

# Steam main and branch steam piping

**Table 2 : Steam pipe sizing base on velocity**

Pressure bar g	Velocity m/s	Steam flow kg/h										
		15 mm	20 mm	25 mm	32 mm	40 mm	50 mm	65 mm	80 mm	100 mm	125 mm	150 mm
<b>0.4</b>	15	7	14	24	37	52	99	145	213	394	648	917
	25	10	25	40	62	92	162	265	384	675	972	1457
	40	17	35	64	102	142	265	403	576	1037	1670	2303
<b>0.7</b>	15	7	16	25	40	59	109	166	250	431	680	1006
	25	12	25	45	72	100	182	287	430	716	1145	1575
	40	18	37	68	106	167	298	428	630	1108	1712	2417
<b>1.0</b>	15	8	17	29	43	65	112	182	260	470	694	1020
	25	12	26	48	72	100	193	300	445	730	1160	1660
	40	19	39	71	112	172	311	465	640	1150	1800	2500
<b>2.0</b>	15	12	25	45	70	100	182	280	410	715	1125	1580
	25	19	43	70	112	162	295	428	656	1215	1755	2520
	40	30	64	115	178	275	475	745	1010	1895	2925	4175
<b>3.0</b>	15	16	37	60	93	127	245	385	535	925	1505	2040
	25	26	56	100	152	225	425	632	910	1580	2480	3440
	40	41	87	157	250	375	595	1025	1460	2540	4050	5940
<b>4.0</b>	15	19	42	70	108	156	281	432	635	1166	1685	2460
	25	30	63	115	180	270	450	742	1080	1980	2925	4225
	40	49	116	197	295	456	796	1247	1825	3120	4940	7050
<b>5.0</b>	15	22	49	87	128	187	352	526	770	1295	2105	2835
	25	36	81	135	211	308	548	885	1265	2110	3540	5150
	40	59	131	225	338	495	855	1350	1890	3510	5400	7870
<b>6.0</b>	15	26	59	105	153	225	425	632	925	1555	2525	3400
	25	43	97	162	253	370	658	1065	1520	2530	4250	6175
	40	71	157	270	405	595	1025	1620	2270	4210	6475	9445
<b>7.0</b>	15	29	63	110	165	260	445	705	952	1815	2765	3990
	25	49	114	190	288	450	785	1205	1750	3025	4815	6900
	40	76	177	303	455	690	1210	1865	2520	4585	7560	10880
<b>8.0</b>	15	32	70	126	190	285	475	800	1125	1990	3025	4540
	25	54	122	205	320	465	810	1260	1870	3240	5220	7120
	40	84	192	327	510	730	1370	2065	3120	5135	8395	12470
<b>10.0</b>	15	41	95	155	250	372	626	1012	1465	2495	3995	5860
	25	66	145	257	405	562	990	1530	2205	3825	6295	8995
	40	104	216	408	615	910	1635	2545	3600	6230	9880	14390
<b>14.0</b>	15	50	121	205	310	465	810	1270	1870	3220	5215	7390
	25	85	195	331	520	740	1375	2080	3120	5200	8500	12560
	40	126	305	555	825	1210	2195	3425	4735	8510	13050	18630

## Sizing on velocity

This is the quickest and most convenient method of sizing and can be used for short lengths of steam main or branch lines.

On longer pipe runs, pressure drop should also be checked to ensure that it is within acceptable limits.

In saturated steam lines, a reasonable maximum velocity for large pipe diameters and high steam pressures is 40 m/s. A velocity of 25 m/s is more appropriate for middle ranges and 15 m/s for small pipe diameters at low pressures.

Table 1 : gives pipe line capacities of a range of pipe sizes at 15 m/s, 25 m/s and 40 m/s.

## SIZING

The G4 Pressure Regulator can give its best performance when correctly sized to match the maximum demand of the system. It is therefore important that the size of regulator is decided from the known or estimated consumption and never fitted just as a line size valve. It is useful to remember that the G4 is a full lift, high capacity valve and correctly sized will almost invariably be smaller than the size of the pipe work.

