PIPE & HOSE FRICTION TABLES

FLOW	PRESSURE DROP IN PSI FOR VARIOUS PIPE SIZES (10FT. LENGTH)							
IN GPM	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1¼"	1½"
.2	.2							
.3	.4							
.4	.6	.16						
.5	1.0	.24						
.6	1.5	.34						
.8	2.5	.60	.13					
1.0	3.7	.89	.19	.08				
1.5	8.0	1.8	.40	.13				
2.0		3.1	.65	.21	.05			
2.5		4.7	1.1	.32	.08			
3.0		6.3	1.5	.45	.11			
3.5			2.0	.60	.14			
4.0			2.5	.78	.18	.06		
4.5			3.1	.98	.23	.08		
5.0			3.8	1.2	.28	.09		
6.0			5.2	1.6	.38	.11		
8.0				2.8	.63	.20	.06	
10.0				4.2	1.0	.30	.08	.04
15.0					2.2	.61	.16	.08
20.0					3.8	1.1	.29	.13
25.0						1.7	.41	.20
30.0						2.4	.59	.27
35.0							.79	.36
40.0							1.0	.48
50.0								.71

NOTE: The above figures are for standard pipe of either seamless or welded construction, in good clean condition. Recommended maximum capacity to keep velocity at approximately 5 ft. per second is shown above heavy lines.

FLOW	PRESSURE DROP IN PSI FOR VARIOUS HOSE SIZES 25 ft. length with no coupling							
IN GPM	1/4" I.D.	3/8" I.D.	1/2" I.D.	5/8" I.D.	3/4" I.D.	1" I.D.	1¼" I.D.	1½" I.D.
.2	.8							
.3	1.5							
.4	2.5							
.5	4.0	.5						
.6	5.0	.8						
.8	9.0	1.3						
1.0		1.8	.5					
2.0		6.0	1.5					
3.0		13.0	3.1	1.0				
4.0			6.0	1.8				
5.0			8.5	2.5	1.0			
6.0			12.0	3.7	1.5			
8.0				6.5	2.5	.6		
10.0				9.5	3.7	1.0		
15.0					8.0	2.0	.7	
20.0					14.0	3.4	1.2	.4
25.0						5.0	1.8	.6
30.0						6.5	2.5	.9
40.0						12.0	4.4	1.4
50.0							6.0	2.1
60.0							9.0	2.9
70.0							13.0	4.0

NOTE: The above figures are for standard hose in good condition with no couplings.

APPROXIMATE FRICTION LOSS IN PIPE FITTINGS
in terms of equivalent feet of straight pipe.

PIPE SIZE STD. WT.	ACTUAL INSIDE DIAM. IN.	GATE VALVE FULL OPEN	GLOBE VALVE FULL OPEN	45° ELBOW	RUN OF STD. TEE	STD. ELBOW OR RUN OF TEE REDUCED 1/2	STD. TEE THRU SIDE OUTLET
1/8	.269	.15	8	.35	.40	.75	1.4
1/4	.364	.20	11	.50	.65	1.1	2.2
1/2	.622	.35	18.6	.78	1.1	1.7	3.3
3/4	.824	.44	23.1	.97	1.4	2.1	4.2
1	1.049	.56	29.4	1.2	1.8	2.6	5.3
1-1/4	1.380	.74	38.6	1.6	2.3	3.5	7.0
1-1/2	1.610	.86	45.2	1.9	2.7	4.1	8.1
2	2.067	1.1	58	2.4	3.5	5.2	10.4
2-1/2	2.469	1.3	69	2.9	4.2	6.2	12.4

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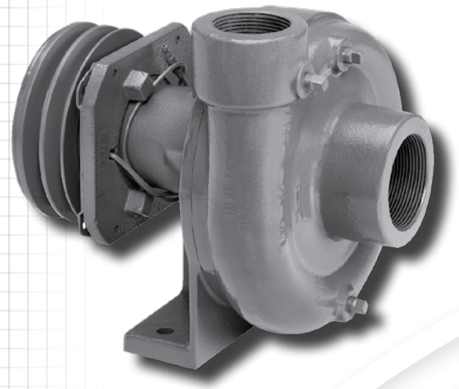
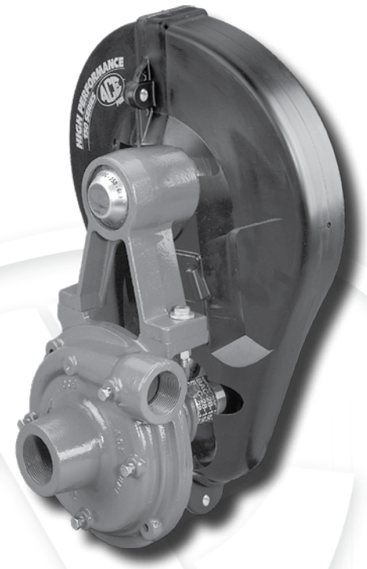
Ace Form # PLUMB
06/09

