

spirax sarco®

Steam Capacities 2 Port Valves

STEAM CAPACITIES - POUNDS OF SATURATED STEAM PER HOUR

Steam Pressure		1/2" BX & BM				SB			KA			KB				KC		NS	
Inlet	Outlet	2	3	4	6	1/2	3/4	1	1/2	3/4	1	1	1-1/4	1-1/2	2	1-1/2	2	2-1/2	3
2	0	8	13	21	33	52	78	137	58	94	198	198	333	479	687	333	687	1,310	1,890
3	0	9	16	26	41	64	96	168	71	115	242	242	408	587	842	408	842	1,610	2,320
5	3	8	14	23	37	57	86	150	64	103	217	217	366	525	754	366	754	1440	2080
5	1	11	19	30	49	76	114	200	85	137	289	289	487	700	1000	487	1000	1920	2720
7	5	9	15	24	39	60	90	159	67	108	229	229	386	554	795	386	795	1520	2190
7	2	13	22	35	56	88	132	231	98	158	333	333	561	807	1160	561	1160	2210	3190
10	7	11	19	31	50	77	116	204	87	139	294	294	496	713	1020	496	1020	1950	2820
10	5	14	24	38	61	95	143	250	107	171	362	362	610	876	1260	610	1260	2400	3470
12	9	12	20	32	52	81	121	213	91	146	308	308	518	745	1070	518	1070	2040	2950
12	7	15	25	40	64	100	150	263	112	180	380	380	640	920	1320	640	1320	2520	3640
12	0	19	31	51	82	128	191	336	143	230	485	485	816	1170	1680	816	1680	3210	4640
15	12	13	21	34	55	86	129	226	96	155	326	326	550	790	1130	550	1130	2170	3130
15	9	17	28	46	73	114	172	301	128	206	435	435	733	1050	1510	733	1510	2880	4170
15	0/3	21	35	57	91	142	214	375	160	257	542	542	912	1310	1880	912	1880	3590	5190
20	17	14	23	37	60	94	140	247	105	169	356	356	599	861	1240	599	1240	2360	3410
20	13	20	33	53	86	134	201	352	150	241	508	508	856	1230	1760	856	1760	3370	4870
20	0/5	24	41	67	107	167	250	439	187	300	633	633	1070	1530	2200	1070	2200	4200	6060
30	26	18	30	49	78	122	184	323	137	220	465	465	784	1130	1620	784	1620	3090	4460
30	22	24	41	66	105	164	247	433	184	296	625	625	1050	1510	2170	1050	2170	4150	5990
30	0/12	31	53	86	137	215	322	565	240	386	815	815	1370	1970	2830	1370	2830	5410	7810
40	34	24	40	66	105	164	246	432	184	295	624	624	1050	1510	2170	1050	2170	4140	5970
40	30	30	50	81	130	203	304	534	227	365	771	771	1300	1870	2680	1300	2680	5110	7390
40	0/17	39	65	105	168	263	394	691	294	473	998	998	1680	2420	3470	1680	3470	6620	9560
50	43	28	48	77	123	193	289	508	216	347	733	733	1230	1770	2550	1230	2550	4860	7020
50	37	37	61	100	159	249	373	655	279	448	946	946	1590	2290	3290	1590	3290	6270	9060
50	0/22	46	77	124	199	311	466	818	348	559	1180	1180	1990	2860	4100	1990	4100	7830	11300
60	52	33	55	89	142	222	333	584	248	399	843	843	1420	2040	2930	1420	2930	5590	8070
60	46	41	69	112	179	280	420	737	313	504	1060	1060	1790	2570	3690	1790	3690	7050	10190
60	0/30	53	88	143	229	359	538	944	402	645	1360	1360	2290	3300	4730	2290	4730	9040	13050
75	65	40	67	108	173	271	407	714	304	488		1030	1735	2490	3575	1735	3575	6830	9870
75	57	51	85	138	221	345	517	908	386	620		1310	2210	3170	4550	2210	4650	8690	12550
75	0/37	63	106	172	275	430	645	1130	482	775		1640	2760	3960	5680	2760	5680	10850	15670
100	90	46	77	124	199	310	465	820	348	560		1180	1990	2860	4100	1990	4100	7830	11310
100	78	64	107	173	277	435	650	1140	485	780		1650	2770	3990	5720	2770	5720	10930	15780
100	0/52	81	136	220	352	550	825	1450	615	990		2090	3520	5070	7270	3520	7270	13870	20040
125	112	57	96	156	250	390	585		435	700		1480	2490			2490	5140	9820	14180
125	98	78	131	212	339	530	795		590	950		2010	3390			3390	6990	13340	19280
125	0/66	98	165	268	430	670	1010		750	1210		2550	4290			4290	8850	16900	24410
150	133	71	119	192	308	480	720		540							3080	6350	12120	17510
150	117	93	156	253	405	630	950		710							4050	8350	15950	23040
150	0/80	116	195	315	505	790	1185		885							5060	10440	19920	28780
175	157	78	132	213	340	535			600							3420	7040		
175	138	106	178	290	460	720			810							4620	9530		
175	0/95	133	225	365	580	910			1020							5830	12020		
200	180	88	148	240	385	600			670							3830	7910		
200	158	120	202	325	525	820			915							5230	10790		
200	0/109	150	255	410	660	1030			1150							6600	13600		
250	225	110	185	300	475	745			830										
250	196	150	250	410	655	1020			1150										
250	0/138	185	315	510	815	1270			1420										