The valve sizing charts illustrate that the maximum capacity occurs when the outlet pressure is less than 55% of the inlet pressure (critical pressure drop sizing). When the outlet pressure is above 55% sub critical flow occurs and the capacity will be reduced.

***Critical pressure drop sizing is only true when both the inlet and outlet pipework is sized correctly in accordance with our pipe sizing charts***

It is important to remember that the outlet pipe is invariably larger than the inlet pipe, in order to pass the same quantity of steam, air or gas at a lower pressure.

***Note Undersized pipe work and fittings cause unnecessary and uncontrolled pressure losses and are a major cause of unstable control.***

## Capacity Variations

The sizing charts give the maximum capacities which can be handled by the regulator for the given inlet and outlet pressures.

For trouble free operation the minimum flow rate should be considered to be 10% of the maximum.

## Steam

If no steam capacity is given, size the regulator based on the maximum flow which can be achieved through the inlet pipe, according to our pipe sizing charts. Alternatively, if the maximum heat requirement of the system is known, the following approximate relationship can be used.

Steam Capacity:

$$\text{Kg/h} = \text{Kcals} \div 554$$

$$\text{kg/h} = \text{kW} \times 0.6446$$

$$\text{lbs/h} = \text{B.T.U's/h} \div 1000$$

## Superheated Steam

If the steam temperature is greater than the saturated steam temperature, the capacities shown in our tables will need to be reduced.

### DEGREES OF SUPERHEAT

°C	°F	Factor
0 to 10	0 to 50	multiply by 0.96
10 to 50	50 to 100	multiply by 0.92
50 to 75	100 to 150	multiply by 0.89
75 to 100	150 to 200	multiply by 0.86
100 to 150	200 to 300	multiply by 0.82

## Air and Gases

For gases other than air, divide the chart air capacity by  $\sqrt{\text{SG}}$  (SG of Air = 1) to give the equivalent gas capacity.

## Other Temperatures

The air/gas capacity tables are based on air at 15°C.

If the actual flowing temperature is different, the chart capacity will need to be divided by  $\sqrt{(T/288)}$

Where: T= flowing temperature °C + 273 °k.

