

BOLTING AND RING GASKET DATA FOR API AND ANSI FLANGES

MT. HOOD FASTENER CO.

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API FLANGES

API Pressure Rating	Flange Size & Bore	Ring Gasket API No.	No. of Studs	Size	Stud with Two Nuts Length
2000 lb WOG 4000 lb Test	2-1/16"	R or RX 23	8	5/8"	4-3/4"
	2-9/16"	R or RX 26	8	3/4"	5-1/4"
	3-1/8"	R or RX 31	8	3/4"	5-1/2"
	4-1/16"	R or RX 37	8	7/8"	6-1/4"
	7-1/16"	R or RX 45	12	1"	7-1/4"
	9"	R or RX 49	12	1-1/8"	8-1/4"
	11"	R or RX 53	16	1-1/4"	9"
	13-5/8"	R or RX 57	20	1-1/4"	9-1/4"
	16-3/4"	R or RX 65	20	1-1/2"	10-1/2"
	21-1/4"	R or RX 73	24	1-5/8"	12"
3000 lb WOG 6000 lb Test	2-1/8"	R or RX 24	8	7/8"	6-1/4"
	2-9/16"	R or RX 27	8	1"	6-3/4"
	3-1/8"	R or RX 31	8	1-1/8"	6-1/4"
	4-1/16"	R or RX 37	8	1-1/8"	7-1/4"
	7-1/16"	R or RX 45	12	1-1/8"	8-1/4"
	9"	R or RX 49	12	1-3/8"	9-1/4"
	11"	R or RX 53	16	1-3/8"	9-3/4"
	13-5/8"	R or RX 57	20	1-3/8"	10-1/2"
	16-3/4"	R or RX 66	20	1-5/8"	12"
	20-3/4"	R or RX 74	20	2"	14-3/4"
5000 lb WOG 10,000 lb Test	2-1/16"	R or RX 24	8	7/8"	6-1/4"
	2-9/16"	R or RX 27	8	1"	6-3/4"
	3-1/8"	R or RX 35	8	1-1/8"	7-1/2"
	4-1/16"	R or RX 39	8	1-1/4"	8-1/4"
	7-1/16"	R or RX 46	12	1-3/8"	11"
	9"	R or RX 50	12	1-5/8"	12-1/4"
	11"	R or RX 54	12	1-7/8"	14"



Note: Studs are measured on end to end basis.

API Pressure Rating	Flange Size & Bore	Ring Gasket API No.	No. of Studs	Size	Stud with Two Nuts Length
2000 lb WOG 4000 lb Test 6 BX	26-3/4"	BX 167	20	1-3/4"	14
	26-3/4"	BX 168	24	2"	17-1/4"
3000 lb WOG 6000 lb Test 6 BX	26-3/4"	BX 160	16	1-5/8"	12-3/4"
	26-3/4"	BX 162	16	1-7/8"	14-3/4"
5000 lb WOG 10,000 lb Test 6 BX	18-3/4"	BX 163	20	2"	17-3/4"
	21-1/4"	BX 165	24	2"	19"
10,000 lb WOG 15,000 lb Test 6 BX	1-11/16"	BX 150	8	3/4"	5-1/4"
	1-13/16"	BX 151	8	3/4"	5-1/4"
	2-1/16"	BX 152	8	3/4"	5-1/2"
	2-9/16"	BX 153	8	7/8"	6-1/4"
	3-1/16"	BX 154	8	1"	7"
	4-1/16"	BX 155	8	1-1/8"	8-1/4"
	5-1/8"	BX 156	12	1-1/8"	9"
	7-1/16"	BX 157	12	1-1/2"	11-1/2"
	9"	BX 158	16	1-1/2"	13-1/4"
	11"	BX 159	16	1-3/4"	15-1/4"
	13-5/8"	BX 160	20	1-7/8"	17-1/2"
	16-3/4"	BX 161	24	1-7/8"	17-3/4"
	18-3/4"	BX 162	24	2-1/4"	22-3/4"
	21-1/4"	BX 163	24	2-1/2"	24"
	1-11/16"	BX 150	8	3/4"	5-1/2"
	1-13/16"	BX 151	8	7/8"	5-3/4"
	2-1/16"	BX 152	8	7/8"	6-1/4"
	2-9/16"	BX 153	8	1"	7"
	3-1/16"	BX 154	8	1-1/8"	7-3/4"
	4-1/16"	BX 155	8	1-3/8"	9-1/2"
15,000 lb WOG 22,000 lb Test 6 BX	7-1/16"	BX 156	16	1-1/2"	13"
	9"	BX 157	16	1-7/8"	16"
	11"	BX 158	20	2"	19-1/2"
20,000 lb WOG 28,000 lb Test 6 BX	1-13/16"	BX 151	8	1"	7-3/4"
	2-1/16"	BX 152	8	1-1/8"	8-1/2"
	2-9/16"	BX 153	8	1-1/4"	9-1/2"
	3-1/16"	BX 154	8	1-3/8"	10-1/4"
	4-1/16"	BX 155	8	1-3/4"	12-1/2"
	7-1/16"	BX 156	16	2"	17-3/4"