ACE PUMPS

PLUMBING GUIDE





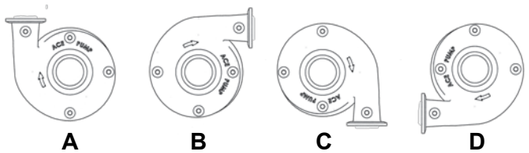
FOR CENTRIFUGAL PUMPS

PUMP MOUNTING

Ace centrifugal pumps are straight centrifugals and must be primed prior to operation. The word "**primed**" means the pump must be completely full of water and any trapped air vented before the pump is operated. Following the pump mounting guidelines will insure proper priming of the pump and avoid premature seal failure.

The following are basic guidelines for proper pump mounting:

- The pump should be mounted below the tank(s) allowing gravity to naturally fill the pump with liquid.
- The volute should be oriented with the discharge port pointing up (A) or across the top (B) of the pump which allows air to rise out of the pump.



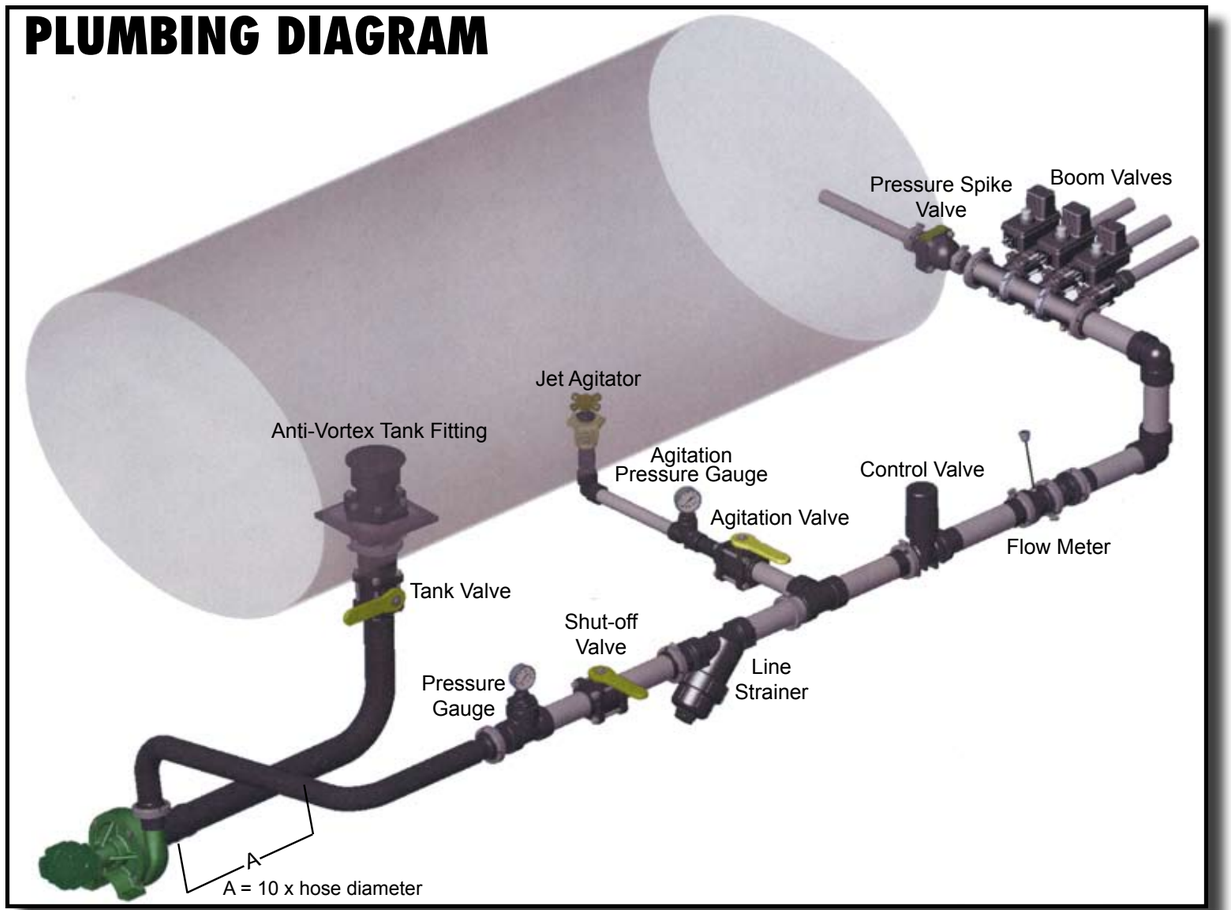
A **B** **C** **D**

If the volute must be oriented at the bottom (C) or across the bottom (D):

1. A 1/4" vent line should be installed from the highest pipe plug hole (1/8" NPT) to the top of the sprayer tank. This will continually bleed air from the pump housing.
2. A petcock valve can also be installed in the highest pipe plug hole to bleed the air manually each time the tanks are filled.

- If the pump must be located above the liquid level, a foot valve should be installed to maintain the pump's prime.

PLUMBING DIAGRAM



PLUMBING SUGGESTIONS

The primary goal when plumbing a sprayer pump is to route liquid from the pump to the spray boom with minimum restriction. Minimizing restrictions is necessary for achieving the pump's maximum rated capacity. The following are recommended practices to maximize pump performance and efficiency:

- Hoses should be the same size as the pump's suction and discharge port.
  A straight run of 10 times the suction hose diameter is recommended prior to the pump inlet.
  Example: 1.5" hose diameter = 15" of straight hose
  The straight section provides laminar water flow to the pump.
  Pump performance may be increased up to 20% by over sizing the suction hose.

- A minimum number of elbows, fittings, and valves should be used to reduce pressure losses. These should also be sized properly to prevent flow restrictions. See the back page for charts with typical losses for standard pipe, hose, and fittings.

