

HEATING VENTILATING AIR CONDITIONING GUIDE 1944

TABLE 4. COMPARATIVE CAPACITY OF STEAM LINES AT VARIOUS PITCHES FOR STEAM AND CONDENSATE FLOWING IN OPPOSITE DIRECTIONS^a

Pitch of Pipe in Inches per 10 Ft

Pitch of Pipe	1/4 in.	1/2 in.	1 in.	1 1/2 in.	2 in.	3 in.	4 in.	5 in.
Pipe Size Inches	Sq Ft Rad. Based on 240 Btu	Max. Vel.	Sq Ft Rad. Based on 240 Btu	Max. Vel.	Sq Ft Rad. Based on 240 Btu	Max. Vel.	Sq Ft Rad. Based on 240 Btu	Max. Vel.
3/4	25.0	12	30.3	14	37.3	18	40.4	19
1	45.8	12	52.6	15	63.0	17	70.0	20
1 1/4	104.9	18	117.2	20	133.0	23	144.5	25
1 1/2	142.6	18	159.0	21	181.0	23	196.5	25
2	236.0	19	263.5	20	299.5	23	325.5	25

^aData from AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS Research Laboratory.

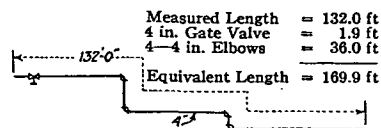
water in certain parts of the system until the steam flow is reduced sufficiently to permit the water to pass. The velocity at which such disturbances take place is a function of (1) the pipe size, whether the pipe runs horizontally or vertically, (2) the pitch of the pipe if it runs hori-

TABLE 5. 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 ^a	Globe Valve ^a	Angle Valve ^a
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

^aValve in full open position.

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



CHAPTER 15. PIPING FOR STEAM HEATING SYSTEMS

TABLE 6. STEAM PIPE CAPACITIES

Capacity Expressed in Square Feet of Equivalent Direct Radiation

(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									Supply Risers Up-Feed	Radiator Valves and Vertical Connections	Radiator and Riser Run-outs
	With the Steam in One-Pipe and Two-Pipe Systems						Against the Steam Two-Pipe Only					
	1/32 lb or 1/4 Oz Drop	1/16 lb or 1/2 Oz Drop	1/8 lb or 1 Oz Drop	1/4 lb or 2 Oz Drop	3/8 lb or 4 Oz Drop	1/2 lb or 6 Oz Drop	Vertical	Horizontal				
	A	B	C	D	E	F	G	H*	I*			
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	1,797	635	395	464	260	260	
3	822	948	1,163	1,645	2,326	3,289	1,129	700	799	475	475	
3 1/2	1,228	1,419	1,737	2,457	3,474	4,913	1,548	1,150	1,144	745	745	
4	1,738	2,011	2,457	3,475	4,914	6,950	2,042	1,700	1,520	1,110	1,110	
5	3,214	3,712	4,546	6,429	9,092	12,858	-----	3,150	-----	2,180	2,180	
6	5,276	6,094	7,462	10,553	14,924	21,105	-----	-----	-----	-----	-----	
8	10,983	12,682	15,533	21,967	31,066	43,934	-----	-----	-----	-----	-----	
10	20,043	23,144	28,345	40,085	56,689	80,171	-----	-----	-----	-----	-----	
12	32,168	37,145	45,492	64,336	90,985	128,672	-----	-----	-----	-----	-----	
16	60,506	69,671	84,849	121,012	169,698	242,024	-----	-----	-----	-----	-----	
All Horizontal Mains and Down-Feed Risers								Up-Feed Risers	Mains and Un-dripped Run-outs	Up-Feed Risers	Radiator Connections	Run-outs Not Dripped

Note.—All drops shown are in pounds per 100 ft of equivalent run—based on pipe properly reamed.
^aDo not use Column H for drops of 1/24 or 1/32 lb; substitute Column C or Column B as required.
^bDo not use Column J for drop of 1/32 lb except on sizes 3 in. and over; below 3 in. substitute Column B.
^cOn radiator runouts over 8 ft long increase one pipe size over that shown in Table 6.

zonally, (3) the quantity of condensate flowing against the steam, and (4) freedom of the piping from water pockets which under certain conditions act as a restriction in pipe size.

Reaming Important

Three factors of uncertainty always exist in determining the capacity of any steam pipe. The first is variation in manufacture, which apparently cannot be avoided. The second is the care used in reaming the ends of the pipe after cutting. The effect of both of these factors increases as the pipe size decreases. According to A.S.H.V.E. Research Laboratory tests, either of these factors may affect the capacity of a 1-in. pipe as much as 20 per cent. The third factor is the uniformity in grading the pipe line. 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.