Charts replicated from Dan-Loc brochures and charts.

TORQUE REQUIRED TO PRODUCE BOLT STRESS

Torque Data For Use With Alloy Steel Stud Bolts

Load in pounds on stud bolt when torque loads are applied.

NOMINAL DIAMETER OF BOLT (Inches)	NUMBER OF THREADS (Per Inch)	DIAMETER AT ROOT OF THREAD (Inches)	AREA AT ROOT OF THREAD (Sq. Inch)	STRESS					
				30,000 PSI		45,000 PSI		60,000 PSI	
				Torque Ft/Lbs	Compression Lbs	Torque Ft/Lbs	Compression Lbs	Torque Ft/Lbs	Compression Lbs
1/4	20	.185	.027	4	810	6	1215	8	1620
5/16	18	.240	.045	8	1350	12	2025	16	2700
3/8	16	.294	.068	12	2040	18	3060	24	4080
7/16	14	.345	.093	20	2790	30	4185	40	5580
1/2	13	.400	.126	30	3780	45	5670	60	7560
9/16	12	.454	.162	45	4860	68	7290	90	9720
5/8	11	.507	.202	60	6060	90	9090	120	12120
3/4	10	.620	.302	100	9060	150	13590	200	18120
7/8	9	.731	.419	160	12570	240	18855	320	25140
1	8	.838	.551	245	16530	368	24795	490	33060
1-1/8	8	.963	.728	355	21840	533	32760	710	43680
1-1/4	8	1.088	.929	500	27870	750	41805	1000	55740
1-3/8	8	1.213	1.155	680	34650	1020	51975	1360	69300
1-1/2	8	1.338	1.405	800	42150	1200	63225	1600	84300
1-5/8	8	1.463	1.680	1100	50400	1650	75600	2200	100800
1-3/4	8	1.588	1.980	1500	59400	2250	89100	3000	118800
1-7/8	8	1.713	2.304	2000	69120	3000	103680	4000	138240
2	8	1.838	2.652	2200	79560	3300	119340	4400	159120
2-1/4	8	2.088	3.423	3180	102690	4770	154035	6360	205380
2-1/2	8	2.338	4.292	4400	128760	6600	193140	8800	257520
2-3/4	8	2.588	5.259	5920	157770	8880	236655	11840	315540
3	8	2.838	6.324	7720	189720	11580	284580	15440	379440

The table above reflects the results of many tests to determine the relation between torque and bolt stress. Values are based on steel bolting well lubricated with a heavy graphite and oil mixture.