## G4 DRY SATURATED STEAM CAPACITY - Kg/h

Inlet Pressure Barg	Outlet Pressure Barg	R15mm	15mm	20mm	25mm	32mm	40mm	50mm	65mm	80mm	100mm	125mm	150mm
0.70	0.35	14.4	42.5	86.7	143	215	310	534	NA	NA	NA	NA	NA
	0.07*	14.4	42.5	86.7	143	215	310	534	NA	NA	NA	NA	NA
1.00	0.65	15.3	46.7	95.3	157	239	346	594	NA	NA	NA	NA	NA
	0.55	16.3	49.5	101	166	254	367	630	NA	NA	NA	NA	NA
	0.32*	16.3	49.5	101	166	254	367	630	1072	1337	2397	NA	NA
	0.07*	16.3	49.5	101	166	254	367	630	1072	1337	2397	NA	NA
2.00	1.65	19.2	58.7	120	197	300	434	747	NA	NA	NA	NA	NA
	1.30	22.8	69.5	141	233	356	514	884	1418	1769	3171	4590	6538
	1.10	24.8	75.5	154	254	386	559	960	1540	1920	3442	4981	7095
	0.35	24.8	75.5	154	254	386	559	960	1540	1920	3442	4981	7095
	0.07*	24.8	75.5	154	254	386	559	960	1540	1920	3442	NA	NA
5.00	4.30	35.4	108	220	363	553	799	1374	NA	NA	NA	NA	NA
	4.00	39.9	121	248	408	623	900	1547	2347	2388	2978	5338	7727
	2.75	51.8	158	322	530	808	1168	2007	3219	4015	7196	10415	14834
	0.35	51.8	158	322	530	808	1168	2007	3219	4015	7196	10415	14834
	0.07*	51.8	158	322	530	808	1168	2007	3219	4015	7196	NA	NA
10.00	9.00	56.7	172	352	580	884	1279	2198	3024	3771	6759	9783	13934
	5.50	95.4	291	593	977	1489	2152	3699	5932	7398	13260	19193	27335
	1.20	95.4	291	593	977	1489	2152	3699	5932	7398	13260	19193	27335
	0.35	95.4	291	593	977	1489	2152	3699	5932	7398	13260	NA	NA
15.00	14.00	67.9	207	422	695	1059	1531	2633	3216	4011	7190	NA	NA
	12.00	108	330	673	1109	1690	2443	4199	6629	8267	14819	21448	30548
	8.25	139	423	862	1420	2164	3128	5377	8624	10755	19277	27901	39739
	2.90	139	423	862	1420	2164	3128	5377	8624	10755	19277	27901	39739
	0.80*	139	423	862	1420	2164	3128	5377	8624	10755	19277	NA	NA
20.00	19.00	78.3	238	487	802	1222	1767	3037	3360	4190	7511	NA	NA
	12.00	177	539	1101	1814	2764	3995	6868	11014	13736	24621	35636	50755
	11.00	181	552	1126	1855	2827	4086	7024	11265	14048	25180	36445	51906
	4.60	181	552	1126	1855	2827	4086	7024	11265	14048	25180	36445	51906
	3.10	181	552	1126	1855	2827	4086	7024	11265	14048	25180	NA	NA
	1.28	181	552	1126	1855	2827	4086	7024	NA	NA	NA	NA	NA
25.00	20.70	164	500	1020	1680	2560	3700	6359	9717	12118	21720	NA	NA
	13.75	220	684	1395	2297	3500	5059	8696	13946	17392	31174	45120	64261
	12.00	220	684	1395	2297	3500	5059	8696	13946	17392	31174	45120	64261
	6.30	220	684	1395	2297	3500	5059	8696	13946	17392	31174	45120	64261
	2.80	220	684	1395	2297	3500	5059	8696	NA	NA	NA	NA	NA
30.00	20.70	243	743	1516	2497	3805	5500	9454	15162	18908	33891	NA	NA
	16.50	268	817	1667	2746	4184	6047	10395	16671	20789	37264	NA	NA
	12.00	268	817	1667	2746	4184	6047	10395	16671	20789	37264	53934	76816
	8.00	268	817	1667	2746	4184	6047	10395	16671	20789	37264	53934	76816
	6.90	268	817	1667	2746	4184	6047	10395	16671	20789	37264	NA	NA
	4.60	268	817	1667	2746	4184	6047	10395	NA	NA	NA	NA	NA
35.00	20.70	305	930	1898	3126	4763	6884	11834	18979	23668	42425	NA	NA
	19.25	309	943	1923	3168	4827	6977	11993	19234	23986	42993	NA	NA
	12.00	309	943	1923	3168	4827	6977	11993	19234	23986	42993	62227	88627
	9.60	309	943	1923	3168	4827	6977	11993	19234	23986	42993	62227	88627
	7.50	309	943	1923	3168	4827	6977	11993	19234	23986	42993	NA	NA
	6.20	309	943	1923	3168	4827	6977	11993	NA	NA	NA	NA	NA
40.00	20.70	353	1074	2195	3615	5508	7961	13684	21945	27367	49055	NA	NA
	12.00	353	1074	2195	3615	5508	7961	13684	21945	27367	49055	71000	101121
	10.30	353	1074	2195	3615	5508	7961	13684	21945	27367	49055	71000	101121
	8.07	353	1074	2195	3615	5508	7961	13684	21945	27367	49055	NA	NA
	6.20	353	1074	2195	3615	5508	7961	13684	NA	NA	NA	NA	NA
42.00	20.70	369	1125	2295	3780	5760	8325	14310	22950	28619	51299	NA	NA
	12.00	369	1125	2295	3780	5760	8325	14310	22950	28619	51299	74249	105748
	10.30	369	1125	2295	3780	5760	8325	14310	22950	28619	51299	74249	105748
	8.30	369	1125	2295	3780	5760	8325	14310	22950	28619	51299	NA	NA
	6.20	369	1125	2295	3780	5760	8325	14310	NA	NA	NA	NA	NA

