

HYDRAULIC FLANGED TUBE, PIPE, AND HOSE CONNECTIONS, FOUR-BOLT SPLIT FLANGE TYPE

Foreword—This Reaffirmed Document has been changed only to reflect the new SAE Technical Standards Board Format.

- 1. Scope**—This SAE Standard covers complete general and dimensional specifications for the flanged heads and split flange clamp halves applicable to four-bolt split flange type tube, pipe, and hose connections with appropriate references to the O-ring seals and attaching components used in their assembly. (See Figures 1 and 2.) Also included are recommended port dimensions and port design considerations.

The flanged heads specified are incorporated into fittings having suitable means for attachment of tubes, pipes, or hoses to provide connection ends. These connections are intended for application in hydraulic systems, on industrial and commercial products, where it is desired to avoid the use of threaded connections.

THE RATED WORKING PRESSURE OF A HOSE ASSEMBLY COMPRISING SAE J518 HOSE CONNECTIONS AND SAE J517 HOSE SHALL NOT EXCEED THE LOWER OF THE TWO WORKING PRESSURE RATED VALUES.

Flanged heads shall be as specified in Figure 3 and Table 1. Split flange clamp halves shall be as specified in Figure 4 and Table 1. Port dimensions and spacing shall be as specified in Figure 5 and Table 2.

O-ring seals, having nominal dimensions as indicated in Table 1, are used in conjunction with these connections. They shall conform to the seals specified in SAE J120, Table on Dimensions and Tolerances.

Bolts for use with these connections shall be of the sizes and lengths indicated in Table 1. They shall be of SAE Grade 5 material or better as specified in SAE J429. Socket head cap screws of SAE Grade 5 material or better are acceptable.

Lock washers, if used, shall be in accordance with the light spring lock washers specified in SAE J489, Dimensions of Light, Medium, Heavy, Extra Heavy, and Hi Collar Spring Lock Washers, and of sizes applicable to the corresponding bolts.

The following general specifications supplement the dimensional data contained in Table 1 with respect to all unspecified detail.

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2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J120—Rubber Rings for Automotive Applications

SAE J429—Mechanical and Material Requirements for Externally Threaded Fasteners

SAE J489—Lock Washers

SAE J517—Hydraulic Hose

SAE J846—Coding Systems for Identification of Fluid Conductors and Connectors

2.1.2 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 117—Method of Salt Spray (Fog) Testing

3. Size Designation—Four-bolt split flange connection sizes are designated by the nominal flange size which corresponds to the maximum inside diameter of the hole through the flanged head.

4. Dimensions and Tolerances—Tabulated dimensions and tolerances shall apply to the finished parts, plated or otherwise processed, as specified by the purchaser. Tolerances on all dimensions for flanged heads, split flange clamp halves, and ports not otherwise limited shall be ± 0.4 mm (0.016 in).

5. Material—Flanged heads shall be made of steel. Split flange clamp halves shall be made from a material with the properties in Table 3.

6. Finish—The external surfaces and threads of all carbon steel parts shall be plated or coated with a suitable material that passes a 72 h salt spray test in accordance with ASTM B 117. Any appearance of red rust during the 72 h salt spray test shall be considered failure, except for the following:

- All internal fluid passages.
- Edges such as hex points, serrations, and crests of threads where there may be mechanical deformation of the plating or coating typical of mass-produced parts or shipping effects.
- Areas where there is mechanical deformation of the plating or coating caused by crimping, flaring, bending, and other post-plate metal forming operations.
- Areas where the parts are suspended or affixed in the test chamber where condensate can accumulate.

NOTE—Cadmium plating is not preferred due to environmental reasons. Parts manufactured to this Standard after January 1, 1997, shall not be cadmium plated. Internal fluid passages shall be protected from corrosion during storage. Changes in plating may affect assembly torques and require requalification, when applicable.

Bolts shall be finished with a suitable coating that meet the previous requirements after a 16 h salt spray test in accordance with ASTM B 117. Lock washers may have a plain (natural) finish or a suitable coating.

