

TABLE 10. RETURN PIPE CAPACITIES FOR 30 PSI STEAM SYSTEMS^a
Capacity Expressed in Pounds per Hour

PIPE SIZE INCHES	DROP IN PRESSURE—POUNDS PER 100 FT IN LENGTH				
	1/8	1/4	3/8	1/2	1
3/4	115	170	245	308	365
1	230	340	490	615	730
1 1/4	485	710	1,025	1,290	1,530
1 1/2	790	1,160	1,670	2,100	2,500
2	1,580	2,360	3,400	4,300	5,050
2 1/2	2,650	3,900	5,600	7,100	8,400
3	4,850	7,100	10,300	12,900	15,300
3 1/2	7,200	10,600	15,300	19,200	22,800
4	10,200	15,000	21,600	27,000	32,300
5	19,000	27,800	40,300	55,500	60,000
6	31,000	45,500	65,500	83,000	98,000

^aNote: The above table is based on steam at pressures of 0 to 4 psi.

the main riser on a down-feed system from Column B, the dry return from Column O, and the wet return from Column N.

Notes on Gravity One-Pipe Air-Vent Systems

1. Pitch of mains should not be less than 1/4 in. in 10 ft.
2. Pitch of horizontal runouts to risers and radiators should not be less than 1/2 in. per foot. Where this pitch cannot be obtained runouts over 8 ft in length should be one size larger than called for in the table.
3. In general, it is not desirable to have a main less than 2 in. The diameter of the far end of the supply main should not be less than half its diameter at its largest part.
4. Supply mains, runouts to risers, or risers, should be dripped where necessary.
5. Where supply mains are decreased in size they should be dripped, or be provided with eccentric couplings, flush on bottom.

Example 4. Size the one-pipe gravity steam system shown in Fig. 19 assuming that this is all there is to the system or that the riser and main shown involve the longest run on the system.

Solution. The total length of run actually shown is 215 ft. If the equivalent length of run is taken at double this, it will amount to 430 ft, and with a total drop of 1/4 psi the drop per 100 ft will be slightly less than 1/6 psi. It would be well in this case to use 1/4 psi, and this would result in the theoretical sizes indicated in Table 12. These theo-

TABLE 11. RETURN PIPE CAPACITIES FOR 150 PSI STEAM SYSTEMS^a
Capacity Expressed in Pounds per Hour

PIPE SIZE INCHES	DROP IN PRESSURE—PSI PER 100 FT IN LENGTH					
	1/8	1/4	3/8	1/2	1	2
3/4	156	232	360	465	560	890
1	313	462	690	910	1,120	1,780
1 1/4	650	960	1,500	1,950	2,330	3,700
1 1/2	1,070	1,580	2,460	3,160	3,800	6,100
2	2,160	3,300	4,950	6,400	7,700	12,300
2 1/2	3,600	5,350	8,200	10,700	12,800	20,400
3	6,500	9,600	15,000	19,500	23,300	37,200
3 1/2	9,600	14,400	22,300	28,700	34,500	55,000
4	13,700	20,500	31,600	40,500	49,200	78,500
5	25,600	38,100	58,500	76,000	91,500	146,000
6	42,000	62,500	96,000	125,000	150,000	238,000

^aNote: The above table is based on steam at pressures of 1 to 20 psi.

TABLE 12. PIPE SIZES FOR ONE-PIPE UP-FEED SYSTEM SHOWN IN FIG. 19

PART OF SYSTEM	SECTION OF PIPE	RADIATION SUPPLIED EDR Sq Ft	THEORETICAL PIPE SIZE (INCHES)	PRACTICAL PIPE SIZE (INCHES)
Branches to radiators		100	2	2
Branches to radiators		50	1 1/4	1 1/4
Riser	a to b	200	2	2
Riser	b to c	300	2 1/2	2 1/2
Riser	c to d	400	2 1/2	2 1/2
Riser	d to e	500	3	3
Riser	e to f	600	3	3
Runout to riser	f to g	600	3 1/2	3 1/2
Supply main	g to h	600	3	3
Branch to supply main	h to j	600	2 1/2	3
Dry return main	f to k	600	1 1/4	2
Wet return main	k to m	600	1	2
Wet return main	m to n	600	1	2
Wet return main	n to p	600	1	2

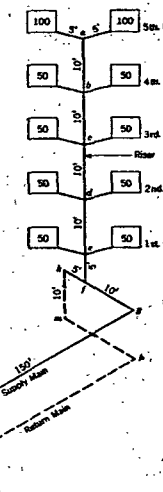


FIG. 19. RISER, SUPPLY MAIN AND RETURN MAIN OF ONE-PIPE SYSTEM

retical sizes, however, should be modified by not using a wet return less than 2 in. while the main supply, g-h, if from the uptake of a boiler, should be made the full size of the main, or 3 in. Also the portion of the main k-m should be made 2 in. if the wet return is made 2 in.

SIZING PIPING FOR ONE-PIPE VAPOR SYSTEMS

Piping for one-pipe vapor systems is sized so as to permit only a few ounces pressure drop in the system. Otherwise, the method follows that outlined for sizing one-pipe gravity systems.

SIZING PIPING FOR TWO-PIPE HIGH PRESSURE SYSTEMS

Steam piping for two-pipe high pressure can be sized for greater pressure drops than that of the return piping. For a system using steam at 30 psi, the total pressure drop can be 5 to 10 psi and for 150 psi systems, 25 to 30 psi.

It has been observed that the maximum total pressure in the returns of a 30-psi system is about 5 psi, and that of a 150-psi system is about 20 psi. The pressure in the return mains is, of course, caused by the discharge of traps, or by leaky traps and by flashing of condensate into steam due to the lower pressure in the return line. The usual practice in the sizing of high pressure returns has been to size on the basis of 1/2 psi per 100 ft of pipe for 30-psi systems, and 1 psi per 100 ft for 150-psi systems. This is an average figure which corresponds generally to several of the previously published tables for the design of high pressure return piping.

Notes on Two-Pipe High Pressure Systems

Pitch of mains should not be less than 1/4 inch in 10 feet.

Pitch of horizontal runouts to risers and heating units should be not less than 1/2 inch per foot.