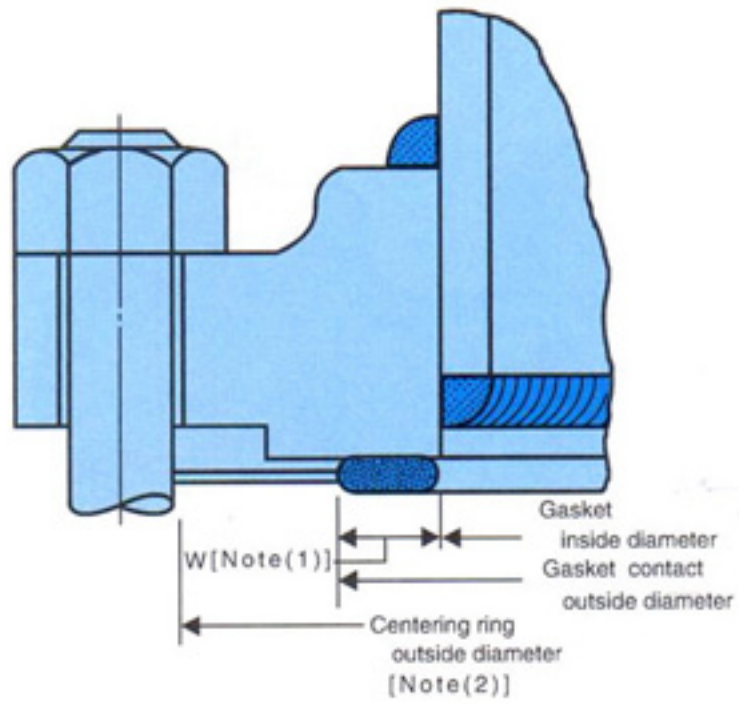


FIG. E5[3]

Nominal Size	Gasket Contact Width (1) W	Fig. E4		Fig. E5								
		Inside Diameter	Outside Diameter	Inside Diameter	Gasket Contact Outside Diameter	Centering Ring Outside Diameter (2)						
						150	300	400	600	900	1500	2500
1/2	0.19	0.84	1.22	0.84	1.22	1.88	2.12	2.12	2.12	2.50	2.50	2.75
3/4	0.19	1.06	1.44	1.06	1.44	2.25	2.62	2.62	2.62	2.75	2.75	3.00
1	0.25	1.31	1.81	1.31	1.81	2.62	2.88	2.88	2.88	3.12	3.12	3.38
1 1/4	0.31	1.66	2.28	1.66	2.28	3.00	3.25	3.25	3.25	3.50	3.50	4.12
1 1/2	0.38	1.91	2.66	1.91	2.66	3.38	3.75	3.75	3.75	3.88	3.88	4.62
2	0.38	2.38	3.12	2.38	3.12	4.12	4.38	4.38	4.38	5.62	5.62	5.75
2 1/2	0.38	2.88	3.62	2.83	3.62	4.88	5.12	5.12	5.12	6.50	6.50	6.62
3	0.38	3.50	4.25	3.50	4.25	5.38	5.88	5.88	5.83	6.62	6.88	7.75
3 1/2	0.38	4.00	4.75	4.00	4.75	6.38	6.50	6.38	6.38	...	...	...
4	0.50	4.50	5.50	4.50	5.50	6.88	7.12	7.00	7.62	8.12	8.25	9.25
5	0.50	5.56	6.56	5.56	6.56	7.75	8.50	8.38	9.50	9.75	10.00	11.00
6	0.50	6.62	7.62	6.62	7.62	8.75	9.88	9.75	10.50	11.38	11.12	12.50
8	0.62	8.62	9.88	8.62	9.88	11.00	12.12	12.00	12.62	14.12	13.88	15.25
10	0.75	10.75	12.25	10.75	12.25	13.38	14.25	14.12	15.75	17.12	17.12	18.75
12	0.75	12.75	14.25	12.75	14.25	16.12	16.62	16.50	18.00	19.62	20.50	21.62
14	0.75	14.00	15.50	14.00	15.50	17.75	19.12	19.00	19.38	20.50	22.75	...
16	0.88	16.00	17.75	16.00	17.75	20.25	21.25	21.12	22.25	22.62	25.25	...
18	0.88	18.00	19.75	18.00	19.75	21.62	23.50	23.38	24.12	25.12	27.75	...
20	1.00	20.00	22.00	20.00	22.00	23.88	25.75	25.50	26.88	27.50	29.75	...
24	1.00	24.00	26.00	24.00	26.00	28.25	30.50	30.25	31.12	33.00	35.50	...