7. **Workmanship**—Workmanship shall conform to the best commercial practice to produce high-quality connection components. Connection components shall be free from all hanging burrs, loose scale, and slivers which might become dislodged in usage and all other defects which might affect their serviceability. All sealing surfaces must be smooth except that annular tool marks up to 3 μm (100 μin) max, unless specified otherwise, shall be permissible.

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SAE J518 Revised JUN93

NOTE—Unspecified Detail With Respect To Dimensions, Tolerances, Contours, Material, Workmanship, Etc., Must Conform To General Specifications Of Hydraulic Flanged Tube, Pipe, And Hose Connections, 4-bolt Split Flange Type. Dimensions In Figures 1 To 4 Apply To Table 1. Codes Shown In Parentheses Adjacent To Figure Numbers Represent Respective Flanged Connection Identification, With XX Substituted For The Pressure Rating Code Depicted In Respective Subheadings Of Table 1. In Accordance With SAE J846.

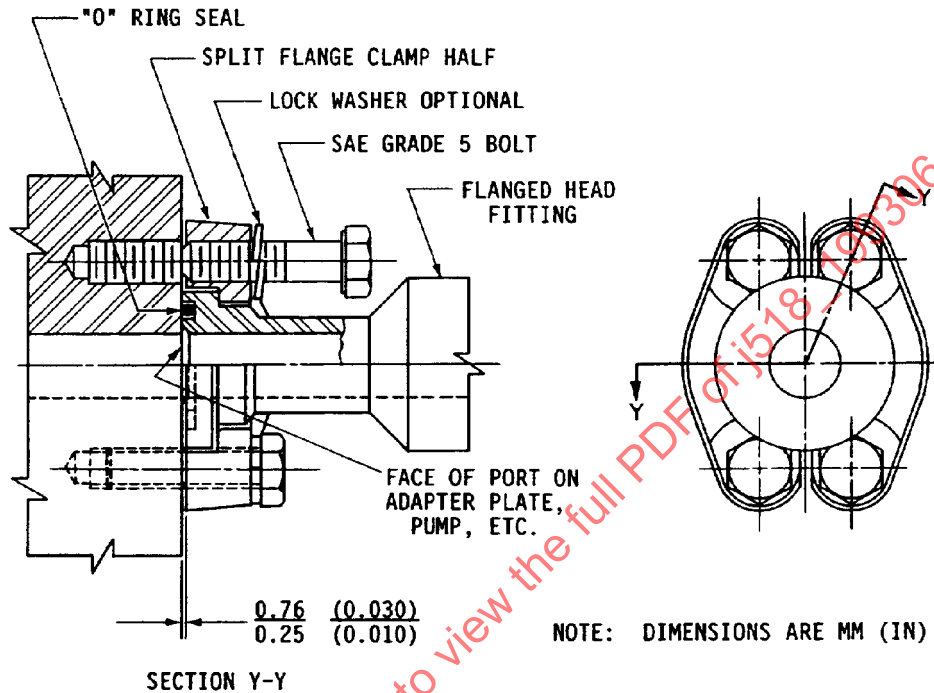
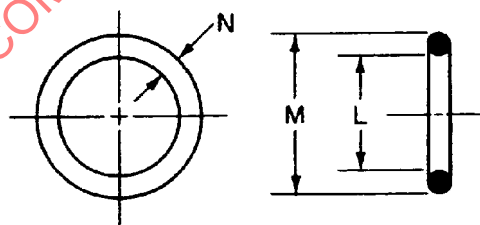


FIGURE 1—ASSEMBLED SPLIT FLANGED CONNECTION



BASIC "O" RING DIMENSIONS ARE SHOWN FOR REFERENCE ONLY

FIGURE 2—O-RING SEAL

SAE J518 Revised JUN93

NOTE—Unspecified Detail With Respect To Dimensions, Tolerances, Contours, Material, Workmanship, Etc., Must Conform To General Specifications Of Hydraulic Flanged Tube, Pipe, And Hose Connections, 4-bolt Split Flange Type. Dimensions In Figures 1 To 4 Apply To Table 1. Codes Shown In Parentheses Adjacent To Figure Numbers Represent Respective Flanged Connection Identification, With Xx Substituted For The Pressure Rating Code Depicted In Respective Subheadings Of Table 1, In Accordance With Sae J846.