Size steam valves on minimum pressure drop across the valve. As a general rule 10% to 20% of the upstream pressure should be used. If steam is directly injected into water through a sparge pipe, critical pressure drop should be used.

Local regulation may restrict the use of this product below the conditions quoted. Limiting conditions refer to standard connections only.

In the interests of development and improvement of the product, we reserve the right to change the specification.

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Steam Capacities 2 Port Valves

Unless a control valve is correctly sized, the most sensitive and accurate thermostat cannot give satisfactory control. If the valve is too big, it can cause a "hunting" and rapid wear on the valve head and seat due to wire drawing. Valves too small increase heat-up time and may be incapable of maintaining temperature on heavy load.

The capacity of any valve depends on the difference in pressure between the inlet and outlet (the pressure drop.)

In the case of steam valves, it also depends on the inlet pressure.

USING THE STEAM CHART

Proper valve selection requires the following information:

- 1) Required flow in pounds of steam per hour.
- 2) Inlet steam pressure immediately ahead of the valve.
- 3) Allowable pressure drop across the valve. On steam applications where it is impossible to calculate the allowable pressure drop, 10% to 20% of the absolute inlet pressure should be used on most applications. Higher pressure drops imply low pressures within the heat exchanger and maximum heater rating may not be achieved.
- 4) Select valve which meets the above requirements and has suitable end connections and body materials.

VALVE CAPACITY FACTORS

Type	C _v
1/2 BX2, BM2	0.44
1/2 BX3, BM4	0.74
1/2 BX4, BM4	1.20
1/2 BX6, BM6	1.92
1/2 SB	3.0
3/4 SB	4.5
1 SB	7.9
1/2 KA	3.36
3/4 KA	5.4
1 KA, KB	11.4
1-1/4 KB, KC	19.2
1-1/2 KB	27.6
1-1/2 KC	19.2
2 KB, KC	39.6
2-1/2 NS	75.6
3 NS	109.2

$$1. \text{ For Liquids } C_v = \text{GPM} \sqrt{\frac{\text{Sp. Gr.}}{\text{Pressure Drop, psi}}}$$

Where Sp. Gr. Water = 1
GPM = Gallons per minute

2. For Steam (Saturated)

a. Critical Flow
When ΔP is greater than

$$F_L^2 (P_1/2)$$

$$C_v = \frac{W}{1.83 F_L P_1}$$

b. Noncritical Flow

When ΔP is less than

$$F_L^2 (P_1/2)$$

$$C_v = \frac{W}{2.1 \sqrt{\Delta P} (P_1 + P_2)}$$

Where:

P₁ = Inlet Pressure psia

P₂ = Outlet Pressure psia

W = Capacity lb/hr

F_L = Pressure Recovery Factor

(.9 on globe pattern valves for flow to open)

(.85 on globe pattern valves for flow to close)

3. For Air and Other Gases

a. When P₂ is 0.53 P₁ or less,

$$C_v = \frac{\text{SCFH} \sqrt{\text{Sp. Gr.}}}{30.5 P_1}$$

Where Sp. Gr. of air is 1.

