



RM Cotton Co
 7145 Boone Ave N, Suite 200B
 Brooklyn Park, MN 55428
 (763) 473-4640 / (888) 658-5513
 www.rm cotton.com

BOILERS

BURNERS

COMMERCIAL WATER HEATERS

CONDENSATE HANDLING

CONTROLS

EXHAUST SYSTEMS

PUMPS

MISC HYDRONIC SPECIALTIES

OFFICES		
Twin Cities 7145 Boone Ave N Suite 200B Brooklyn Park, MN 55428 (763) 473-4640	Duluth 2820 Piedmont Avenue Suite C Duluth, MN 55811 (218) 206-3750	Fargo 1241 Prairie Parkway Suite 110 West Fargo, ND 58078 (701) 532-3040

since 1956

BOILERS & HYDRONICS

Volume of Water in Standard Pipe and Tube

Nominal Pipe Size			Standard Steel Pipe				Type L Copper Tube			
			Inside Diameter		Volume		Inside Diameter		Volume	
inch	(mm)	Schedule No.	inch	(mm)	gal/ft	(L/m)	inch	(mm)	gal/ft	(L/m)
3/8	10	-	-	-	-	-	0.430	1.09	0.008	0.09
1/2	15	40	0.622	1.58	0.016	0.19	0.545	1.38	0.012	0.15
5/8	16	-	-	-	-	-	0.666	1.69	0.018	0.22
3/4	20	40	0.824	2.09	0.028	0.34	0.785	1.99	0.025	0.31
1	25	40	1.049	2.66	0.045	0.56	1.025	2.60	0.043	0.53
1 1/4	32	40	1.380	3.50	0.078	0.97	1.265	3.21	0.065	0.81
1 1/2	40	40	1.610	4.09	0.106	1.32	1.505	3.82	0.092	1.15
2	50	40	2.067	5.25	0.174	2.16	1.985	5.04	0.161	2.00
2 1/2	65	40	2.469	6.27	0.249	3.09	2.465	6.26	0.248	3.08
3	80	40	3.068	7.79	0.384	4.77	2.945	7.48	0.354	4.40
3 1/2	90	40	3.548	9.01	0.514	6.38	3.425	8.70	0.479	5.95
4	100	40	4.026	10.23	0.661	8.21	3.905	9.92	0.622	7.73
5	125	40	5.047	12.82	1.04	12.92	4.875	12.38	0.97	12.05
6	150	40	6.065	15.41	1.50	18.63	5.845	14.85	1.39	17.26
8	200	30	8.071	20.50	2.66	33.03	7.725	19.62	2.43	30.18
10	250	30	10.136	25.75	4.19	52.04	9.625	24.45	3.78	46.95
12	300	30	12.090	30.71	5.96	74.02	11.565	29.38	5.46	67.81

USEFUL FORMULAS

$$GPM = \frac{BTU/HR}{500 \times \Delta T}$$

$$PUMP\ HP = \frac{GPM \times FT\ HD}{3960 \times PUMP\ EFF}$$

1 FT³ H₂O = 7.48 GAL

BOILER HP = 33475 BTU/HR

1 GAL H₂O = 8.33 LBS

$$LBS/HR\ OF\ CONDENSATE = \frac{BTU/HR}{BTU/LB\ OF\ STEAM}$$

1 FT³ H₂O = 62.3 LBS

$$GPM = \frac{LBS/HR\ OF\ CONDENSATE}{500}$$

1 PSI = 2.31 FT of H₂O

746 WATTS = 1HP

1 WATT = 3.415 BTU

PPH Steam = BTU/970 = BHP*34.5

Affinity Laws

	GPM Capacity	Ft Head	BHP
Impeller Diameter Change	$Q_2 = (D_2/D_1) \times Q_1$	$H_2 = (D_2/D_1)^2 \times H_1$	$P_2 = (D_2/D_1)^3 \times P_1$
Speed Change	$Q_2 = (RPM_2/RPM_1) \times Q_1$	$H_2 = (RPM_2/RPM_1)^2 \times H_1$	$P_2 = (RPM_2/RPM_1)^3 \times P_1$

Q=GPM, H=Head, P=BHP, D=Impeller Dia, RPM= Pump Speed

Recommended Max Flow Rates

GPM Max	Size (in)
Up to 4	3/4
4 to 8	1
8 to 16	1 1/4
16 to 24	1 1/2
24 to 50	2
50 to 80	2 1/2
80 to 150	3
150 to 300	4
300 to 750	6
750 to 1600	8
1600 to 2800	10
2800 to 4500	12