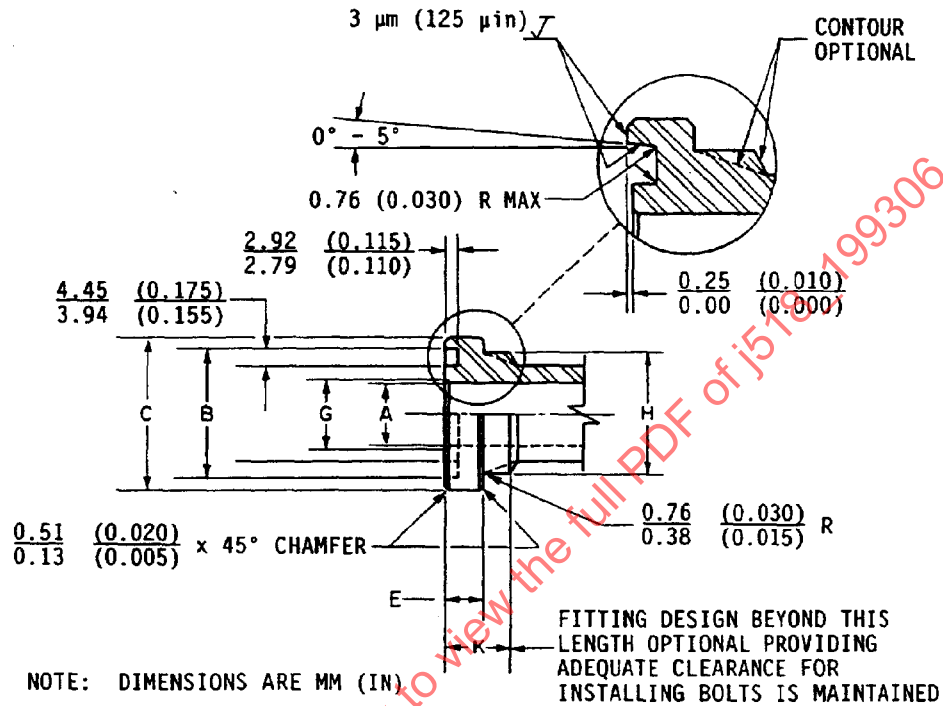


FIGURE 3—FLANGED HEAD

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NOTE—Unspecified Detail With Respect To Dimensions, Tolerances, Contours, Material, Workmanship, Etc., Must Conform To General Specifications Of Hydraulic Flanged Tube, Pipe, And Hose Connections, 4-bolt Split Flange Type. Dimensions In Figures 1 To 4 Apply To Table 1. Codes Shown In Parentheses Adjacent To Figure Numbers Represent Respective Flanged Connection Identification, With XX Substituted For The Pressure Rating Code Depicted In Respective Subheadings Of Table 1, In Accordance With SAE J846.

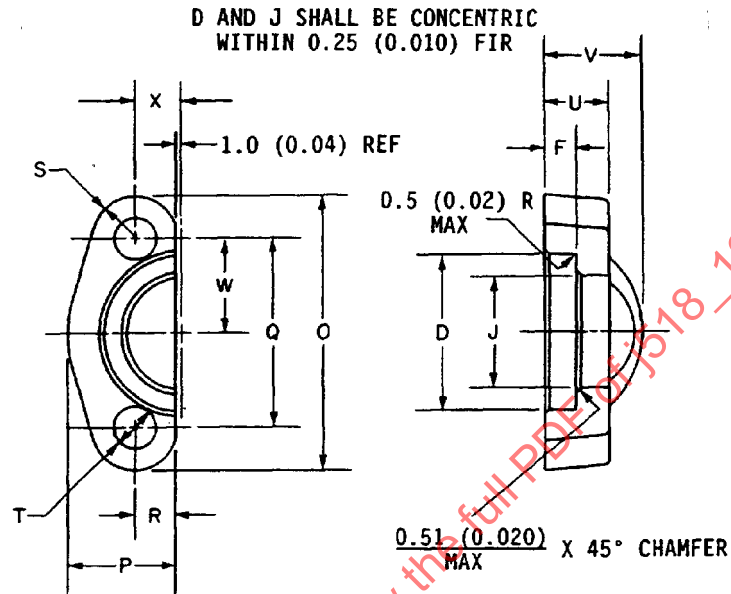


FIGURE 4—SPLIT FLANGE CLAMP HALF (1101XX)

