

All of the capacity tables given in this chapter include a factor of safety. However, the factor of safety referred to does not cover abnormal defects or constrictions *nor does it cover pipe not properly reamed.*

Equivalent Length of Run

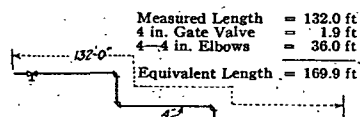
All tables for the flow of steam in pipes, based on pressure drop, must allow for the friction offered by the pipe as well as for the additional resistance of the fittings and valves. These resistances generally are stated in terms of straight pipe; in other words, a certain fitting will produce a drop in pressure equivalent to so many feet of straight run of

TABLE 3. LENGTH IN FEET OF PIPE TO BE ADDED TO ACTUAL LENGTH OF RUN—OWING TO FITTINGS—TO OBTAIN EQUIVALENT LENGTH

SIZE OF PIPE INCHES	LENGTH IN FEET TO BE ADDED TO RUN				
	Standard Elbow	Side Outlet Tee	Gate Valve*	Globe Valve*	Angle Valve*
1/2	1.3	3	0.3	14	7
3/4	1.8	4	0.4	18	10
1	2.2	5	0.5	23	12
1 1/4	3.0	6	0.6	29	15
1 1/2	3.5	7	0.8	34	18
2	4.3	8	1.0	46	22
2 1/2	5.0	11	1.1	54	27
3	6.5	13	1.4	66	34
3 1/2	8	15	1.6	80	40
4	9	18	1.9	92	45
5	11	22	2.2	112	56
6	13	27	2.8	136	67
8	17	35	3.7	180	92
10	21	45	4.6	230	112
12	27	53	5.5	270	132
14	30	63	6.4	310	152

*Valve in full open position.

Example of length in feet of pipe to be added to actual length of run.



the same size of pipe. Table 3 gives the number of feet of straight pipe usually allowed for the more common types of fittings and valves. In all pipe sizing tables in this chapter the *length of run* refers to the *equivalent length of run* as distinguished from the *actual length* of pipe in feet. The length of run is not usually known at the outset; hence it may be necessary to assume some pipe size at the start. Such an assumption frequently is considerably in error and a more common and practical method is to assume the length of run and to check this assumption after the pipes are sized. For this purpose the length of run usually is taken as double the actual length of pipe.

TABLES FOR PIPE SIZING FOR LOW PRESSURE SYSTEMS²

Tables 4, 5, and 6 are based on the actual inside diameters of the pipe and the condensation of 1/4 lb (4 oz) of steam per square foot of equivalent direct radiation (*abbreviated EDR*) per hour. The drops indicated are

TABLE 4. STEAM PIPE CAPACITIES FOR LOW PRESSURE SYSTEMS

(Reference to this table will be by column letter A through L)

This table is based on pipe size data developed through the research investigations of the AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS.

CAPACITIES OF STEAM MAINS AND RISERS							SPECIAL CAPACITIES FOR ONE-PIPE SYSTEMS ONLY				
PIPE SIZE IN.	DIRECTION OF CONDENSATION FLOW IN PIPE LINE										
	With the Steam in One-Pipe and Two-Pipe Systems						Against the Steam Two-Pipe Only		Supply Risers Up-Feed	Radiator Valves and Vertical Connections	Radiator and Riser Run-outs
	1/4 psi or 1/2 Oz Drop	1/8 psi or 3/4 Oz Drop	1/4 psi or 1 Oz Drop	1/2 psi or 2 Oz Drop	1/4 psi or 4 Oz Drop	1/2 psi or 8 Oz Drop	Vertical	Horizontal			
A	B	C	D	E	F	G	H*	I*	J*	K	L*
Capacity Expressed in Square Feet E D R											
3/4			30				30		25		
1	39	46	56	79	111	157	56	34	45	28	28
1 1/4	87	100	122	173	245	346	122	75	98	62	62
1 1/2	134	155	190	269	380	538	190	108	152	93	93
2	273	315	386	546	771	1,091	386	195	288	169	169
2 1/2	449	518	635	898	1,270	1,800	635	395	464	260	260
3	822	948	1,160	1,650	2,330	3,290	1,130	700	800	475	475
3 1/2	1,230	1,420	1,740	2,460	3,470	4,910	1,550	1,150	1,140	745	745
4	1,740	2,010	2,460	3,480	4,910	6,950	2,040	1,700	1,520	1,110	1,110
5	3,210	3,710	4,550	6,430	9,090	12,900		3,150		2,180	2,180
6	5,280	6,100	7,460	10,550	14,900	21,100					
8	11,000	12,700	15,500	21,970	31,070	43,900					
10	20,000	23,100	28,300	40,100	56,700	80,200					
12	32,000	37,100	45,500	64,300	91,000	129,000					
16	61,000	69,700	84,800	121,000	170,000	242,000					
Capacity Expressed in Pounds per Hour											
3/4			8				8		6		7
1	10	12	14	20	28	40	14	9	11	7	7
1 1/4	22	25	31	43	61	87	31	19	20	16	16
1 1/2	34	39	48	67	95	135	48	27	38	23	23
2	68	79	97	137	193	273	97	49	72	42	42
2 1/2	112	130	159	225	318	449	159	99	116	65	65
3	206	237	291	411	581	822	282	175	200	119	119
3 1/2	307	355	434	614	869	1,230	387	288	286	186	186
4	435	503	614	869	1,230	1,740	511	425	380	278	278
5	806	928	1,140	1,610	2,270	3,210		788		545	545
6	1,320	1,520	1,870	2,640	3,730	5,280					
8	2,750	3,170	3,880	5,490	7,770	11,000					
10	5,010	5,790	7,090	10,000	14,200	20,000					
12	8,040	9,290	11,400	16,100	22,700	32,200					
16	15,100	17,400	21,200	30,300	42,400	60,500					
All Horizontal Mains and Down-Feed Risers							Up-Feed Risers	Mains and Undripped Run-outs	Up-Feed Risers	Radiator Connections	Run-outs Not Dripped

Note.—All drops shown are in psi per 100 ft of equivalent run—based on pipe properly reamed.

*Do not use Column H for drops of 1/24 or 1/32 psi; substitute Column C or Column B as required.

*Do not use Column J for drop of 1/32 psi except on sizes 3 in. and over; below 3 in. substitute Column B.

*On radiator runouts over 8 ft long increase one pipe size over that shown in Table 4.