**Useful Conversions**

\* Low pressure top required for outlet pressures below 0.35 Barg

lbs/h = kg/h x 2.2046

1. The Max. & Min. outlet pressure for a given inlet pressure and valve size, can be determined from the above table. E.g. a 100mm valve with an inlet pressure of 40 Barg has a maximum available outlet pressure of 20.7 Barg and a minimum of 8.07 Barg.

2. To ensure the above flows, it is critical the correct size of outlet pipe is used.

3. For super heated steam the above capacities need to be derated.

## G4 AIR CAPACITY - l/s @ 15°C

Inlet Pressure Barg	Outlet Pressure Barg	R15mm	15mm	20mm	25mm	32mm	40mm	50mm	65mm	80mm	100mm	125mm	150mm
0.70	0.35	4.6	14	28.6	47.1	71.8	104	178	NA	NA	NA	NA	NA
	0.07*	4.6	14	28.6	47.1	71.8	104	178	NA	NA	NA	NA	NA
1.00	0.65	5.0	15.5	31.5	52.0	79.2	114	196	NA	NA	NA	NA	NA
	0.55	5.4	16.4	33.5	55.2	84.2	122	209	NA	NA	NA	NA	NA
	0.32*	5.4	16.4	33.5	55.2	84.2	122	209	357	445	797	NA	NA
	0.07*	5.4	16.4	33.5	55.2	84.2	122	209	357	445	797	NA	NA
2.00	1.65	6.3	19.3	39.5	65.0	99.1	143	246	NA	NA	NA	NA	NA
	1.30	7.6	23.2	47.3	77.9	118	171	295	473	590	1057	1530	2180
	1.10	8.3	25.3	51.6	85.0	129	187	322	516	643	1153	1819	2377
	0.35	8.3	25.3	51.6	85.0	129	187	322	516	643	1153	1819	2377
	0.07*	8.3	25.3	51.6	85.0	129	187	322	516	643	1153	NA	NA
5.00	4.30	11.2	34.3	70.1	115	176	254	437	NA	NA	NA	NA	NA
	4.00	12.8	39.1	79.8	131	200	289	497	765	954	1711	2477	3528
	2.75	17.0	51.8	106	174	265	383	659	1057	1318	2363	3803	4871
	0.35	17.0	51.8	106	174	265	383	659	1057	1318	2363	3803	4871
	0.07*	17.0	51.8	106	174	265	383	659	1057	1318	2363	NA	NA
10.00	9.00	17.4	53.3	108	179	272	394	678	912	1137	2039	2951	4204
	5.50	31.0	94.5	193	317	484	699	1202	1928	2404	4309	7008	8882
	1.20	31.0	94.5	193	317	484	699	1202	1928	2404	4309	7008	8882
	0.35	31.0	94.5	193	317	484	699	1202	1928	2404	4309	NA	NA
15.00	14.00	20.2	61.7	125	207	316	456	785	908	1132	2029	NA	NA
	12.00	34.3	104	213	351	536	775	1332	2099	2618	4692	6792	9673
	8.25	45.0	137	280	460	702	1014	1743	2796	3486	6249	10187	12882
	2.90	45.0	137	280	460	702	1014	1743	2796	3486	6249	10187	12882
	0.80*	45.0	137	280	460	702	1014	1743	2796	3486	6249	NA	NA
20.00	19.00	22.8	69.7	142	234	356	515	886	892	1112	1994	NA	NA
	12.00	57.5	175	357	589	897	1297	2229	3579	4459	7993	11569	16478
