

TYPES 135, 145 BACK PRESSURE VALVES

Capacity Table

The maximum capacity of any back pressure valve depends on its size and on the inlet and outlet pressures at the maximum rate of flow. The capacity depends also on the type and design of control mechanism. It is necessary to have all this information to figure the capacity accurately. Although a very large capacity can be obtained from any back pressure or relief valve if the inlet pressure rises enough, only the capacity obtainable with a moderate and safe pressure rise is important.

The capacities of valves in this bulletin are based on 10% rise or accumulation in inlet pressure above the set opening pressure, except Type 135 based on 5% rise.

Don't base your selection of valve size merely on size of pipe.

1. To find Valve Capacity—Multiply Capacity Factor by Orifice Capacity.
2. To find Valve Size needed—Divide Required Capacity by Orifice Capacity to obtain Capacity Factor. Then use Table No. 1.

Capacity Factors in Table No. 1 represent the capacity of each valve, with good regulation, as compared to the capacity of a standard orifice under the same conditions.

Orifice Capacities in Tables Nos. 2, 3, 4 and 5 are the rates of flow through a perfect (100% coefficient) orifice or nozzle of 1 sq. in. area for various combinations of inlet and outlet pressures.

Corrections for superheat and for fluids of different specific gravities are shown.

Maximum inlet temperature 450°F.

Example: Find steam capacity of 3" Type 135 Inlet pressure 20 lbs. —Outlet 8 lbs. or lower. Capacity Factor = 2.4 (See Table No. 1). Orifice Capacity = 1,900 lbs. per hr. (Table No. 3). Valve Capacity = 2.4 x 1,900 = 4,560 lbs. per hr. steam.

table no. 1—capacity factors—valves

	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"	10"	12"	14"
No. 135			.16	.27	.48	.64	1.1	1.5	2.4	4.4	6.4	8.8	16			

table no. 2—orifice capacities—high pressure steam

Outlet Pressure Lbs. per Square Inch Gage	Initial Gage Pressure—Lbs. per Square Inch							
	200	175	150	125	100	80	60	50
	Lbs. of Steam per Hour per Square Inch of Orifice							
125	10570	8820	6270					
100	10900	9580	7960	5640				
80	10900	9650	8400	6840	4620			
60	10900	9650	8400	7150	5720	4100		
50	10900	9650	8400	7150	5900	4670	2760	
40	10900	9650	8400	7150	5900	4900	3580	2550
30	10900	9650	8400	7150	5900	4900	3885	3225
25	10900	9650	8400	7150	5900	4900	3900	3360
20-0	10900	9650	8400	7150	5900	4900	3900	3400

If the steam is initially superheated multiply the above weights by
1—(0.00065 x degrees Fahr. superheat)

table no. 3—orifice capacities—low pressure steam

Outlet Pressure Lbs. per Square Inch Gage	Initial Gage Pressure—Lbs. per Square Inch							
	40	30	25	20	15	10	8	5
	Lbs. of Steam per Hour per Square Inch of Orifice							
30	2310							
25	2710	1575						
20	2840	2050	1480					
15	2900	2370	1930	1385				
10	2900	2400	2115	1780	1235			
8	2900	2400	2150	1900	1540	760		
5	2900	2400	2150	1900	1600	1110	860	
1	2900	2400	2150	1900	1600	1310	1075	915
O-Vac.	2900	2400	2150	1900	1600	1330	1210	985

If the steam is initially superheated multiply the above weights by
1—(0.00065 x degrees Fahr. superheat)

table no. 4—orifice capacities for air

Outlet Pressure Lbs. per Square Inch Gage	Initial Gage Pressure—Lbs. per Square Inch									
	100	90	80	70	60	50	40	30	20	10
	Cu. Ft. per Min. of Free Air (60°F.—14.7#/sq. in.) per Sq. In.									
70	1886	1535	1100							
60	2035	1770	1453	1023						
50	2090	1880	1643	1355	958					
40	2100	1913	1725	1505	1235	881				
35	2100	1913	1735	1530	1317	1025	590			
30	2100	1913	1735	1550	1350	1120	802			
25	2100	1913	1735	1550	1370	1165	910	533		
20	2100	1913	1735	1550	1370	1185	978	696		
15	2100	1913	1735	1550	1370	1185	1002	812	460	
10	2100	1913	1735	1550	1370	1185	1002	815	580	
5	2100	1913	1735	1550	1370	1185	1002	818	635	375
0	2100	1913	1735	1550	1370	1185	1002	818	635	446

For other gases, divide above CFM by $\sqrt{\text{specific gravity of the gas.}}$

table no. 5—orifice capacities for water

Pressure Drop	Pressure Drop through Orifice—Lbs. per Square Inch											
	100	85	70	60	50	40	30	25	20	15	10	5
GPM per Square Inch	380	350	318	294	269	240	208	190	170	147	120	85

For other liquids, divide above GPM by $\sqrt{\text{specific gravity of the liquid.}}$