GENERAL NOTE: Dimensions are in inches.

NOTES:

(1) Applies to both Figs. E4 and E5. Gasket diameters may be varied, provided the gasket contact width does not exceed that shown, subject to tolerances in para. E4. See para. E3(d).

(2) Metallic gaskets may have attached centering device. The outside diameter of any centering ring may be 0.12 in. less than specified.

(3) Slip-on type flange is shown for illustration purposes only. Gaskets may be used with other types of flange. See para. E3 (f).

TABLE E2B GROUP NO. & IIb GASKETS

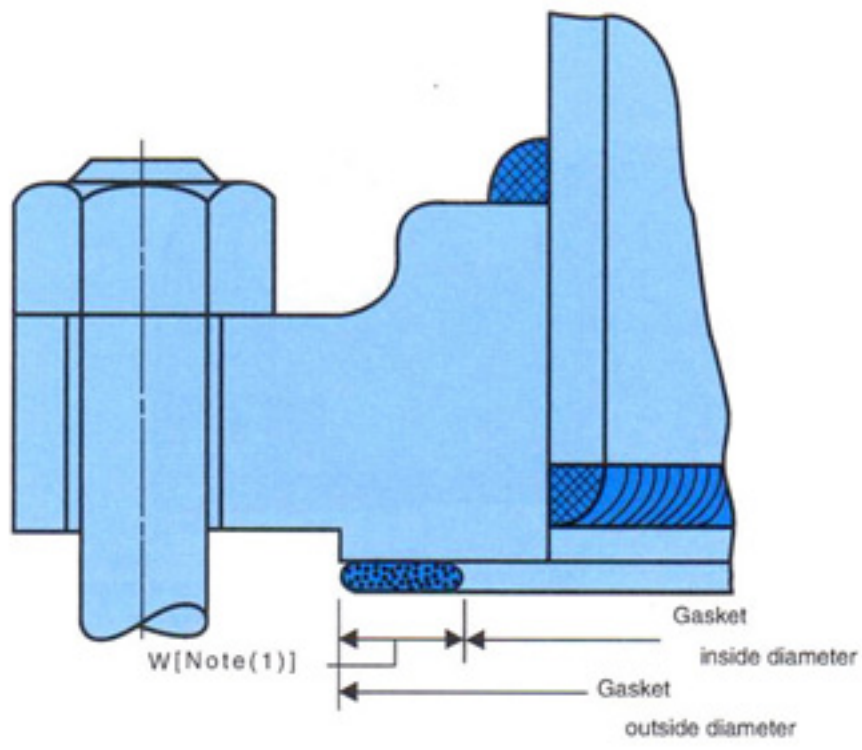


FIG. E6[3]

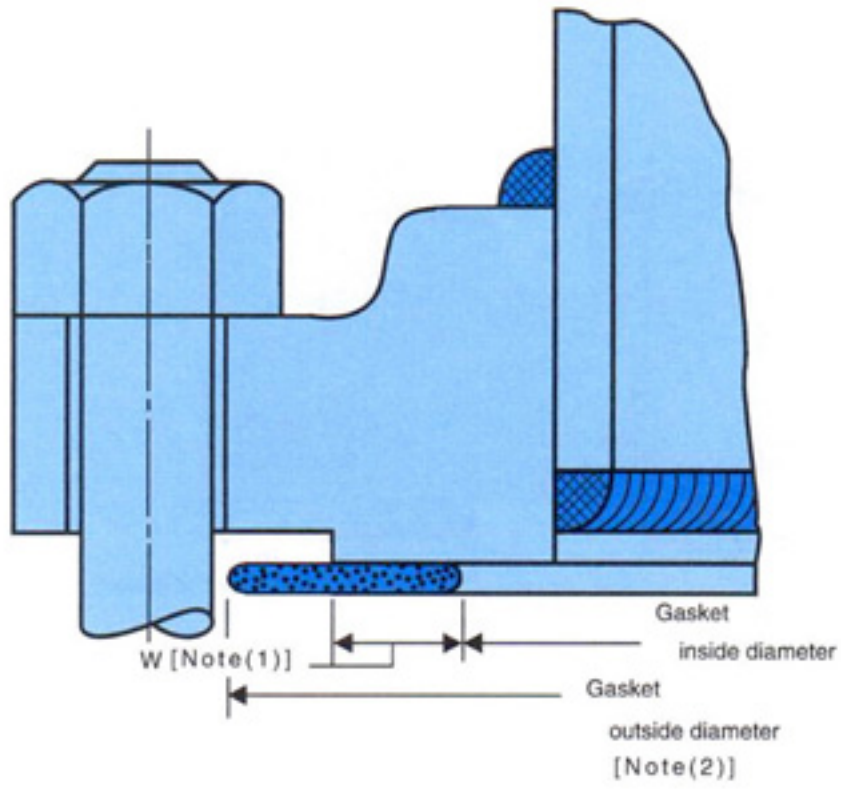


FIG. E7[3]