	11.00	58.9	180	366	603	920	1329	2284	3664	4569	8190	13307	16882
	4.60	58.9	180	366	603	920	1329	2284	3664	4569	8190	13307	16882
	3.10	58.9	180	366	603	920	1329	2284	3664	4569	8190	NA	NA
	1.28	58.9	180	366	603	920	1329	2284	NA	NA	NA	NA	NA
25.00	20.70	51.7	157	321	530	807	1167	2006	3049	3802	6815	NA	NA
	13.75	72.9	222	453	746	1137	1664	2826	4532	5651	10130	NA	NA
	12.00	72.9	222	453	746	1137	1664	2826	4532	5651	10130	14662	20882
	6.30	72.9	222	453	746	1137	1664	2826	4532	5651	10130	14662	20882
	2.80	72.9	222	453	746	1137	1664	2826	NA	NA	NA	NA	NA
30.00	20.70	78.3	238	487	802	1222	1767	3038	4872	6076	10891	NA	NA
	16.50	86.8	265	540	889	1355	1959	3367	5400	6734	12070	NA	NA
	12.00	86.8	265	540	889	1355	1959	3367	5400	6734	12070	17470	24882
	8.00	86.8	265	540	889	1355	1959	3367	5400	6734	12070	17470	24882
	6.90	86.8	265	540	889	1355	1959	3367	5400	6734	12070	NA	NA
	4.60	86.8	265	540	889	1355	1959	3367	NA	NA	NA	NA	NA
35.00	20.70	99.3	302	617	1017	1550	2241	3852	6178	7705	13811	NA	NA
	19.25	101	307	627	1032	1573	2274	3908	6268	7817	14011	NA	NA
	12.00	101	307	627	1032	1573	2274	3908	6268	7817	14011	20279	28882
	9.60	101	307	627	1032	1573	2274	3908	6268	7817	14011	20279	28882
	7.50	101	307	627	1032	1573	2274	3908	6268	7817	14011	NA	NA
	6.20	101	307	627	1032	1573	2274	3908	NA	NA	NA	NA	NA
40.00	20.70	115	350	714	1175	1791	2589	4450	7136	8899	15951	NA	NA
	12.00	115	350	714	1175	1791	2589	4450	7136	8899	15951	23088	32882
	10.30	115	350	714	1175	1791	2589	4450	7136	8899	15951	23088	32882
	8.07	115	350	714	1175	1791	2589	4450	7136	8899	15951	NA	NA
	6.20	115	350	714	1175	1791	2589	4450	NA	NA	NA	NA	NA
42.00	20.70	120	367	748	1233	1878	2715	4666	7483	9332	16728	NA	NA
	12.00	120	367	748	1233	1878	2715	4666	7483	9332	16728	24211	34482
	10.30	120	367	748	1233	1878	2715	4666	7483	9332	16728	24211	34482
	8.30	120	367	748	1233	1878	2715	4666	7483	9332	16728	NA	NA
	6.20	120	367	748	1233	1878	2715	4666	NA	NA	NA	NA	NA

### Useful Conversions

\* Low pressure top required for outlet pressures below 0.35 Barg

1. The Max. & Min. outlet pressure for a given inlet pressure and valve size, can be determined from the above table. E.g. a 100mm valve with an inlet pressure of 40 Barg has a Maximum available outlet pressure of 20.7 Barg and a minimum of 8.07 Barg.