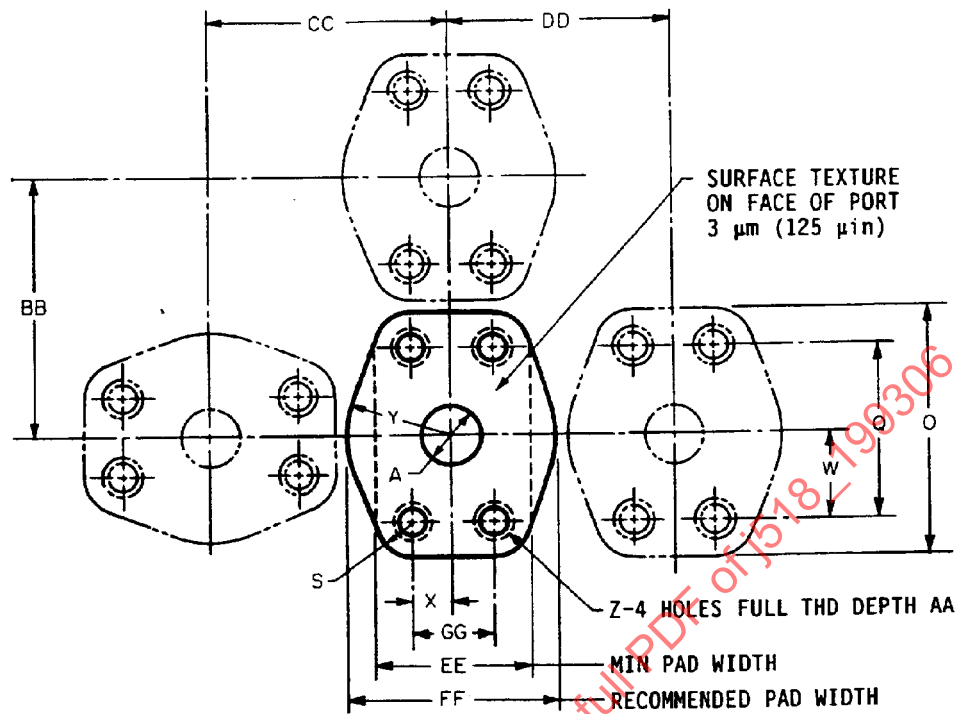


FIGURE 5—PORT DIMENSIONS FOR HYDRAULIC FLANGED, TUBE, PIPE, AND HOSE CONNECTIONS, FOUR-BOLT SPLIT FLANGE TYPE

**TABLE 1A— DIMENSIONS OF HYDRAULIC FLANGED CONNECTIONS,
STANDARD PRESSURE SERIES (CODE 61)**

Nominal Flange Size, in	Flange Dash Size	A Dia Max mm	A Dia Max in	B Dia mm	B Dia in	C Dia ± 0.25 mm	C Dia ± 0.010 in	D Dia ± 0.25 mm	D Dia ± 0.010 in	E ± 0.13 mm	E ± 0.005 in	F ± 0.13 mm	F ± 0.005 in
1/2	-8	13	0.50	25.53- 25.40	1.005-1.000	30.18	1.188	30.96	1.219	6.73	0.265	6.22	0.245
3/4	-12	19	0.75	31.88- 31.75	1.255-1.250	38.10	1.500	38.89	1.531	6.73	0.265	6.22	0.245
1	-16	25	1.00	39.75- 39.62	1.565-1.560	44.45	1.750	45.24	1.781	8.00	0.315	7.49	0.295
1-1/4	-20	32	1.25	44.58- 44.45	1.755-1.750	50.80	2.000	51.59	2.031	8.00	0.315	7.49	0.295
1-1/2	-24	38	1.50	53.98- 53.72	2.125-2.115	60.33	2.375	61.09	2.406	8.00	0.315	7.49	0.295
2	-32	51	2.00	63.50- 63.25	2.500-2.490	71.42	2.812	72.24	2.844	9.53	0.375	9.02	0.355
2-1/2	-40	64	2.50	76.33- 76.07	3.005-2.995	84.12	3.312	84.94	3.344	9.53	0.375	9.02	0.355
3	48	76	3.00	92.08- 91.82	3.625-3.615	101.60	4.000	102.39	4.031	9.53	0.375	9.02	0.355
3-1/2	-56	89	3.50	104.52-104.01	4.115-4.095	114.30	4.500	115.09	4.531	11.23	0.422	10.72	0.422
4	-64	102	4.00	117.22-116.71	4.615-4.595	127.00	5.000	127.79	5.031	11.23	0.442	10.72	0.422
5	-80	127	5.00	142.62-142.11	5.615-5.595	152.40	6.000	153.19	6.031	11.23	0.442	10.72	0.422