SCFH is Cu. ft. Free Air per

Hour at 14.7 psia, and 60°F.

b. When P₂ is greater than 0.53 P₁,

$$C_v = \frac{\text{SCFH} \sqrt{\text{Sp. Gr.}}}{61 \sqrt{(P_1 - P_2) P_2}}$$

Where Sp. Gr. of air is 1.

SCFH is Cu. Ft. Free Air per

Hour at 14.7 psia, and 60°F.

4. Correction for Superheated Steam

The required Valve C_v is the C_v from the formula multiplied by the correction factor.

Correction Factor =

1 + (.00065 x degrees F. superheat above saturation)

Example: With 25°F of

Superheat, Correction Factor

$$= 1 + (.00065 \times 25)$$

$$= 1.01625$$

5. Correction for Moisture Content

Correction Factor =

$\sqrt{\text{Dryness Fraction}}$

Example: With 4% moisture,

Correction Factor = $\sqrt{1 - 0.04}$

$$= 0.98$$

6. Gas—Correction for Temperature

Correction Factor =

$$\sqrt{\frac{460 + ^\circ\text{F}}{520}}$$

Example: If gas temperature is

150°F, Correction Factor =

$$\sqrt{\frac{460 + 150}{520}} = 1.083$$

SPIRA-TROL VALVE CAPACITIES FOR PROPORTIONAL BAND RANGE OF 2°F TO 14°F CV TABLE BASED ON SENSORS 121, 123, 422 AND 423

Valve Type	Size	Proportional Band								Max C _v	Max. Proportional Band @
		2°F (± 1°)	3°F (± 1-1/2°)	4°F (± 2°)	6°F (± 3°)	8°F (± 4°)	10°F (± 5°)	12°F (± 6°)	14°F (± 7°)		
BX BM	1/2" BX2/BM2	.23	.32	.39	.44	—	—	—	—	—	—
	1/2" BX3/BM3	.24	.36	.48	.68	.74	—	—	—	0.74	7.9°F
	1/2" BX4/BM4	.43	.61	.75	.98	1.2	—	—	—	1.2	7.9°F
	1/2" BX6/BM6	.56	.80	1.1	1.5	1.9	—	—	—	1.9	7.9°F
BXRA/BMRA	1/2"	.18	.26	.35	.52	.66	—	—	—	0.66	7.9°F
SB SBRA	1/2"	1.1	1.6	2.1	2.7	3.0	—	—	—	3.0	7.9°F
	3/4"	1.8	2.5	3.2	4.0	4.5	—	—	—	4.5	7.9°F
	1"	2.6	3.6	4.6	6.3	7.5	7.9	—	—	7.9	10°F
K Series KC 1-1/2" has same rating as KC 1-1/4"	1/2"	1.5	2.1	2.6	3.2	3.4	—	—	—	3.4	7.9°F
	3/4"	1.6	2.2	2.7	3.7	4.6	5.4	—	—	5.4	10°F
	1"	3.1	4.6	6.0	8.4	10.0	10.6	11.0	11.4	11.4	14°F
	1-1/4"	3.5	5.3	7.0	10.0	12.3	14.3	16.0	17.0	19.2	20°F
	1-1/2"	3.7	5.5	7.3	10.6	13.6	16.3	19.0	22.0	27.6	22.5°F
NS NSRA	2"	3.8	5.8	7.6	11.5	15.0	19.0	23.0	27.0	39.6	23.8°F
	2-1/2"	8.8	13.0	17.4	26.0	35.0	43.0	51.0	60.0	75.6	23.8°F
TW*	3"	17.0	25.0	33.0	48.0	65.0	80.0	92.0	98.0	109	23.8°F
	3/4"	—	—	—	—	5.4	—	—	—	—	—
	1"	—	—	—	—	—	10.1	—	—	—	—
* size 3-port valves on Max. C _v	1-1.2"	—	—	—	—	—	—	—	27	—	—

For Sensor Types 122 & 128, double proportional bands given above.