2. To ensure the above flows, it is critical the correct size of outlet pipe is used. See page 65.

3. For gases other than air and temperatures other than 15 C refer to page 62

## PIPE SIZING

**CAPACITIES FOR STEAM IN kg/h** (For lbs/h multiply capacity by 2.2046.) See opposite for air capacities

Pressure in Psig	Pressure in Barg	PIPE SIZE (millimetres)														
		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350
7.5	0.5	9	18	30	45	88	159	308	476	705	1270	1540	3080	4620	6810	9430
		<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>	<i>0.02</i>	<i>0.02</i>	<i>0.02</i>
15	1.0	12	22	39	59	118	218	400	590	975	1630	2270	4000	6430	9480	13100
		<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.04</i>	<i>0.03</i>	<i>0.03</i>	<i>0.03</i>
30	2.0	16	33	55	88	177	305	545	840	1475	2450	3500	6140	8920	13100	18200
		<i>0.05</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.06</i>	<i>0.05</i>	<i>0.04</i>	<i>0.04</i>
45	3.0	20	44	75	118	241	419	795	1180	1900	3080	4400	8160	12400	16700	23200
		<i>0.07</i>	<i>0.08</i>	<i>0.08</i>	<i>0.09</i>	<i>0.10</i>	<i>0.10</i>	<i>0.09</i>	<i>0.08</i>	<i>0.08</i>	<i>0.08</i>	<i>0.08</i>	<i>0.08</i>	<i>0.07</i>	<i>0.06</i>	<i>0.05</i>
60	4.0	24	54	97	147	309	545	1040	1500	2450	4080	5670	10200	16900	23500	30400
		<i>0.10</i>	<i>0.10</i>	<i>0.11</i>	<i>0.12</i>	<i>0.13</i>	<i>0.12</i>	<i>0.12</i>	<i>0.12</i>	<i>0.12</i>	<i>0.11</i>	<i>0.11</i>	<i>0.11</i>	<i>0.10</i>	<i>0.09</i>	<i>0.08</i>
75	5.0	29	67	116	180	359	625	1180	1820	2950	4760	6670	13100	20300	28600	37500
		<i>0.11</i>	<i>0.12</i>	<i>0.13</i>	<i>0.14</i>	<i>0.14</i>	<i>0.14</i>	<i>0.14</i>	<i>0.14</i>	<i>0.14</i>	<i>0.13</i>	<i>0.13</i>	<i>0.13</i>	<i>0.12</i>	<i>0.11</i>	<i>0.10</i>
90	6.0	36	76	136	211	427	750	1400	2130	3450	5800	7950	15000	23700	33600	44500
		<i>0.12</i>	<i>0.14</i>	<i>0.15</i>	<i>0.16</i>	<i>0.16</i>	<i>0.16</i>	<i>0.16</i>	<i>0.16</i>	<i>0.16</i>	<i>0.16</i>	<i>0.16</i>	<i>0.15</i>	<i>0.14</i>	<i>0.13</i>	<i>0.12</i>
100	7.0	43	91	154	245	490	864	1650	2450	3950	6600	9300	17200	27100	38600	51500
		<i>0.14</i>	<i>0.16</i>	<i>0.18</i>	<i>0.18</i>	<i>0.19</i>	<i>0.19</i>	<i>0.19</i>	<i>0.18</i>	<i>0.18</i>	<i>0.18</i>	<i>0.17</i>	<i>0.16</i>	<i>0.15</i>	<i>0.14</i>	<i>0.13</i>
115	8.0	48	104	182	272	545	955	1860	2640	4300	7270	10200	19000	30500	43700	58500
		<i>0.15</i>	<i>0.17</i>	<i>0.20</i>	<i>0.21</i>	<i>0.22</i>	<i>0.22</i>	<i>0.22</i>	<i>0.20</i>	<i>0.20</i>	<i>0.20</i>	<i>0.19</i>	<i>0.18</i>	<i>0.17</i>	<i>0.16</i>	<i>0.15</i>
130	9.0	52	113	200	309	613	1140	2180	3090	5080	8650	12200	21800	34800	50000	65500
		<i>0.18</i>	<i>0.20</i>	<i>0.24</i>	<i>0.25</i>	<i>0.26</i>	<i>0.26</i>	<i>0.26</i>	<i>0.25</i>	<i>0.25</i>	<i>0.25</i>	<i>0.23</i>	<i>0.22</i>	<i>0.20</i>	<i>0.19</i>	<i>0.17</i>