Nominal Flange Size, in	G Dia Max mm	G Dia Max in	H Dia Max mm	H Dia Max in	J Dia ± 0.25 mm	J Dia ± 0.010 in	K Ref mm	K Ref in	L ID Ref mm	L ID Ref in	M OD Ref mm	M OD Ref in	N Dia Ref mm	N Dia Ref in	O-Ring Size No.
1/2	14	0.56	24	0.94	24.26	0.955	13	0.50	18.64	0.734	25.70	1.012	3.53	0.139	210
3/4	21	0.81	32	1.25	32.13	1.265	14	0.56	24.99	0.984	32.05	1.262	3.53	0.139	214
1	27	1.06	38	1.50	38.48	1.515	14	0.56	32.92	1.296	39.98	1.574	3.53	0.139	219
1-1/4	33	1.31	43	1.70	43.69	1.720	14	0.56	37.69	1.484	44.75	1.762	3.53	0.139	222
1-1/2	40	1.56	50	1.98	50.80	2.000	16	0.62	47.22	1.859	54.28	2.137	3.53	0.139	225
2	52	2.06	62	2.45	62.74	2.470	16	0.62	56.74	2.234	63.80	2.512	3.53	0.139	228
2-1/2	65	2.56	74	2.92	74.93	2.950	18	0.69	69.44	2.734	76.50	3.012	3.53	0.139	232
3	78	3.06	90	3.55	90.93	3.580	19	0.75	85.32	3.359	92.38	3.637	3.53	0.139	237
3-1/2	90	3.56	102	4.00	102.36	4.030	22	0.88	98.02	3.859	105.08	4.137	3.53	0.139	241
4	103	4.06	114	4.50	115.06	4.530	25	1.00	110.72	4.359	117.78	4.637	3.53	0.139	245
5	129	5.06	140	5.50	140.46	5.530	28	1.12	136.12	5.359	143.18	5.637	3.53	0.139	253

Nominal Flange Size, in	O mm	O in	P ± 0.8 mm	P ± 0.03 in	Q ± 0.25 mm	Q ± 0.010 in	R mm	R in	S Rad mm	S Rad in	T Dia ± 0.25 mm	T Dia ± 0.010 in	U mm	U in	V mm	V in
1/2	54.9- 53.1	2.16-2.09	21.8	0.86	38.10	1.500	8	0.31	8	0.31	8.74	0.344	13	0.50	19	0.75
3/4	65.8- 64.3	2.59-2.53	24.9	0.98	47.63	1.875	10	0.40	9	0.34	10.31	0.406	14	0.56	22	0.78
1	70.6- 69.1	2.78-2.72	28.2	1.11	52.37	2.062	12	0.48	9	0.34	10.31	0.406	16	0.62	24	0.94
1-1/4	80.3- 78.5	3.16-3.09	35.3	1.39	58.72	2.312	14	0.56	10	0.41	11.91	0.469	14	0.56	22	0.88
1-1/2	94.5- 93.0	3.72-3.66	40.1	1.58	69.85	2.750	17	0.67	12	0.47	13.49	0.531	16	0.62	25	1.00
2	103.1-100.1	4.06-3.94	47.2	1.86	77.77	3.062	21	0.81	12	0.47	13.49	0.531	16	0.62	26	1.03
2-1/2	115.8-112.8	4.56-4.44	53.1	2.09	88.90	3.500	24	0.96	13	0.50	13.49	0.531	19	0.75	38	1.50
3	136.7-133.4	5.38-5.25	64.3	2.53	106.38	4.188	30	1.18	14	0.56	16.66	0.656	22	0.88	41	1.62
3-1/2	153.9-150.9	6.06-5.94	68.6	2.70	120.65	4.750	34	1.34	16	0.62	16.66	0.656	22	0.88	28	1.12
4	163.6-160.3	6.44-6.31	74.9	2.95	130.18	5.125	38	1.49	16	0.62	16.66	0.656	25	1.00	35	1.38
5	185.7-182.6	7.31-7.19	89.4	3.52	152.40	6.000	45	1.78	16	0.62	16.66	0.656	28	1.12	41	1.62