NUMBER AND SIZE OF BOLTS FOR FLANGED JOINTS — ASME B16.5

PRIMARY SERVICE PRESSURE RATING	BOLTING	FLANGE FACING	NOMINAL PIPE SIZE																			
			1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
Class 150	Number		4	4	4	4	4	4	4	8	8	8	8	8	12	12	12	16	16	20	20	
	Diameter		1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	5/8	5/8	3/4	3/4	3/4	7/8	7/8	1	1	1 1/8	1 1/8	1 1/4
	Length of Stud Bolts	1/16" RF	2 1/4	2 1/2	2 1/2	2 3/4	2 3/4	3 1/4	3 1/2	3 1/2	3 1/2	3 1/2	3 3/4	4	4 1/4	4 1/2	4 3/4	5 1/4	5 1/4	5 3/4	6 1/4	6 3/4
		RTJ			3	3 1/4	3 1/4	3 3/4	4	4	4	4	4 1/4	4 1/2	4 3/4	5	5 1/4	5 3/4	5 3/4	6 1/4	6 3/4	7 1/4
	Length of Mach. Bolts	1/16" RF	2	2	2 1/4	2 1/4	2 1/2	2 3/4	3	3	3	3	3 1/4	3 1/4	3 1/2	4	4	4 1/2	4 1/2	5	5 1/2	6
	Ring No.				R15	R17	R19	R22	R25	R29	R33	R36	R40	R43	R48	R52	R56	R59	R64	R68	R72	R76
Class 300	Number		4	4	4	4	4	8	8	8	8	8	8	12	12	16	16	20	20	24	24	24
	Diameter		1/2	5/8	5/8	5/8	3/4	5/8	3/4	3/4	3/4	3/4	3/4	3/4	7/8	1	1 1/8	1 1/8	1 1/4	1 1/4	1 1/4	1 1/2
	Length of Stud Bolts	1/16" RF	2 1/2	3	3	3 1/4	3 1/2	3 1/2	4	4 1/4	4 1/4	4 1/2	4 3/4	4 3/4	5 1/2	6 1/4	6 3/4	7	7 1/2	7 3/4	8	9
		RTJ	3	3 1/2	3 1/2	3 3/4	4	4	4 1/2	4 3/4	5	5	5 1/4	5 1/2	6	6 3/4	7 1/4	7 1/2	8	8 1/4	8 3/4	10
	Length of Mach. Bolts	1/16" RF	2 1/4	2 1/2	2 1/2	2 3/4	3	3	3 1/4	3 1/2	3 3/4	3 3/4	4 1/4	4 1/4	4 3/4	5 1/2	5 3/4	6 1/4	6 1/2	6 3/4	7 1/4	8
	Ring No.		R11	R13	R16	R18	R20	R23	R26	R31	R34	R37	R41	R45	R49	R53	R57	561	R65	R69	R73	R77
Class 400	Number		4	4	4	4	4	8	8	8	8	8	8	12	12	16	16	20	20	24	24	24
	Diameter		1/2	5/8	5/8	5/8	3/4	5/8	3/4	3/4	7/8	7/8	7/8	7/8	1	1 1/8	1 1/4	1 1/4	1 3/8	1 3/8	1 1/2	1 3/4
	Length of Stud Bolts	1/4" RF	3	3 1/2	3 1/2	3 3/4	4 1/4	4 1/4	4 3/4	5	5 1/2	5 1/2	5 3/4	6	6 3/4	7 1/2	8	8 1/4	8 3/4	9	9 1/2	10 1/2
		M & F T & G	2 3/4	3 1/4	3 1/4	3 1/2	4	4	4 1/2	4 3/4	5 1/4	5 1/4	5 1/4	5 3/4	6 1/2	7 1/4	7 3/4	8	8 1/2	8 3/4	9 1/4	10 1/4
		RTJ	3	3 1/2	3 1/2	3 3/4	4 1/4	4 1/4	4 3/4	5	5 1/2	5 1/2	5 3/4	6	6 3/4	7 1/2	8	8 1/4	8 3/4	9	9 3/4	11
	Ring No.		R11	R13	R16	R18	R20	R23	R26	R31	R34	R37	R41	R45	R49	R53	R57	R61	R65	R69	R73	R77
Class 600	Number		4	4	4	4	4	8	8	8	8	8	8	12	12	16	20	20	20	20	24	24
	Diameter		1/2	5/8	5/8	5/8	3/4	5/8	3/4	3/4	7/8	7/8	1	1	1 1/8	1 1/4	1 1/4	1 3/8	1 1/2	1 5/8	1 5/8	1 7/8
	Length of Stud Bolts	1/4" RF	3	3 1/2	3 1/2	3 3/4	4 1/4	4 1/4	4 3/4	5	5 1/2	5 3/4	6 1/2	6 3/4	7 1/2	8 1/2	8 3/4	9 1/4	10	10 3/4	11 1/4	13