145	10.0	57	123	222	336	668	1200	2360	3400	5580	9550	13400	25000	39900	57500	76100
		<i>0.20</i>	<i>0.23</i>	<i>0.27</i>	<i>0.30</i>	<i>0.30</i>	<i>0.30</i>	<i>0.29</i>	<i>0.28</i>	<i>0.28</i>	<i>0.28</i>	<i>0.27</i>	<i>0.26</i>	<i>0.24</i>	<i>0.23</i>	<i>0.21</i>
175	12.0	67	136	259	418	818	1450	2900	4090	6850	11500	16100	30000	47500	68700	91700
		<i>0.23</i>	<i>0.27</i>	<i>0.31</i>	<i>0.34</i>	<i>0.35</i>	<i>0.35</i>	<i>0.37</i>	<i>0.36</i>	<i>0.35</i>	<i>0.35</i>	<i>0.34</i>	<i>0.31</i>	<i>0.29</i>	<i>0.28</i>	<i>0.26</i>
220	15.0	75	168	318	510	1020	1820	3640	5220	8600	14300	19700	33200	59000	84600	113900
		<i>0.29</i>	<i>0.33</i>	<i>0.39</i>	<i>0.42</i>	<i>0.44</i>	<i>0.45</i>	<i>0.46</i>	<i>0.46</i>	<i>0.46</i>	<i>0.46</i>	<i>0.43</i>	<i>0.41</i>	<i>0.39</i>	<i>0.37</i>	<i>0.35</i>
260	18.0	93	227	395	617	1230	2270	4300	6450	10900	17700	24500	47600	74100	106900	144800
		<i>0.35</i>	<i>0.40</i>	<i>0.46</i>	<i>0.49</i>	<i>0.51</i>	<i>0.52</i>	<i>0.54</i>	<i>0.55</i>	<i>0.55</i>	<i>0.55</i>	<i>0.53</i>	<i>0.51</i>	<i>0.49</i>	<i>0.47</i>	<i>0.45</i>
290	20.0	107	250	435	680	1360	2460	4760	7030	12200	20000	28200	54000	85400	123600	168100
		<i>0.38</i>	<i>0.44</i>	<i>0.50</i>	<i>0.55</i>	<i>0.57</i>	<i>0.59</i>	<i>0.62</i>	<i>0.64</i>	<i>0.64</i>	<i>0.64</i>	<i>0.63</i>	<i>0.61</i>	<i>0.59</i>	<i>0.57</i>	<i>0.55</i>
360	25.0	134	287	522	838	1680	2890	5400	8790	14700	24200	36100	66600	106000	154000	210000
		<i>0.47</i>	<i>0.54</i>	<i>0.61</i>	<i>0.66</i>	<i>0.68</i>	<i>0.71</i>	<i>0.74</i>	<i>0.76</i>	<i>0.78</i>	<i>0.78</i>	<i>0.78</i>	<i>0.76</i>	<i>0.74</i>	<i>0.72</i>	<i>0.70</i>
435	30.0	159	342	619	995	2010	3450	6470	10500	17600	28900	43100	79600	127100	185000	253400
		<i>0.56</i>	<i>0.64</i>	<i>0.72</i>	<i>0.78</i>	<i>0.82</i>	<i>0.85</i>	<i>0.89</i>	<i>0.91</i>	<i>0.93</i>	<i>0.93</i>	<i>0.93</i>	<i>0.91</i>	<i>0.89</i>	<i>0.87</i>	<i>0.85</i>
510	35.0	186	399	721	1170	2370	4060	7550	12200	20400	33500	50100	92700	148200	216200	296400
		<i>0.66</i>	<i>0.75</i>	<i>0.84</i>	<i>0.92</i>	<i>0.98</i>	<i>1.01</i>	<i>1.04</i>	<i>1.06</i>	<i>1.08</i>	<i>1.08</i>	<i>1.08</i>	<i>1.06</i>	<i>1.04</i>	<i>1.02</i>	<i>1.00</i>
580	40.0	214	456	820	1320	2690	4610	8550	13900	23300	38200	57100	105800	169400	247500	339700
		<i>0.76</i>	<i>0.86</i>	<i>0.95</i>	<i>1.03</i>	<i>1.10</i>	<i>1.14</i>	<i>1.17</i>	<i>1.20</i>	<i>1.23</i>	<i>1.23</i>	<i>1.23</i>	<i>1.21</i>	<i>1.19</i>	<i>1.17</i>	<i>1.15</i>
610	42.0	221	420	847	1360	2770	4750	11900	14400	24100	39700	59200	109800	175800	256900	352800
		<i>0.79</i>	<i>0.89</i>	<i>0.99</i>	<i>1.07</i>	<i>1.14</i>	<i>1.18</i>	<i>2.20</i>	<i>1.26</i>	<i>1.29</i>	<i>1.29</i>	<i>1.29</i>	<i>1.27</i>	<i>1.25</i>	<i>1.23</i>	<i>1.21</i>

