TABLE 5. 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 AIR-CONDITIONING ENGINEERS.

	CAPACITIES OF STEAM MAINS AND RISERS								SPECIAL CAPACITIES FOR ONE-PIPE SYSTEMS ONLY		
	DIRECTION OF CONDENSATE FLOW IN PIPE LINE										
	With the Steam in One-Pipe and Two-Pipe Systems						Against the Steam Two-Pipe Only				
PIPE SIZE IN.	1/8 psi or 1/4 Oz Drop	1/4 psi or 1/2 Oz Drop	1/2 psi or 1 Oz Drop	1 psi or 2 Oz Drop	1 1/2 psi or 4 Oz Drop	3 psi or 8 Oz Drop	Vertical	Horizontal	Supply Risers Up-Feed	Radiator Valves and Vertical Connections	Radiator and Riser Runouts
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*[a]	*I*[c]	*J*[b]	*K*	*L*[c]
	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
3	822	948	1,160	1,650	2,330	3,290	1,130	700	800	—	475
3 1/2	1,230	1,420	1,740	2,460	3,470	4,910	1,550	1,150	1,140	—	745
4	1,740	2,010	2,460	3,480	4,910	6,950	2,040	1,700	1,520	—	1,110
5	3,210	3,710	4,550	6,430	9,090	12,900	4,200	3,150	—	—	2,180
6	5,280	6,100	7,460	10,550	14,900	21,100	7,200	5,600	—	—	—
8	11,000	12,700	15,500	21,970	31,070	43,900	15,000	12,000	—	—	—
10	20,000	23,100	28,300	40,100	56,700	80,200	28,000	23,000	—	—	—
12	32,000	37,100	45,500	64,300	91,000	129,000	46,000	38,000	—	—	—
16	61,000	69,700	84,800	121,000	170,000	242,000	88,000	76,000	—	—	—
	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
3	206	237	291	411	581	822	282	175	200	—	119
3 1/2	307	355	434	614	869	1,230	387	288	286	—	186
4	435	503	614	869	1,230	1,740	511	425	380	—	278
5	806	928	1,140	1,610	2,270	3,210	1,050	788	—	—	545
6	1,320	1,520	1,870	2,640	3,730	5,280	1,800	1,400	—	—	—
8	2,750	3,170	3,880	5,490	7,770	11,000	3,750	3,000	—	—	—
10	5,010	5,790	7,090	10,000	14,200	20,000	7,000	5,700	—	—	—
12	8,040	9,290	11,400	16,100	22,700	32,200	11,500	9,500	—	—	—
16	15,100	17,400	21,200	30,300	42,400	60,500	22,000	19,000	—	—	—
	All Horizontal Mains and Down-Feed Risers						Up-Feed Risers	Mains and Undripped Runouts	Up-Feed Risers	Radiator Connections	Runouts Not Dripped

Note.—Steam at an average pressure of 1 psig is used as a basis for calculating capacities. All drops shown are in psi per 100 ft of equivalent run—based on pipe properly reamed.

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

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

[c] Pitch of horizontal runouts to risers and radiators should be not less than 1/2 in. per ft. Where this pitch cannot be obtained, runouts over 8 ft in length should be one pipe size larger than called for in Table 5.

critical velocities of the steam to permit the counter flow of condensate without noise.

Return piping may be sized with the aid of Tables 6 and 7 where pipe capacities for wet, dry, and vacuum return lines are shown for the pressure drops per 100 ft corresponding to the drops in Table 5. *It is customary to use the same pressure drop on both the steam and return sides of a system.*

Example 2: What pressure drop should be used for the steam piping of a system if the measured length of the longest run is 500 ft, and the initial pressure is not to be over 2-psig?

Solution: It will be assumed, if the measured length of the longest run is 500 ft., that when the allowance for fittings is added, the equivalent length of run will not exceed 1,000 ft. Then, with the pressure drop not over one-half of the initial pressure, the drop could be 1 psi or less. With a pressure drop of 1 psi and a length of run of 1,000 ft, the drop per 100 ft would be 1/10 psi, while if the total drop were 1/2 psi, the drop per 100 ft would be 1/20 psi. In the first instance the pipe could be sized according to Column *D* for 1/16 psi per 100 ft, and in the second case, the pipe could be sized according to Column *C* for 1/4 psi. On completion of the sizing, the drop could be checked by taking the longest line and actually calculating the equivalent length of run from the pipe sizes determined. If the calculated drop is less than that assumed, the pipe size is all right; if it is more, it is probable that there are an unusual number of fittings involved, and either the lines must be straightened or the column for the next lower drop must be used, and the lines resized. Ordinarily, resizing will be unnecessary.

TABLES FOR PIPE SIZING FOR HIGH PRESSURE SYSTEMS

Many of the recent installations of heating systems for large industrial type buildings have been designed for the use of high pressure steam, that is, without the use of pressure reducing valves. Such systems usually involve the use of unit heaters or large built-up fan units with blast heating coils. Pressures on these systems vary from 30 to 150 psi. Temperatures are controlled by a modulating or throttling type thermostatic valve controlled by the air temperature in the room, fan inlet or outlet.

Tables 8 to 11 may be used for the sizing of steam and return piping for systems of 30 and 150 psi pressure at various pressure drops. These tables are based on Babcock's formula, and have been used as the basis of design for a number of years.

SIZING PIPING FOR ONE-PIPE GRAVITY SYSTEMS

Gravity one-pipe air-vent systems, in which the equivalent length of run does not exceed 200 ft, should be sized by means of Tables 5, 6 and 7 as follows:

1. *For the steam main and dripped runouts to risers* where the steam and condensate flow in the same direction, use 1/8-psi drop (Column *D*).
2. *Where the riser runouts are not dripped* and the steam and condensate flow in opposite directions, and *also in the radiator runouts* where the same condition occurs, use Column *L*.
3. *For up-feed steam risers* carrying condensate back from the radiators, use Column *J*.
4. *For down-feed systems, the main risers* of which do not carry any radiator condensate, use Column *H*.
5. *For the radiator valve size and the stub connection*, use Column *K*.
6. For the *dry-return main*, use Column *U*.
7. For the *wet-return main*, use Column *T*.

On systems exceeding an equivalent length of 200 ft., it is suggested that the total drop be not over 1/4 psi. The return piping sizes should correspond with the drop used on the steam side of the system. Thus, where 1/24-psi drop is being used, the steam main and dripped runouts would be