Nominal Size	Gasket Contact Width (1) W	Fig. E6		Fig. E7							
		Inside Diameter	Outside Diameter	Inside Diameter	Outside Diameter (2)						
					150	300	400	600	900	1500	2500
1/2	0.19	1.00	1.38	1.00	1.88	2.12	2.12	2.12	2.50	2.50	2.75
3/4	0.19	1.31	1.69	1.31	2.25	2.62	2.62	2.62	2.75	2.75	3.00
1	0.25	1.50	2.00	1.50	2.62	2.88	2.88	2.88	3.12	3.12	3.38
1 1/4	0.31	1.88	2.50	1.88	3.00	3.25	3.25	3.25	3.50	3.50	4.12
1 1/2	0.38	2.12	2.88	2.12	3.38	3.75	3.75	3.75	3.88	3.88	4.62
2	0.38	2.88	3.62	2.88	4.12	4.38	4.38	4.38	5.62	5.62	5.75
2 1/2	0.38	3.38	4.12	3.38	4.88	5.12	5.12	5.12	6.50	6.50	6.62
3	0.38	4.25	5.00	4.25	5.38	5.88	5.88	5.88	6.62	6.88	7.75
3 1/2	0.38	4.75	5.50	4.75	6.38	6.50	6.38	6.38	...	...	...
4	0.50	5.19	6.19	5.19	6.88	7.12	7.00	7.62	8.12	8.25	9.25
5	0.50	6.31	7.31	6.31	7.75	8.50	8.38	9.50	9.75	10.00	11.00
6	0.50	7.50	8.50	7.50	8.75	9.88	9.75	10.50	11.38	11.12	12.50
8	0.62	9.38	10.62	9.38	11.00	12.12	12.00	12.62	14.12	13.88	15.25
10	0.75	11.25	12.75	11.25	13.38	14.25	14.12	15.75	17.12	17.12	18.75
12	0.75	13.50	15.00	13.50	16.12	16.62	16.50	18.00	19.62	20.50	21.62
14	0.75	14.75	16.25	14.75	17.75	19.12	19.00	19.38	20.50	22.75	...
16	0.88	16.75	18.50	16.75	20.25	21.25	21.12	22.25	22.62	25.25	...
18	0.88	19.25	21.00	19.25	21.62	23.50	23.38	24.12	25.12	27.75	...
20	1.00	21.00	23.00	21.00	23.88	25.75	25.50	26.88	27.50	29.75	...
24	1.00	25.25	27.25	25.25	28.25	30.50	30.25	31.12	33.00	35.50	...

GENERAL NOTE: Dimensions are in inches.

NOTES:

(1) Applies to both Figs. E6 and E7. Gasket diameters may be varied, provided the gasket contact width does not exceed that shown, subject to tolerances in para. E4. See para. E3(d).

(2) Gasket outside diameter may be extended, or an attached centering device may be used. The outside diameter of extended metallic gasket or of any centering ring may be 0.12 in. less than specifled.

(3) Slip-on type flanges are shown for illustration purposes only. Gaskets may be used with other types of flange. See para. E3(f).

