AIR - Flow Table

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Table B - Based upon inlet pressure 5 times higher than drop through valve
(valve pressure drop is 20% of inlet pressure)

PRESSURE DROP

IN POUNDS PER SQUARE INCH THRU { **V - FULL PORT MAGNATROL OR GLOBE VALVE**; **PIPE - PER LENGTH AS INDICATED**

FLOW CUBIC FEET OF FREE AIR PER HOUR	3/8"			1/2"			3/4"			1"			1-1/4"			1-1/2"			2"			2-1/2"			3"		
	V	PIPE		V	PIPE		V	PIPE		V	PIPE		V	PIPE		V	PIPE		V	PIPE		V	PIPE		V	PIPE	
		25'	50'		25'	50'		25'	50'		25'	50'		50'	100'		50'	100'		50'	100'		50'	100'		100'	200'
400	.55	.71	1.7	.24	.28	.60																					
600	1.1	1.2	3.1	.50	.50	1.2																					
800	1.7	1.7	4.4	.83	.75	1.8	.23	.24	.59																		
1,000	2.3	2.2	5.7	1.2	.99	2.5	.34	.33	.75																		
1,500	3.9	3.5	9.5	2.1	1.7	4.3	.70	.60	1.4	.25	.25	.55															
2,000	5.7	4.8	13	3.2	2.3	6.1	1.1	.88	2.3	.42	.38	.90	.20	.25	.53												
3,000	9.2	7.4	21	5.3	3.6	10	2.0	1.5	3.8	.85	.69	1.7	.42	.50	1.1	.25	.25	.53									
4,000	13	10	28	7.5	5.0	14	3.1	2.1	5.5	1.5	.99	2.6	.70	.75	1.8	.41	.42	.89	.15	.12	.24						
6,000	20	15	42	12	7.7	22	5.1	3.3	9.0	2.4	1.7	4.3	1.3	1.4	3.2	.84	.75	1.8	.32	.25	.54	.16	.11	.22			
8,000	27	21	58	17	11	29	7.2	4.5	12	3.5	2.3	6.0	2.0	2.0	5.2	1.3	1.2	2.7	.52	.42	.89	.28	.19	.38	.13	.12	.25
10,000	34	27	73	21	13	36	10	5.8	16	4.5	3.0	8.0	2.8	2.7	6.8	2.2	1.6	3.9	.77	.60	1.3	.41	.27	.57	.20	.19	.39
15,000	53	41	113	33	41	56	15	8.9	25	7.6	4.7	13	4.6	4.3	11	3.2	2.7	6.8	1.5	1.1	2.5	.85	.50	1.2	.43	.40	.85
20,000	72	58	150	44	27	77	20	12	34	11	6.3	18	6.6	6.0	16	4.7	3.6	9.7	2.2	1.6	3.9	1.3	.82	1.9	.70	.66	1.4
30,000	–	–	–	68	42	116	31	18	49	17	9.8	27	11	9.5	25	7.5	6.0	16	3.8	2.7	6.8	2.4	1.5	3.5	1.3	1.3	2.9
40,000	–	–	–	–	–	–	43	25	69	23	13	37	15	13	35	11	8.0	22	5.5	3.6	9.8	3.5	2.1	5.3	2.1	2.0	4.6
60,000	–	–	–	–	–	–	65	38	106	35	20	56	23	20	54	17	13	35	8.6	6.0	16	5.8	4.0	8.6	3.3	3.3	8.4
80,000	–	–	–	–	–	–	–	–	–	48	28	76	31	27	74	23	18	47	13	8.5	22	8.2	4.9	13	5.1	4.9	13
100,000	–	–	–	–	–	–	–	–	–	60	35	96	39	34	93	29	22	60	16	11	29	11	6.3	17	6.7	6.5	17
150,000	–	–	–	–	–	–	–	–	–	–	–	–	60	52	142	44	34	93	25	16	44	17	9.7	27	11	10	27
200,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	60	46	125	33	22	60	25	14	36	15	14	39
300,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	51	34	93	35	21	57	23	22	60
400,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	69	46	125	48	28	77	32	30	83
600,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	72	42	117	48	46	128
800,000	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	66	63	173

PROBLEM: Air to be discharged from tank to atmosphere. Rate of flow is 20,000 feet per hour. Tank pressure is 40 PSI. Discharge line to have one Magnatrol Valve, fittings with resistance equal to 20 feet of pipe, pipe 80 feet long, an equivalent of 100 feet of pipe.

SOLUTION: Total pressure drop is 100% of inlet pressure. Checking with the flow table at the 20,000 line and the medium size valves which appear to be in line for this job, roughly 1/3 of the drop, or 33%, goes to the valve, therefore table (B) which is based upon a 20% drop through the valve, should be used.

Reading on the 20,000 line from left to right, the first choice is 1 inch. Valve drop is given as 11 pounds. Pipe drop is given for lengths of 25 and 50 feet, and it will be noted that the drop for 50 feet is more than 2-1/2 times greater than for 25 feet. Multiplying the figure 18 by 2-1/2 gives 45 pounds as approximately the drop for 100 feet of 1 inch pipe; or a total drop of 56 pounds, which is too high. Repeating with the1-1/4 inch size, the valve drop is 6.6 pounds, the pipe, here shown for 100 feet, is 16 pounds; a total indicated pressure drop of 22.6 pounds, therefore the 1-1/4 inch size will serve.

The solution given for steam flow is also pertinent to the air flow problems.