STANDARD
SAE J518c

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HYDRAULIC FLANGED TUBE, PIPE, AND HOSE CONNECTIONS, 4 BOLT SPLIT FLANGE TYPE

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HYDRAULIC FLANGED TUBE, PIPE, AND HOSE CONNECTIONS, 4-BOLT SPLIT FLANGE TYPE—SAE J518c

SAE Standard

Report of Construction and Industrial Machinery Technical Committee and Tube, Pipe, Hose, and Lubrication Fittings Committee approved February 1952 and last revised by Tube, Pipe, Hose, and Lubrication Fittings Committee May 1972.

GENERAL SPECIFICATIONS

Scope—This standard covers complete general and dimensional specifications for the flanged heads and split flange clamp halves applicable to 4-bolt split flange type tube, pipe, and hose connections with appropriate references to the O-ring seals and attaching components used in their assembly. Also included are recommended port dimensions and port design considerations.

The flanged heads specified are incorporated into fittings having suitable means for attachment to 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.

Flanged heads shall be as specified in Fig. 3 and Table 1. Split flange clamp halves shall be as specified in Fig. 4 and Table 1. Port dimensions and spacing shall be as specified in Fig. 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 conform with the finished hexagon bolts specified in SAE J105. 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.

Size Designation—4-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.

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 ±0.016 in (±0.4 mm).

Material—Flanged heads shall be made of steel. Split flange clamp halves shall be made from a material with the following properties:

Standard series—1/2 in (-8) size	Minimum yield, 32,000 psi (221 MPa) Minimum elongation, 3%
All other sizes	Minimum yield, 60,000 psi (414 MPa) Minimum elongation, 3%
High pressure series—all sizes	Minimum yield, 48,000 psi (331 MPa) Minimum elongation, 3%

Finish—Unless otherwise specified by the purchaser, the flanged heads and split flange clamp halves shall be furnished with the following finishes:

1. Cadminum or zinc plated to a thickness of 0.0002 in (0.005 mm) minimum followed by a chromate treatment. These parts must meet the requirements of a 32 h salt spray test in accordance with ASTM B 117, Method of Salt Spray (Fog) Testing.
2. Phosphate coated (oil finish). These parts must meet the requirements of a 16 h salt spray test in accordance with ASTM B 117.

Bolts shall be finished with a phosphate coating (oil finished). These parts must meet the requirements of a 16 h salt spray test in accordance with ASTM B 117. Lock washers shall have a plain (natural) finish.

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 100 μin (3 μm) max shall be permissible.

(continued)

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

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

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

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

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

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

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

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

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

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

be ±0.016 in (±0.4 mm).

Material—Flanged heads shall be made of steel. Split flange clamp halves shall be made from a material with the following properties:

Standard series—1/2 in (-8) size	Minimum yield, 32,000 psi (221 MPa) Minimum elongation, 3%
All other sizes	Minimum yield, 60,000 psi (414 MPa) Minimum elongation, 3%
High pressure series—all sizes	Minimum yield, 48,000 psi (331 MPa) Minimum elongation, 3%

Finish—Unless otherwise specified by the purchaser, the flanged heads and split flange clamp halves shall be furnished with the following finishes:

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2. Phosphate coated (oil finish). These parts must meet the requirements of a 16 h salt spray test in accordance with ASTM B 117.

Bolts shall be finished with a phosphate coating (oil finished). These parts must meet the requirements of a 16 h salt spray test in accordance with ASTM B 117. Lock washers shall have a plain (natural) finish.

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 100 μin (3 μm) max shall be permissible.