**TABLE 1A—DIMENSIONS OF HYDRAULIC FLANGED CONNECTIONS,
STANDARD PRESSURE SERIES (CODE 61) (CONTINUED)**

Nominal Flange Size, in	Bolt Dimensions Thread	Bolt Dimensions Length mm	Bolt Dimensions Length in	W ± 0.25 mm	W ± 0.010 in	X ± 0.25 mm	X ± 0.010 in	Max Rec. Working Pressure MPa	Max Rec. Working Pressure psi	Rec. Bolt Torque Range N·m	Rec. Bolt Torque Range lb·in
1/2	5/16-18	32	1-1/4	19.05	0.750	8.74	0.344	34.5	5000	20-25	175-225
3/4	3/8-16	32	1-1/4	23.83	0.938	11.13	0.438	34.5	5000	28-40	250-350
1	3/8-16	32	1-1/4	26.19	1.031	13.08	0.515	34.5	5000	37-48	325-425
1-1/4	7/16-14	38	1-1/2	29.36	1.156	15.09	0.594	27.6	4000	48-62	425-550
1-1/2	1/2-13	38	1-1/2	34.93	1.375	17.86	0.703	20.7	3000	62-79	550-700
2	1/2-13	38	1-1/2	38.89	1.531	21.44	0.844	20.7	3000	73-90	650-800
2-1/2	1/2-13	44	1-3/4	44.45	1.750	25.40	1.000	17.2	2500	107-124	950-1100
3	5/8-11	44	1-3/4	53.19	2.094	30.96	1.219	13.8	2000	186-203	1650-1800
3-1/2	5/8-11	51	2	60.33	2.375	34.93	1.375	3.4	500	158-181	1400-1600
4	5/8-11	51	2	65.07	2.562	38.89	1.531	3.4	500	158-181	1400-1600
5	5/8-11	57	2-1/4	76.20	3.000	46.02	1.812	3.4	500	158-181	1400-1600

TABLE 1B—DIMENSIONS OF HYDRAULIC FLANGED CONNECTIONS, HIGH PRESSURE SERIES (CODE 62)

Nominal Flange Size, in	Flange Dash Size	A Dia Max mm	A Dia Max in	B Dia mm	B Dia in	C Dia ± 0.25 mm	C Dia ± 0.010 in	D Dia ± 0.25 mm	D Dia ± 0.010 in	E ± 0.13 mm	E ± 0.005 in	F ± 0.13 mm	F ± 0.005 in
1/2	-8	13	0.50	25.53-25.40	1.005-1.000	31.75	1.250	32.54	1.281	7.75	0.305	7.24	0.285
3/4	-12	19	0.75	31.88-31.75	1.255-1.250	41.28	1.625	42.06	1.656	8.76	0.345	8.26	0.325
1	-16	25	1.00	39.75-39.62	1.565-1.560	47.63	1.875	48.41	1.906	9.53	0.375	9.02	0.355
1-1/4	-20	32	1.25	44.58-44.45	1.755-1.750	53.98	2.125	54.76	2.156	10.29	0.405	9.78	0.385
1-1/2	-24	38	1.50	53.98-53.72	2.125-2.115	63.50	2.500	64.29	2.531	12.57	0.495	12.07	0.475
2	-32	51	2.00	63.50-63.25	2.500-2.490	79.38	3.125	80.16	3.156	12.57	0.495	12.07	0.475