TABLE E3A GROUP NO. IIIa GASKETS

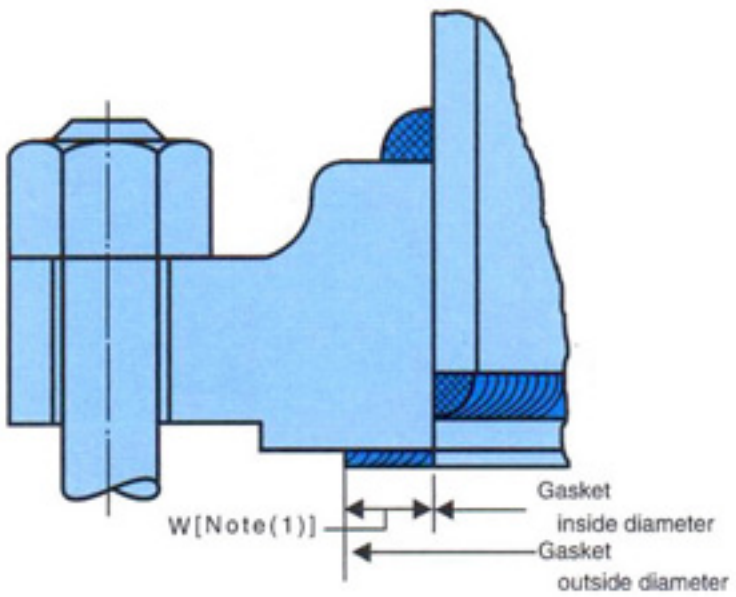


FIG. E8[3]

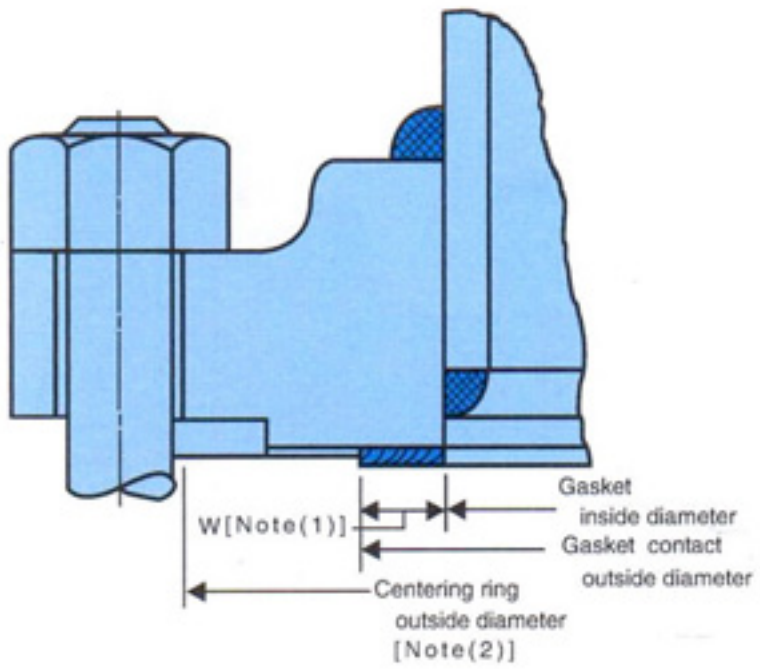


FIG. E9[3]

Nominal Size	Gasket Contact Width (1) W	Fig. E8		Fig. E9								
		Inside Diameter	Outside Diameter	Inside Diameter	Gasket Contact Outside Diameter	Centering Ring Outside Diameter (2)						
						150	300	400	600	900	1500	2500
1/2	0.19	0.84	1.22	0.84	1.22	1.88	2.12	2.12	2.12	2.50	2.50	2.75
3/4	0.19	1.06	1.44	1.06	1.44	2.25	2.62	2.62	2.62	2.75	2.75	3.00
1	0.19	1.31	1.69	1.31	1.69	2.62	2.88	2.88	2.88	3.12	3.12	3.38
1 1/4	0.19	1.66	2.03	1.66	2.03	3.00	3.25	3.25	3.25	3.50	3.50	4.12
1 1/2	0.19	1.91	2.28	1.91	2.28	3.38	3.75	3.75	3.75	3.88	3.88	4.62
2	0.19	2.38	2.75	2.38	2.75	4.12	4.38	4.38	4.38	5.62	5.62	5.75
2 1/2	0.19	2.88	3.25	2.88	3.25	4.88	5.12	5.12	5.12	6.50	6.50	6.62
3	0.19	3.50	3.88	3.50	3.88	5.38	5.88	5.88	5.88	6.62	6.88	7.75
3 1/2	0.19	4.00	4.38	4.00	4.38	6.38	6.50	6.38	6.38	...	...	...
4	0.22	4.50	4.94	4.50	4.94	6.88	7.12	7.00	7.62	8.12	8.25	9.25
5	0.22	5.56	6.00	5.56	6.00	7.75	8.50	8.38	9.50	9.75	10.00	11.00
6	0.22	6.62	7.06	6.62	7.06	8.75	9.88	9.75	10.50	11.38	11.12	12.50
8	0.28	8.62	9.19	8.62	9.19	11.00	12.12	12.00	12.62	14.12	13.88	15.25
10	0.34	10.75	11.44	10.75	11.44	13.38	14.25	14.12	15.75	17.12	17.12	18.75
12	0.34	12.75	13.44	12.75	13.44	16.12	16.62	16.50	18.00	19.62	20.50	21.62
14	0.34	14.00	14.69	14.00	14.69	17.75	19.12	19.00	19.38	20.50	22.75	...
16	0.41	16.00	16.81	16.00	16.81	20.25	21.25	21.12	22.25	22.62	25.25	...
18	0.41	18.00	18.81	18.00	18.81	21.62	23.50	23.38	24.12	25.12	27.75	...
20	0.47	20.00	20.94	20.00	20.94	23.88	25.75	25.50	26.88	27.50	29.75	...
24	0.47	24.00	24.94	24.00	24.94	28.25	30.50	30.25	31.12	33.00	35.50	...

