

PIPE SIZE	FLANGE BOLT DIAMETER (T.P.I.)	STUD LENGTH	# BOLTS PER FLANGE	MAX TORQUE UNLINED 150# STEEL FLANGES	150# FLANGE CIRCUMFERENCE	STANDARD WEIGHT PIPE CIRCUMFERENCE	STANDARD PIPE I.D.	STANDARD PIPE O.D.	STANDARD WEIGHT PIPE / FOOT	GALLONS WATER PER FOOT	WATER WEIGHT PER FOOT	MAXIMUM HANGER SPACING	MAX FLOW WATER (@ 7 FPS)	MAX 0 PSIG AIR FLOW	MAX 100 PSIG AIR FLOW	MAX 30# STEAM FLOW	MAX 30# CONDENSATE FLOW	MAX NATURAL GAS FLOW	INSULATION STEAM	CONDEN SATE	HOT WATER	CHILLED WATER	SWEAT PROTECT	APPROX. CHILLER SIZE	APPROX. TOWER SIZE	APPROX. BOILER SIZE	PIPE SIZE NOTES
NOTES	1, 2	1	1	1,3,4,5,6,7,8	1	1	1	1	1	1	1	1,9	1,10,11	1,10,12	1,10,12	1,13	1,14	1,15	17	18	19	20	21	22	23	24	
INCHES	INCHES - #	INCHES	#	FT-LBS	INCHES	INCHES	INCHES	INCHES	LB	GAL	LB	FT	GPM	SCFM	ACFM	LB/HR	LB/HR	CFH	INCHES	INCHES	INCHES	INCHES	INCHES	TON	TON	MBTH	INCHES
1/2	1/2 - 13	2 1/4	4	24	10.99	2.64	0.62	0.84	0.85	0.02	0.98	7	6	10	2	14	94	31	2.0	1.5	1.0	1.0	1.0	2.4	2	60	1/2
3/4	1/2 - 13	2 1/2	4	35	12.17	3.32	0.82	1.13	0.93	0.36	1.36	7	10	20	3	32	230	69	2.0	1.5	1.0	1.0	1.0	4	3	100	3/4
1	1/2 - 13	2 1/2	4	46	13.35	4.13	1.05	1.32	1.68	0.04	2.05	7	15	45	6	65	461	139	2.0	1.5	1.0	1.0	1.0	6	5	150	1
1 1/4	1/2 - 13	2 3/4	4	50	14.52	5.21	1.38	1.66	2.27	0.08	2.92	7	30	90	13	142	1,107	305	2.5	1.5	1.0	1.5	1.0	12	10	300	1 1/4
1 1/2	1/2 - 13	2 3/4	4	50	15.70	5.97	1.61	1.90	2.72	0.11	3.60	9	40	125	19	221	1,750	475	2.5	1.5	1.0	1.5	1.0	16	13	400	1 1/2
2	5/8 - 11	3 1/4	4	104	18.84	7.46	2.07	2.38	3.65	0.17	5.11	10	70	275	37	448	3,627	962	2.5	1.5	1.0	1.5	1.0	28	23	701	2
2 1/2	5/8 - 11	3 1/2	4	104	21.98	9.03	2.47	2.88	5.79	0.25	7.87	11	100	425	59	737	6,031	1,570	2.5	2.0	1.5	1.5	1.0	40	33	1,001	2 1/2
3	5/8 - 11	3 1/2	4	104	23.55	10.99	3.07	3.50	7.58	0.38	10.78	12	150	750	103	1,342	11,200	2,860	2.5	2.0	1.5	1.5	1.0	60	60	1,501	3
3 1/2	5/8 - 11	3 1/2	8	104	26.69	12.56	3.55	4.00	9.11	0.51	13.39	12	200	1,100	151				2.5	2.0	1.5	1.5	1.0	80	67	2,002	3 1/2
4	5/8 - 11	3 1/2	8	104	28.26	14.13	4.03	4.50	10.79	0.66	16.30	14	275	1,600	165	2,852	14,196	5,990	2.5	2.0	1.5	1.5	1.0	110	92	2,753	4
5	3/4 - 10	3 3/4	8	184	31.40	17.47	5.05	5.56	14.62	1.04	23.28	16	425	2,500	389	5,249	22,465	10,900	3.0	2.0	2.0	2.0	1.0	170	142	4,254	5
6	3/4 - 10	4	8	184	34.54	20.80	6.07	6.63	19.98	1.50	31.49	17	600	4,500	616	8,662	32,186	17,700	3.0	2.0	2.0	2.0	1.0	240	200	6,006	6