Nominal Flange Size, in	G Dia Max mm	G Dia Max in	H Dia Max mm	H Dia Max in	J Dia ± 0.25 mm	J Dia ± 0.010 in	K Ref mm	K Ref in	L ID Ref mm	L ID Ref in	M OD Ref mm	M OD Ref in	N Dia Ref mm	N Dia Ref in	O-Ring Size No.
1/2	14	0.56	24	0.94	24.64	0.970	14	0.56	18.64	0.734	25.70	1.012	3.53	0.139	210
3/4	21	0.81	32	1.25	32.51	1.280	18	0.69	24.99	0.984	32.05	1.262	3.53	0.139	214
1	27	1.06	38	1.50	38.86	1.530	21	0.81	32.92	1.296	39.98	1.574	3.53	0.139	219
1-1/4	33	1.31	44	1.72	44.45	1.750	25	1.00	37.69	1.484	44.75	1.762	3.53	0.139	222
1-1/2	40	1.56	51	2.00	51.56	2.030	30	1.19	47.22	1.859	54.28	2.137	3.53	0.139	225
2	52	2.06	67	2.62	67.56	2.660	38	1.50	56.74	2.234	63.80	2.512	3.53	0.139	228

Nominal Flange Size, in	O mm	O in	P ± 0.8 mm	P ± 0.03 in	Q ± 0.25 mm	Q ± 0.010 in	R mm	R in	S Rad mm	S Rad in	T Dia ± 0.25 mm	T Dia ± 0.010 in	U mm	U in	V mm	V in
1/2	57.2-55.6	2.25-2.19	22.6	0.89	40.49	1.594	8	0.32	8	0.31	8.74	0.344	16	0.62	22	0.88
3/4	72.1-70.6	2.84-2.78	29.0	1.14	50.80	2.000	11	0.43	10	0.41	10.31	0.406	19	0.75	28	1.12
1	81.8-80.3	3.22-3.16	33.8	1.33	57.15	2.250	13	0.51	12	0.47	11.91	0.469	24	0.94	33	1.31
1-1/4	96.0-94.5	3.78-3.72	37.6	1.48	66.68	2.625	15	0.59	14	0.56	13.49	0.531	27	1.06	38	1.50
1-1/2	114.3-111.3	4.50-4.38	46.5	1.83	79.38	3.125	17	0.68	17	0.66	16.66	0.656	30	1.19	43	1.69
2	134.9-131.8	5.31-5.19	55.9	2.20	96.82	3.812	21	0.84	18	0.72	19.84	0.781	37	1.44	52	2.06

**TABLE 1B—DIMENSIONS OF HYDRAULIC FLANGED CONNECTIONS,
HIGH PRESSURE SERIES (CODE 62) (CONTINUED)**

Nominal Flange Size, in	Bolt Dimensions Thread	Bolt Dimensions Length mm	Bolt Dimensions Length in	W ± 0.25 mm	W ±0.010 in	X ±0.25 mm	X ±0.010 in	Max Rec. Working Pressure MPa	Max Rec. Working Pressure psi	Rec. Bolt Torque Range N-m	Rec. Bolt Torque Range lb-in
1/2	5/16-18	32	1-1/4	20.24	0.797	9.12	0.359	41.4	6000	20-25	175-225
3/4	3/8-16	38	1-1/2	25.40	1.000	11.91	0.469	41.4	6000	34-45	300-400
1	7/16-14	44	1-3/4	28.58	1.125	13.89	0.547	41.4	6000	56-68	500-600
1-1/4	1/2-13	44	1-3/4	33.32	1.312	15.88	0.625	41.4	6000	85-102	750-900
1-1/2	5/8-11	57	2-1/4	39.67	1.562	18.26	0.719	41.4	6000	158-181	1400-1600
2	3/4-10	70	2-3/4	48.41	1.906	22.23	0.875	41.4	6000	271-294	2400-2600