		M & F T & G	2 3/4	3 1/4	3 1/4	3 1/2	4	4	4 1/2	4 3/4	5 1/4	5 1/2	6 1/4	6 1/2	7 1/4	8 1/4	8 1/2	9	9 3/4	10 1/2	11	12 3/4
		RTJ	3	3 1/2	3 1/2	3 3/4	4 1/4	4 1/4	4 3/4	5	5 1/2	5 3/4	6 1/2	6 3/4	7 3/4	8 1/2	8 3/4	9 1/4	10	10 3/4	11 1/2	13 1/4
	Ring No.		R11	R13	R16	R18	R20	R23	R26	R31	R34	R37	R41	R45	R49	R53	R57	R61	R65	R69	R73	R77
Class 900	Number		4	4	4	4	4	8	8	8		8	8	12	12	16	20	20	20	20	20	20
	Diameter		3/4	3/4	7/8	7/8	1	7/8	1	7/8		1 1/8	1 1/4	1 1/8	1 3/8	1 3/8	1 3/8	1 1/2	1 5/8	1 7/8	2	2 1/2
	Length of Stud Bolts	1/4" RF	4 1/4	4 1/2	5	5	5 1/2	5 3/4	6 1/4	5 3/4		6 3/4	7 1/2	7 1/2	8 3/4	9 1/4	10	10 3/4	11 1/4	12 3/4	13 3/4	17 1/4
		M & F T & G	4	4 1/4	4 3/4	4 3/4	5 1/4	5 1/2	6	5 1/2		6 1/2	7 1/4	7 1/4	8 1/2	9	9 3/4	10 1/2	11	12 1/2	13 1/2	17
		RTJ	4 1/4	4 1/2	5	5	5 1/2	5 3/4	6 1/4	5 3/4		6 3/4	7 1/2	7 3/4	8 3/4	9 1/4	10	11	11 1/2	13 1/4	14 1/4	18
	Ring No.		R12	R14	R16	R18	R20	R24	R27	R31		R37	R41	R45	R49	R53	R57	R62	R66	R70	R74	R78
Class 1500	Number		4	4	4	4	4	8	8	8		8	8	12	12	16	16	16	16	16	16	16
	Diameter		3/4	3/4	7/8	7/8	1	7/8	1	1 1/8		1 1/4	1 1/2	1 3/8	1 5/8	1 7/8	2	2 1/4	2 1/2	2 3/4	3	3 1/2
	Length of Stud Bolts	1/4" RF	4 1/4	4 1/2	5	5	5 1/2	5 3/4	6 1/4	7		7 3/4	9 3/4	10 1/4	11 1/2	13 1/4	14 3/4	16	17 1/2	19 1/2	21 1/4	24 1/4
		M & F T & G	4	4 1/4	4 3/4	4 3/4	5 1/4	5 1/2	6	6 3/4		7 1/2	9 1/2	10	11 1/4	13	14 1/2	15 3/4	17 1/4	19 1/4	21	24
		RTJ	4 1/4	4 1/2	5	5	5 1/2	5 3/4	6 1/4	7		7 3/4	9 3/4	10 1/2	12 3/4	13 1/2	15 1/4	16 3/4	18 1/2	20 3/4	22 1/4	25 1/2
	Ring No.		R12	R14	R16	R18	R20	R24	R27	R35		R39	R44	R46	R50	R54	R58	R63	R67	R71	R75	R79
Class 2500	Number		4	4	4	4	4	8	8	8		8	8	8	12	12	12					
	Diameter		3/4	3/4	7/8	1	1 1/8	1	1 1/8	1 1/4		1 1/2	1 3/4	2	2	2 1/2	2 3/4					
	Length of Stud Bolts	1/4" RF	4 3/4	5	5 1/2	6	6 3/4	7	7 3/4	8 3/4		10	11 3/4	13 1/2	15	19 1/4	21 1/4					
		M & F T & G	4 1/2	4 3/4	5 1/4	5 3/4	6 1/2	6 3/4	7 1/2	8 1/2		9 3/4	11 1/2	13 1/4	14 3/4	19	21					
		RTJ	4 3/4	5	5 1/2	6	6 3/4	7	8	9		10 1/4	12 1/4	14	15 1/2	20	22					
	Ring No.		R13	R16	R18	R21	R23	R26	R28	R32		R38	R42	R47	R51	R55	R60					

Stud-Bolt lengths do not include the height of the points. Lengths of studs and bolts, when used with lap joint flanges, are dependent upon the thickness of the lap of the stub end.

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