

CHOOSING THE PERFECT PUMP

BY CALCULATING TOTAL DYNAMIC HEAD

1 PICK A LOOK AND SPECIFY A FLOW



≈ 750 GPH PER FOOT

≈ 1500 GPH PER FOOT

≈ 2250 GPH PER FOOT

Choose the appearance you would like for your waterfall from the suggested choices to the left. Multiply the corresponding **GPH Per Foot** by the desired **Width of the Waterfall** to find the **Recommended Flow**.

$$\text{THE LOOK YOU WANT IN GPH/FT} \times \text{THE WIDTH OF WATERFALL IN FEET} = \text{RECOMMENDED FLOW (GPH)}$$

2 CHART A

FRICITION LOSS PER FOOT OF TUBING

FLOW (GPH)	TUBING SIZE						
	½"	¾"	1"	1¼"	1½"	2"	3"
100	0.10	0.01					
200	0.38	0.05	0.01				
300	0.83	0.10	0.02				
400	1.00	0.18	0.04	0.01			
500	2.23	0.27	0.06	0.02			
750		0.50	0.14	0.04	0.02		
1000		0.84	0.21	0.07	0.03		
1250		1.20	0.33	0.10	0.04	0.01	
1500			0.43	0.15	0.06	0.02	
2000			0.94	0.26	0.10	0.03	
3000			2.07	0.52	0.22	0.05	
4000				1.10	0.43	0.09	0.01
5000				1.80	0.67	0.15	0.02
6000					0.96	0.22	0.03
8000					1.77	0.38	0.05
10,000						0.59	0.07
12,000						0.84	0.10
15,000							0.15
18,000							0.25

(Example) GPH: 3000 Multiplier: 0.05 Tubing: 2"

** For flows over 10,000 GPH or lengths over 100 ft. please contact us.

CHART B

FRICITION IN EQUIVALENT FEET OF STRAIGHT PIPE

PVC FITTINGS	FITTING SIZE					
	½"	1"	1¼"	1½"	2"	3"
Std Elbow, 90 degree	4.5	5.5	7.0	7.5	8.5	11.0
Std Elbow, 45 degree	1.0	1.5	2.0	2.5	3.0	4.0
Male / Female Adapter	1.5	2.0	3.0	3.5	4.5	6.5
Tee (Straight Thru)	2.5	3.0	5.0	6.0	8.0	12.0
Tee (Thru Branch)	5.5	7.0	9.0	10.0	12.0	17.0
Swing Check Valve	9.0	11.0	13.0	15.0	19.0	27.0

Example: 8.5 (90°) + 4.5 (M/FA) + 19.0 (Check Valve) = 32 (Fitting Length in Feet)

SELECT TUBING & MULTIPLIER

Find the dark blue cell in the row that corresponds with the **Recommended Flow (GPH)** in CHART A. The column indicates the recommended tubing size and the number in the cell is the **Friction Loss** in every foot of tubing. Keep Friction Loss low for greatest flow.

To find the **Friction Loss** of existing systems, estimate the flow through the actual tubing size used.

ADD EQUIVALENT TUBING LENGTHS

Add the equivalent lengths of all the fittings in the system, from CHART B, to the tubing length from pump to falls to find the **Equivalent Tubing Length**.

$$\text{FITTING LENGTH IN FEET} + \text{TUBING LENGTH IN FEET} = \text{EQUIVALENT TUBING LENGTH IN FEET}$$

CALCULATE FRICTION HEAD

Multiply the **Equivalent Tubing Length** in feet by the **Friction Loss** in the dark blue cell from CHART A to find the **Friction Head** of the system.

$$\text{EQUIVALENT TUBING LENGTH IN FEET} \times \text{FRICTION LOSS FROM CHART} = \text{FRICTION HEAD IN FEET}$$

3 FIND THE TOTAL DYNAMIC HEAD

Add the **Friction Head in Feet** to the **Vertical Head** of the system. Vertical Head is the height in feet from the surface of the water the pump will be sitting in, to the highest point the water is pumped to.

$$\text{FRICTION HEAD IN FEET} + \text{VERTICAL HEAD IN FEET} = \text{TDH}$$

4 CHOOSE YOUR PUMP

Find the **Total Dynamic Head (TDH)** at the top of CHART C, then find the pumps below that provide at least the **Recommended Flow**. Grey colored cells indicate that the TDH is outside the pump's operating range and the pump will likely not last in this application. The light blue cells indicate the pump is operating within its operating range. Dark blue means the TDH is in the pump's Best Efficiency Range, where the pump will run best and longest. If the chart gives you a choice of more than one pump, check for the type that best fits your application from the list below, then check for the lowest wattage, to save on operating costs.

- Magnetic Drive Pumps (MD-Series) - compact size, impervious to hard water, best for smaller water features
- Asynchronous Pumps (TT-Series) - compact size, clean water pumps, best choice for most applications
- Solids Handling Pumps (PAF- and SH-Series) - mid-size solids handling, best for dirty water applications
- Direct Drive Pumps (A-Series) - large size, good for dirty water applications, best for high pressure applications
- Axial Pumps (L-Series) - very large, clean water pumps, great for low, wide falls, require large diameter plumbing

CHART C

MODEL	WATTS	MAX FLOW	5'	10'	15'	20'	25'	30'	35'	40'	45'	50'	55'	60'
MD250	15	300	65											
MD350	25	370	145											
MD550	40	650	385											
MD750	50	790	465											
MD1000	90	1080	785	275										
MD1250	120	1330	1040	580										
MD1500	165	1560	1255	780										
TT1500	101	1640	1060	350										
TT2000	115	2640	1760	715										
TT3000	173	3000	2180	1215	475									
TT4000	230	4490	3330	1785	700									
TT5000	310	5150	4255	3170	1615									
TT6000	334	6600	4915	3065	1480									
TT7500	520	7650	6300	4640	2860	1250								
TT9000	587	9200	7795	6210	4490	2695								
SH1450	240	---	1170	650										
SH2050	320	---	1700	1130										
SH3600	575	---	3245	2750	2090									
SH5000	950	---	4350	3620	2800									
SH6500	1000	---		4875	4000	3080								
PAF-20	360	---	2800	1950	1080									
PAF-25	545	---	3900	3150	2300									
PAF-40	650	---		4350	3570	2700								
PAF-75	900	---			4560	3750	2830							
A-05	645	---			2500	2155	1875	1455	935					
A-05L	725	---			4320	3600	2820	1920						
A-21	1060	---				4335	3770	3140	2400					
A-31	1160	---				8150	6830	5535	4120	2535				
A-32	2055	---						8280	7560	6780	5580	4920		
L-305	710	---	10380	7380										
L-310	1105	---	13500	10560	7380									

Best Efficiency Range Recommended Operating Range Do Not Operate Range