- An anti-vortex fitting should be installed on the suction port inside the tank. This fitting prevents a vortex from forming when the tank liquid level is low. A vortex will allow the pump to pull air in causing irregular performance or loss of prime.

PLUMBING SUGGESTIONS (continued)

- Install a pressure gauge and valve on the discharge side of the pump for the purpose of measuring the SHUT-OFF pressure. The SHUT-OFF pressure is needed for the setup of HYD series pumps.

- An agitation flow rate of 5% of the tank capacity is recommended for most chemicals. A higher rate of 10% is suggested for wettable powders and materials difficult to keep in suspension. See the chart below for common tank sizes.

Tank Capacity	5%	10%
500 gallons	25 gpm	50 gpm
750 gallons	37 gpm	75 gpm
1000 gallons	50 gpm	100 gpm
1500 gallons	75 gpm	150 gpm

Jet agitators are the most efficient way to agitate a large tank. They operate on an entrainment principle where flow through an orifice is multiplied by capturing surrounding fluid. The flow rate is based on the pressure of the fluid passing through. A pressure gauge installed on the agitation line gives the operator an indication of total agitation flow. This is especially important for high application rates where more flow is needed for the boom.

- A line strainer should be installed on the discharge side of the pump to protect the nozzles from clogging. If a strainer must be used in front of the pump, a large mesh screen should be used to filter debris too large to pass through the impeller vanes.

- The electronic spray control valve and flow-meter should be sized for the desired maximum boom flow based on the application rate and ground speed. Use the worksheet below to calculate the total boom flow.

Application Rate (GPA) _____
Speed (MPH) x _____
Nozzle Spacing (inches) x _____
= _____ ÷ 5940 = _____ GPM per Nozzle
x _____ # of Nozzles
= _____ Boom Flow (GPM)

- A pressure spike valve is recommended for use with Ace MAX series models. These models operate at pressures up to 160 psi. A pressure spike is generated when the boom is turned off. The spike valve will relieve the pressure back to tank and prevent damage to system components.