Piping Size Selection for Wall Mount Self Cleaning Systems

To ensure proper operation of the Self Cleaning System, a minimum of 30 PSI water operating pressure during spraying must be achieved at the hood nozzles. For this to occur, proper sizing of the water line is required. Use the following steps to calculate the piping minimum size.

1. Use the Minimum Pressure Requirements for Lengths of Hood chart and find the minimum PSI required at the hood inlet. Subtract this value from the available PSI at the panel pressure gauge. Maximum panel operating pressure is 70 psi. This will be your maximum allowable pressure drop for field installed pipes between the panel and the hood.
2. Most fittings add an equivalent pipe length to the total run. Use the chart below to calculate the equivalent pipe length for installed fittings. If you have multiple fittings of one type, simply multiply the number below by the total number of the fitting and add to the total run length.

Equivalent Pipe Length For Various Pipe Fittings

Pipe Size Inches	45° Elbow	90° Elbow	Tee Thru Run	Tee Thru Branch
3/4"	0.97	2.10	1.40	4.10
1"	1.23	2.60	1.80	5.30
1 ½"	1.90	4.00	2.70	8.00

3. To calculate the total flowing pressure drop between the panel and the hood, take the total equivalent length found in step 2 and add the total linear field installed pipe length. Multiply this number by the value found in the table below, Pressure Drop (PSI) per Equivalent Foot of Waterline. (Gallons per minute is calculated by multiplying the length of the hood by 0.7 gpm) This will be the friction pressure drop between the hood and the panel.

Pressure Drop (PSI) per Equivalent Foot of Waterline - Pipe Size

Gallons per Minute	Waterline Pipe Size (psi per foot of pipe)		
	3/4"	1"	1 1/2"
10	0.102	0.029	0.004
20	0.368	0.105	0.014
30	0.779	0.222	0.030
40	1.327	0.379	0.052
50	2.005	0.573	0.078
60	2.809	0.803	0.109
70	3.735	1.068	0.146
80	4.782	1.367	0.186
90	5.947	1.7	0.232
100	7.223	2.066	0.282

4. Add in the pressure drop due to gravity. This must be evaluated to overcome any rise in pipe elevation between the panel and the hood. There is .43 psi/ft of vertical rise of pressure drop.
5. Now, compare the maximum allowable pressure drop from step 1 to the calculated pressure drop from step 3. If the calculated pressure drop exceeds the maximum allowable pressure drop, increase the pipe size and recalculate steps 2 and 3. Continue this step until the calculated pressure drop is below the maximum allowable.

Field Pipe Pressure Drop Calculation Example

Wall mount panel installed with 30 feet of 3/4 inch linear pipe between panel and hood. There are two 90 degree elbows installed in the pipe run and the pipe run has a vertical rise of 5 feet. Length of end-to-end hood system is 32 feet.

Hood System = 32 feet. Flow rate = 32 feet * 0.7 gpm = 23 gpm
Pressure required at hood = 37 psi.
Pressure at panel gauge = 50 psi.
Allowable pressure drop between panel and hoods: 50 psi – 37 psi = 13 psi

3/4 inch pipe pressure drop calculations:
Equivalent length of pipe = 30 + 2 * 2.10 = 34.20 feet
Friction Pressure Drop through pipe = 34.20 * 0.556 = 19.02 psi
Gravitational Pressure = 0.43 psi/ft * 5 feet = 2.15 psi
Total Pressure Drop in Field Pipe between panel and hood = 19.02 psi + 2.15 psi = **21.17 psi**
Allowable Pressure Drop = 13 psi