GENERAL NOTE: Dimensions are in inches.

NOTES:

(1) Applies to both Figs. E8 and E9. Gasket diameters may be varied, provided the gasket contact width does not exceed that shown, subject to tolerances in para. E4. See para. E3(d).

(2) Metallic gaskets may have attached centering device. The outside diameter of any centering ring may be 0.12 in. less than specified.

(3) Slip-on type flanges are shown for illustration purposes only. Gaskets may be used with other types of flange. See para. E3(f).

TABLE E3B GROUP NO. IIIb GASKETS

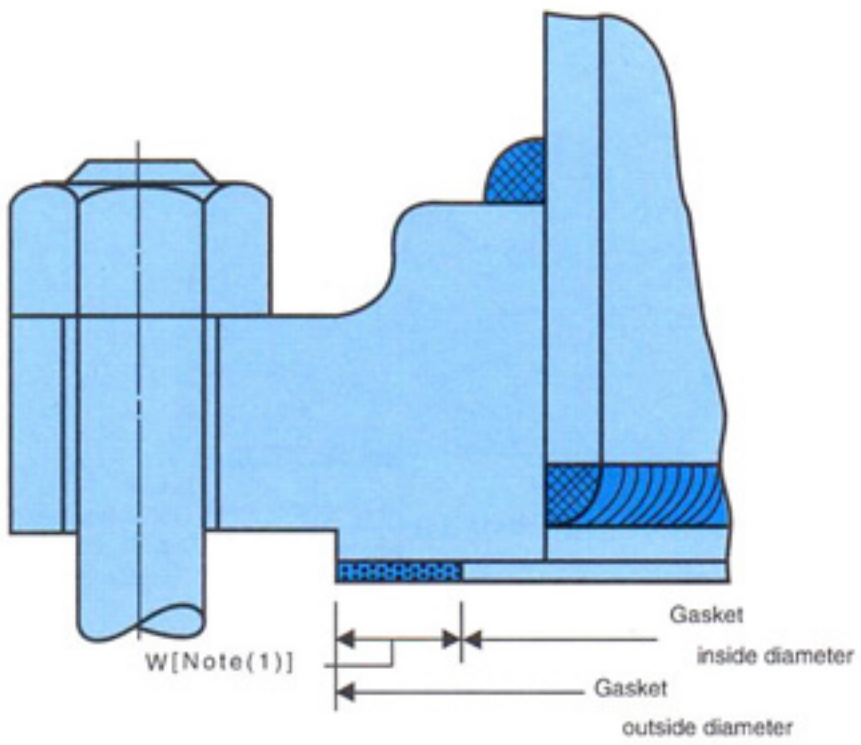


FIG. E10[3]