8	3/4 - 10	4 1/4	8	184	42.39	27.08	7.98	8.63	28.56	2.60	50.24	19	1,000	9,000	1,267	18,030	56,383	36,300	3.0	2.5	2.0	2.0	1.5	400	333	10,009	8
10	7/8 - 9	4 1/2	12	297	50.24	33.76	10.02	10.75	40.50	4.09	74.60	22	1,600	16,000	2,278	32,902	92,189		3.0	2.5	2.0	2.0	1.5	640	533	16,015	10
12	7/8 - 9	4 3/4	12	297	59.66	40.04	12.00	12.75	49.60	5.88	98.60	23	2,000	26,000	3,644	52,806	133,889		3.5	2.5	2.0	2.0	1.5	800	667	20,019	12
14	1 - 8	5 1/4	12	445	65.94	43.96	13.25	14.00	54.60	7.16	114.30	25	2,500						3.5	2.5	2.0	2.0	1.5	1000	833	25,024	14
16	1 - 8	5 1/4	16	445	73.79	50.24	15.25	16.00	62.60	9.48	141.70	27	3,500						3.5	2.5	2.0	2.0	1.5	1400	1,167	35,033	16
18	1 1/8 - 7	5 3/4	16	631	78.50	56.52	17.25	18.00	70.60	12.13	171.80	28	4,500						3.5	2.5	2.0	2.0	1.5	1800	1,500	45,042	18
20	1 1/8 - 7	6 1/4	20	631	86.35	62.80	19.25	20.00	78.60	15.11	204.60	30	6,000						3.5	2.5	2.0	2.0	1.5	2400	2,000	60,056	20
22	1 1/4 - 7	6 1/2	20	890	92.63	69.08	21.25	22.00	86.61	18.43	240.29	30	6,600						3.5	2.5	2.0	2.0	1.5	2640	2,200	66,062	22
24	1 1/4 - 7	6 3/4	20	890	100.48	75.36	23.25	24.00	94.60	22.04	278.40	32	8,000						3.5	2.5	2.0	2.0	1.5	3200	2,667	80,075	24
26	1 1/4 - 7	8 1/2	24	890	108.33	81.64	25.25	26.00	102.63	26.02	319.62	32	9,400						3.5	2.5	2.0	2.0	1.5	3760	3,133	94,088	26
28	1 1/4 - 7			890		87.92	27.25	28.00	110.64	30.30	363.37	32	10,900						3.5	2.5	2.0	2.0	1.5	4360	3,633	109,102	28
30	1 1/4 - 7	9	28	890	121.68	94.20	29.25	30.00	118.70	34.89	409.70	33	12,600						3.5	2.5	2.0	2.0	1.5	5040	4,200	126,118	30
32	1 1/2 - 6			1549		100.48	31.25	32.00	126.66	39.85	450.02	33	14,300						3.5	2.5	2.0	2.0	1.5	5720	4,767	143,134	32
34	1 1/2 - 6	10	32	1549	137.38	106.76	33.25	34.00	134.67	45.12	510.94	33	16,200						3.5	2.5	2.0	2.0	1.5	6480	5,400	162,152	34
36	1 1/2 - 6	10 3/4	32	1549	144.44	113.04	35.25	36.00	142.68	50.71	565.57	33	18,300						3.5	2.5	2.0	2.0	1.5	7320	6,100	183,172	36
42	1 1/2 - 6	11 1/4	36	1549	166.42	131.88	41.25	42.00	166.71	69.42	745.70	33	25,000						3.5	2.5	2.0	2.0	1.5	10000	8,333	250,235	42

GALLONS	CUBIC FEET	HEIGHT	DIAMETER
100	13	4.1	2.0
250	33	5.5	2.8
500	67	7.0	3.5
1,000	134	8.8	4.4
5,000	668	15.0	7.5
10,000	1,337	19.0	9.5
20,000	2,673	23.9	11.9
50,000	6,684	32.4	16.2
100,000	13,367	40.8	20.4
500,000	66,836	69.8	34.9
1,000,000	133,672	88.0	44.0

*SEE NOTE 16 FOR TANK SIZE CHART

- NOTES:
 1. THIS ENTIRE TABLE APPLIES TO SCHEDULE 40 STEEL PIPE WITH 150# FLANGES
 2. STUD LENGTH ASSUMES RAISED FACE FLANGES, 2 FLAT WASHERS, 2 NUTS, AND 2 THREADS SHOWING EACH END