**Estimated Air capacities** – multiply chart capacities as follows:

(1) Multiply chart capacity by 0.66 to give Air flow in SCFM

(2) Multiply chart capacity by 1.2 to give Air flow in Nm<sup>3</sup>/h

Estimated Air pressure drops:

For guidance multiply the chart pressure drop by 1.23 to give an approximate Air pressure drop.

**Note (1)** Figures in blue italics show pressure drops (Barg) for equivalent lengths equal to 360 pipe diameters. When using this table, allowance should be made for the effects of bends and fittings in the pipe line.

**Note (2)** All capacity values are based on acceptable pressure drops, not velocity per unit length of pipe. Higher pressure drops will result in higher steam velocities and increased noise levels.

### Example

**Question:** What size pipe will pass 800 kg/h of dry saturated steam at 7 Barg?

50mm pipe will pass 864 kg/h at 7 Barg (Pressure drop over 18m (360 pipe diameters) will be approximately 0.19 Barg).

## SIZING EXAMPLE

### Requirement

Fluid - Steam @ 184°C

Inlet Pressure - 10 Barg

Outlet Pressure - 5.5 Barg

Required Capacity - 1,100 kg/h

### Sizing

At an inlet pressure of 10 Barg and at an outlet pressure of 5.5 Barg.

The first valve to pass more than 1,100 kg/h is the 32mm (1-1/4"), which will pass 1,489kg/h.

### Selection

We can choose between figures 2042, 2043 or 2046.

The choice will then depend on the customer's requirements on connections and materials. The most economical choice would be the 2042 screwed bronze valve.

At 5.5 Barg a standard top is acceptable only one diaphragm is required (see opposite) and the black spring (ref. page 61) should be fitted with a range of 0.7 to 7,0 Barg.

### Inlet Pipe Size

At 10 Barg the smallest pipe to pass our required flow of 1,100kg/h is 50mm (2").

### Outlet Pipe Size

At 5.5 Barg the smallest pipe to pass our required flow of 1,100kg/h is 65mm (2-1/2").

## SPARES

### Routine Service Pack:

- 1 Diaphragm
- 1 Set of Piston Rings
- 1 Pilot Valve Cap
- 1 Set of Joints

### Complete Repair kit:

- 1 Diaphragm
- 1 Set of Piston Rings
- 1 Pilot Valve Assembly
- 1 Main Valve
- 1 Main Valve Seat
- 1 Main Valve Spring
- 1 Set of Joints
- 1 Pilot Valve Cap



*Each carton of spares contains a leaflet, which not only identifies the parts supplied, but also has a recommended list of 'check-points' to help identify common causes of reducing valve trouble.*

## DIAPHRAGMS

One diaphragm is required for reduced pressures up to 10.5 Barg (150 Psig), but two are required for reduced pressure above this figure.