TABLE 2A—PORT DIMENSIONS FOR BOLTED FLANGE CONNECTIONS, STANDARD PRESSURE SERIES

Nominal Flange Size, in	Flange Dash Size	A Dia + 0.0 -1.5 mm	A Dia + 0.00 -0.06 in	O mm	O in	FF mm	FF in	Q ± 0.25 mm	Q ± 0.010 in	GG ± 0.25 mm	GG ± 0.010 in	S Rad mm	S Rad in	W mm	W in
1/2	-8	12.7	0.50	54	2.12	46	1.81	38.10	1.500	17.48	0.688	8	0.31	19	0.75
3/4	-12	19.1	0.75	65	2.56	52	2.06	47.63	1.875	22.23	0.875	9	0.34	24	0.94
1	-16	25.4	1.00	70	2.75	59	2.31	52.37	2.062	26.19	1.031	9	0.34	26	1.03
1-1/4	-20	31.8	1.25	79	3.12	73	2.88	58.72	2.312	30.18	1.188	10	0.41	29	1.16
1-1/2	-24	38.1	1.50	94	3.69	83	3.25	69.85	2.750	35.71	1.406	12	0.47	35	1.38
2	-32	50.8	2.00	102	4.00	97	3.81	77.77	3.062	42.88	1.688	12	0.47	39	1.53
2-1/2	-40	63.5	2.50	114	4.50	109	4.28	88.90	3.500	50.80	2.000	13	0.50	44	1.75
3	-48	76.2	3.00	135	5.31	131	5.16	106.38	4.188	61.93	2.438	14	0.56	53	2.09
3-1/2	-56	88.9	3.50	152	6.00	140	5.50	120.65	4.750	69.85	2.750	16	0.62	60	2.38
4	-64	101.6	4.00	162	6.38	152	6.00	130.18	5.125	77.77	3.062	16	0.62	65	2.56
5	-80	127.0	5.00	184	7.25	181	7.12	152.40	6.000	92.08	3.625	16	0.62	76	3.00

Nominal Flange Size, in	X mm	X in	Y Rad mm	Y Rad mm	Z Thread UNC-2B	AA Min mm	AA Min mm	BB ⁽¹⁾ Min mm	BB ¹ Min in	CC ¹ Min mm	CC ¹ Min in	DD ¹ Min mm	DD ¹ Min in	EE Min mm	EE Min in
1/2	9	0.34	23	0.91	5/16-18	24	0.94	56	2.22	52	2.06	49	1.91	33	1.31
3/4	11	0.44	26	1.03	3/8-16	22	0.88	68	2.66	61	2.41	55	2.16	41	1.62
1	13	0.52	29	1.16	3/8-16	22	0.88	72	2.84	67	2.62	61	2.41	48	1.88
1-1/4	15	0.59	37	1.44	7/16-14	28	1.12	82	3.22	78	3.09	75	2.97	54	2.12
1-1/2	18	0.70	41	1.62	1/2-13	27	1.06	96	3.78	90	3.56	85	3.34	64	2.50
2	21	0.84	49	1.91	1/2-13	27	1.06	104	4.09	102	4.00	99	3.91	76	3.00
2-1/2	25	1.00	54	2.14	1/2-13	30	1.19	117	4.59	114	4.50	111	4.38	89	3.50
3	31	1.22	66	2.58	5/8-11	30	1.19	137	5.41	136	5.34	133	5.25	106	4.19
3-1/2	35	1.38	70	2.75	5/8-11	33	1.31	155	6.09	148	5.84	142	5.59	119	4.69
4	39	1.53	76	3.00	5/8-11	30	1.19	164	6.47	160	6.28	155	6.09	132	5.19
5	46	1.81	90	3.56	5/8-11	33	1.31	186	7.34	185	7.28	183	7.22	151	6.19

1. Dimensions BB, CC, and DD provide 1.5 mm (0.06 in) clearance between flanges, dimensionally on the high limit, when, the same size flanges are used on adjacent ports. These dimensions do not apply when more than one size of flanges are used on adjacent ports.