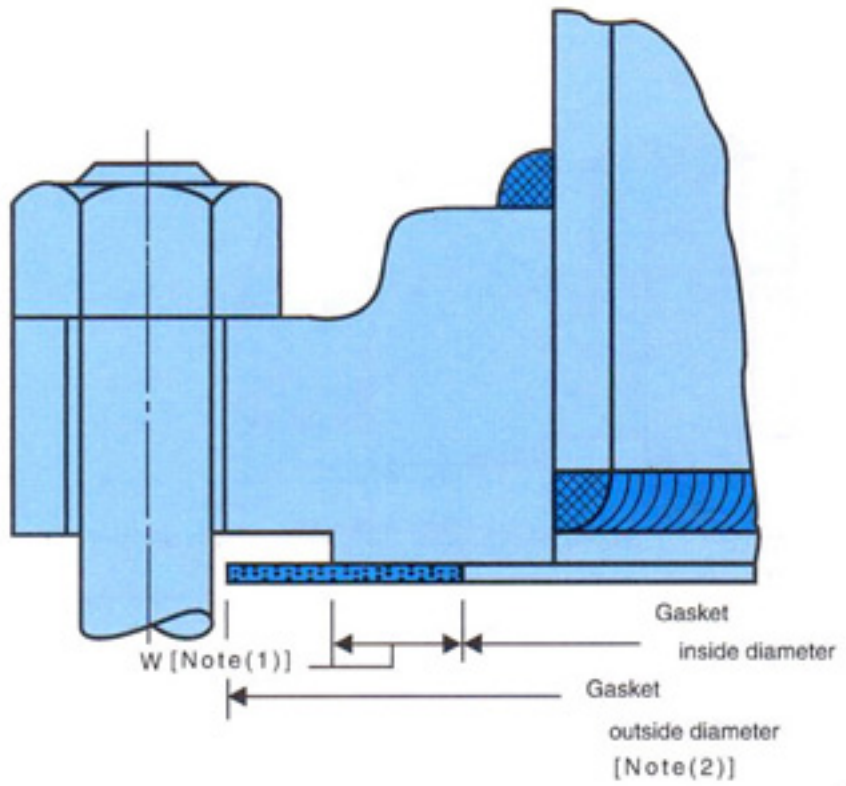


FIG. E11[3]

Nominal Size	Gasket Contact Width (1) W	Fig. E10		Fig. E11							
		Inside Diameter	Outside Diameter	Inside Diameter	Outside Diameter (2)						
					150	300	400	600	900	1500	2500
1/2	0.19	1.00	1.38	1.00	1.88	2.12	2.12	2.12	2.50	2.50	2.75
3/4	0.19	1.31	1.69	1.31	2.25	2.62	2.62	2.62	2.75	2.75	3.00
1	0.19	1.62	2.00	1.62	2.62	2.88	2.88	2.88	3.12	3.12	3.38
1 1/4	0.19	2.12	2.50	2.12	3.00	3.25	3.25	3.25	3.50	3.50	4.12
1 1/2	0.19	2.50	2.88	2.50	3.38	3.75	3.75	3.75	3.88	3.88	4.62
2	0.19	3.25	3.62	3.25	4.12	4.38	4.38	4.38	5.62	5.62	5.75
2 1/2	0.19	3.75	4.12	3.75	4.88	5.12	5.12	5.12	6.50	6.50	6.62
3	0.19	4.62	5.00	4.62	5.38	5.88	5.88	5.88	6.62	6.88	7.75
3 1/2	0.19	5.12	5.50	5.12	6.38	6.50	6.38	6.38	...	...	...
4	0.22	5.75	6.19	5.75	6.88	7.12	7.00	7.62	8.12	8.25	9.25
5	0.22	6.88	7.31	6.88	7.75	8.50	8.38	9.50	9.75	10.00	11.00
6	0.22	8.06	8.50	8.06	8.75	9.88	9.75	10.50	11.38	11.12	12.50
8	0.28	10.06	10.62	10.06	11.00	12.12	12.00	12.62	14.12	13.88	15.25
10	0.34	12.06	12.75	12.06	13.38	14.25	14.12	15.75	17.12	17.12	18.75
12	0.34	14.31	15.00	14.31	16.12	16.62	16.50	18.00	19.62	20.50	21.62
14	0.34	15.56	16.25	15.56	17.75	19.12	19.00	19.38	20.50	22.75	...
16	0.41	17.69	18.50	17.69	20.25	21.25	21.12	22.25	22.62	25.25	...
18	0.41	20.19	21.00	20.19	21.62	23.50	23.38	24.12	25.12	27.75	...
20	0.47	22.06	23.00	22.06	23.88	25.75	25.50	26.88	27.50	29.75	...
24	0.47	26.31	27.25	26.31	28.25	30.50	30.25	31.12	33.00	35.50	...

GENERAL NOTE: Dimensions are in inches.

NOTES:

(1) Applies to both Figs. E10 and E11. Gasket diameters may be varied, provided the gasket contact width does not exceed that shown, subject to tolerances in para. E4. See para. E3(d).

(2) Gasket outside diameter may be extended, or an attached centering device may be used. The outside diameter of extended metallic gasket or of any centering ring may be 0.12 in. less than specified.

(3) Slip-on type flanges are shown for illustration purposes only. Gaskets may be used with other types of flange. See para. E3(f).

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