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TCH
TWIN CITY HOSE, INC.

VIBRATION ELIMINATOR

wessels company
SINCE 1858

OFFICES

Twin Cities
7145 Boone Ave N
Suite 200B
Brooklyn Park, MN 55428
(763) 473-4640

Fargo
1241 Prairie Parkway
Suite 110
West Fargo, ND 58078
(701) 532-3040

since 1956

HYDRONICS & PLUMBING

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

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

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

$$1 \text{ FT}^3 \text{ H}_2\text{O} = 7.48 \text{ GAL}$$

$$\text{BOILER HP} = 33475 \text{ BTU/HR}$$

$$1 \text{ GAL H}_2\text{O} = 8.33 \text{ LBS}$$

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

$$1 \text{ FT}^3 \text{ H}_2\text{O} = 62.3 \text{ LBS}$$

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

$$1 \text{ PSI} = 2.31 \text{ FT of H}_2\text{O}$$

$$746 \text{ WATTS} = 1 \text{ HP}$$

$$1 \text{ WATT} = 3.415 \text{ BTU}$$

$$\text{PPH Steam} = \text{BTU/970} = \text{BHP} \times 34.5$$

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	$Q_2 = (\text{RPM}_2/\text{RPM}_1) \times Q_1$	$H_2 = (\text{RPM}_2/\text{RPM}_1)^2 \times H_1$	$P_2 = (\text{RPM}_2/\text{RPM}_1)^3 \times P_1$

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