 3. TORQUE VALUES ASSUME NEW LUBRICATED, B-7 GRADE, CARBON STEEL BOLTS
 4. TORQUE VALUES FOR FLANGED LARGER THAN 2" ASSUME THAT BOLT STRESS IS LIMITING FACTOR IN JOINT, NOT GASKET CRUSH
 5. TORQUE VALUE IS BASED ON 50% OF BOLT YIELD FOR FLANGES LARGER THAN 2". IF MORE TORQUE IS NEEDED, DO NOT EXCEED RECOMMENDED TORQUE VALUE IN THIS TABLE BY MORE THAN 40%
 6. IF SEAL CAN NOT BE ACHIEVED AT 140% OF TORQUE VALUE IN TABLE, FLANGE SHOULD BE DISASSEMBLED AND GASKET AND FLANGES INSPECTED
 7. FLANGE SHOULD BE TORQUED IN FOUR SUCCESSIVE PASSES, AT 33%, 66%, AND 100% OF FINAL TORQUE VALUE, THEN A FINAL PASS @ 100% TOQUE. MORE PASSES MAY BE NECESSARY DEPENDING UPON THE SYSTEM
 8. TORQUE VALUES ASSUME A PROPER TORQUING SEQUENCE IS USED FOR EACH PASS. FINAL PASS SHOULD BE ROTATIONAL AT FINAL TORQUE VALUE UNTIL ALL BOLTS ARE STABLE
 9. MAX HANGER SPACING IS FOR STRAIGHT, HORIZONTAL RUNS OF UNINSULATED, STANDARD WALL PIPE IN WATER SERVICE WITHOUT CONCENTRATED LOADS.
 10. MAX FLOWS ARE BASED ON FLUID TEMPERATURE OF 60 DEGREES FAHRENHEIT
 11. MAX WATER FLOW IS BASED ON 7 FPS VELOCITY MAX
 12. MAX AIR FLOW IS BASED ON 0.5 PSID PER 100 FEET
 13. MAX 30# STEAM FLOW IS FOR SATURATED STEAM, AND IS BASED ON PRESSURE DROP OF 0.5 PSIG PER 100 FT PIPE
 14. MAX CONDENSATE FLOW ASSUMES 5 PSIG BACKPRESSURE, 0.25 PSIG DROP FOR 3" AND SMALLER PIPE, AND 3000 FPM FOR LARGER THAN 3" PIPE
 15. MAX NATURAL GAS FLOW IS BASED ON 7" WATER COLUMN SUPPLY AND 0.35" WATER COLUMN LOSS PER 100 FEET. USE CAPACITY FACTORS FOR OTHER LENGTH RUNS (10FT = 3.16, 50FT = 1.41, 200FT = 0.707, 400FT = 0.500)
 16. TANK DIMENSIONS FOR HORIZONTAL CYLINDERS IGNORES VOLUME OF HEADS. BASED ON RATIO OF THUMB OF 2:1 RATIO FOR HEIGHT DIAMETER
 17. FIBERGLASS INSULATION THICKNESS RECOMMENDED FOR STEAM LINES UP TO 75 PSIG (320 F).
 18. FIBERGLASS INSULATION THICKNESS RECOMMENDED FOR HOT CONDENSATE.
 19. FIBERGLASS INSULATION THICKNESS RECOMMENDED FOR HOT WATER 120 TO 200 F.
 20. FIBERGLASS INSULATION THICKNESS RECOMMENDED FOR CHILLED WATER 40 TO 55 F.
 21. ELASTOMERIC FOAM INSULATION FOR CONTROL OF OUTER SURFACE CONDENSATION FOR LINES AS COLD AS 35 F EXPOSED TO SEVERE CONDITIONS 90 F / 80 % RH.
 22. CHILLER SIZE BASED ON 7 FPS WATER FLOW AT 2.5 GPM/TON
 23. COOLING TOWER SIZE BASED ON 7 FPS WATER FLOW AT 3.0 GPM/TON.
 24. HOT WATER BOILER SIZE BASED ON 7 FPS WATER FLOW AT 20 DEG F DT.