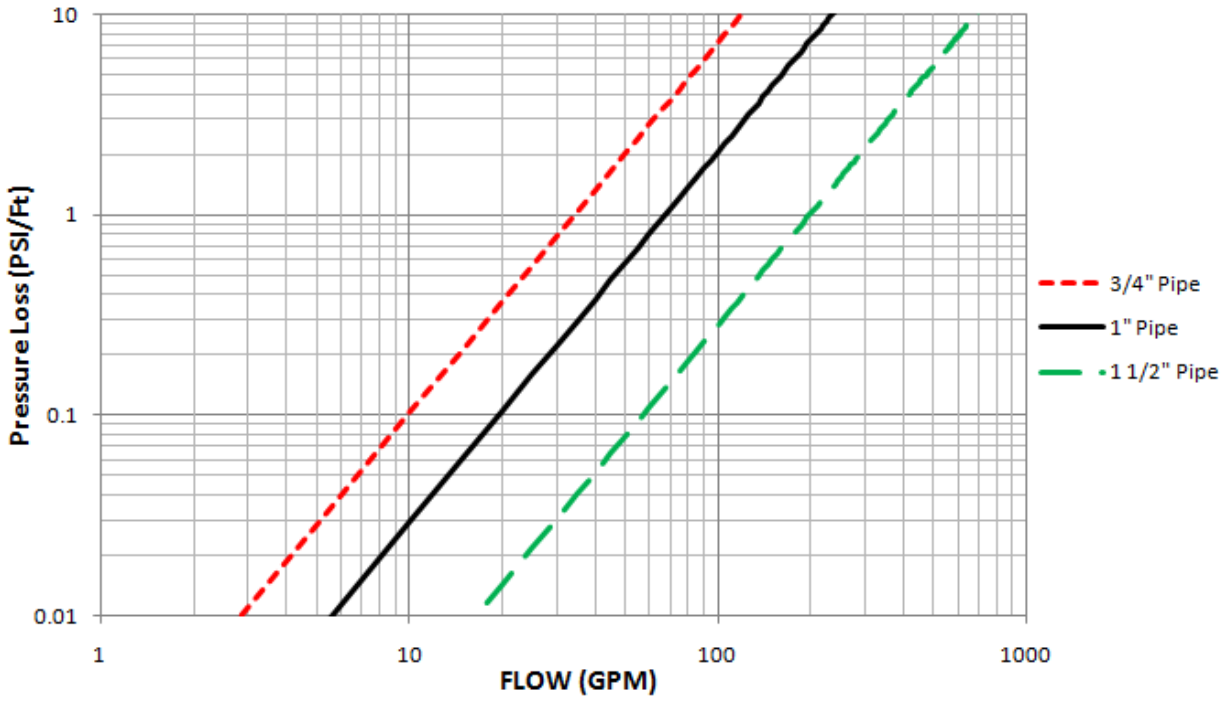
This system will not work correctly because calculated Total Pressure Drop is greater than Allowable Pressure Drop.

Re-calculate with 1 inch pipe instead of 3/4 inch pipe:

Equivalent length of pipe = 30 + 2 * 2.60 = 35.20 feet
Friction Pressure Drop through pipe = 35.20 * 0.159 = 5.60 psi
Gravitational Pressure = 0.43 psi/ft * 5 feet = 2.15 psi
Total Pressure Drop in Field Pipe between panel and hood = 5.60 psi + 2.15 psi = 7.75 psi
Allowable Pressure Drop = 13 psi

This system will work correctly because calculated Total Pressure Drop is less then Allowable Pressure Drop. Pipe size will need to be change to 1 inch diameter.

Pressure Loss through Typical Water Pipe Chart



Minimum Pressure Requirements for Lengths of Hood

Length of Hood (Ft)	Minimum Inlet Water Pressure for Cold Mist (PSI)	3/4" Manifold Minimum Operating Pressure	1" Manifold Minimum Operating Pressure	1-1/2" Manifold Minimum Operating Pressure
4	10	30	30	30
8	10	30	30	30
12	10	30	30	30
16	15	30	30	30
20	15	31	30	30
24	15	32	30	30
28	15	34	31	30
32	20	37	33	30
36	20	39	35	33
40	20	42	42	35
44	20	46	43	38
48	20	50	45	40

NOTE: Water pressure may not drop below 30 PSI while the hood hot water is operating. Pressure may not rise above 70 PSI when the hood is spraying. If the pressure is greater than 70 psi, a water regulator must be connected. The chart above is for continuous hood installations. If you exceed the lengths above, water line must be branched for adequate water supply.

Duct Sumps

If a duct sump is provided with the self-cleaning system, the water manifold of the duct sump would be connected to the hot water line coming from the control panel. The duct sump will be washed with hot water and surfactant simultaneously with the exhaust hood during wash cycles.

Round and rectangular duct sumps require a minimum of 20 psi at the inlet of the sump. All sumps have a 3/4" water inlet connection, 1-1/2" drain size and require 140-170°F water temperature. Rectangular Duct Sumps will use 1.2 GPM per 12" Width of Duct. Round Duct Sumps will use 3.5 GPM each.

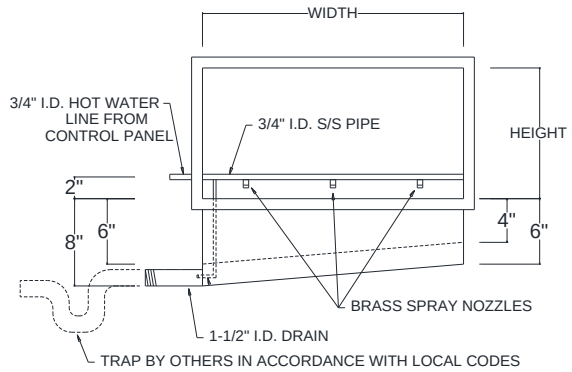
Refer to the table belowError! Reference source not found. for approximation of duct sump coverage per manifold size. Calculations are assuming that there is 0.1 psi/ft pressure loss.

Duct Sump Approximation Coverage

3/4" Manifold	1" Manifold	1-1/2" Manifold
One manifold covers up to 3 duct sumps	One manifold covers up to 6 duct sumps	One manifold covers up to 18 duct sumps

Figure 1 – Duct Sumps

RECTANGLE DUCT SUMP



ROUND DUCT SUMP (DOUBLE WALL SHOWN)