TABLE 8. STEAM PIPE CAPACITIES FOR 30 PSI STEAM SYSTEMS

Capacity Expressed in Pounds per Hour

(Steam and Condensate Flowing in Same Direction)

PIPE SIZE INCHES	DROP IN PRESSURE—POUNDS PER 100 FT IN LENGTH					
	⅛	¼	½	¾	1	2
¾	15	22	31	38	45	63
1	31	46	63	77	89	125
1¼	69	100	141	172	199	281
1½	107	154	219	267	309	437
2	217	313	444	543	627	886
2½	358	516	730	924	1,033	1,460
3	651	940	1,330	1,628	1,880	2,660
3½	979	1,414	2,000	2,447	2,825	4,000
4	1,386	2,000	2,830	3,464	4,000	5,660
5	2,560	3,642	5,225	6,402	7,390	10,460
6	4,210	6,030	8,590	10,420	12,140	17,180
8	8,750	12,640	17,860	21,865	25,250	35,100
10	16,250	23,450	33,200	40,625	46,900	66,350
12	25,640	36,930	52,320	64,050	74,000	104,500

one or more pressure reducing valves, or pressure regulators, as they are sometimes called, are required.

These are used in two classes of service, one where the steam must be shut off tight to prevent the low pressure building up at time of no load, and the other where the low pressure lines will condense enough steam to offset normal leaking through the valve. In the latter case, double seated valves may be used in a manner that reduces the work required of the diaphragm in closing the valve and consequently the size of the diaphragm. These valves also control the low pressures more closely under conditions of varying high pressures.

Valves that shut off all steam are called *dead end* type. They are single seated, and some of them have pilot operation that provides close control of the reduced pressure. If a thermostatically controlled valve is installed

TABLE 9. STEAM PIPE CAPACITIES FOR 150 PSI STEAM SYSTEMS

Capacity Expressed in Pounds per Hour

(Steam and Condensate Flowing in Same Direction)

PIPE SIZE INCHES	DROP IN PRESSURE—POUNDS PER 100 FT IN LENGTH					
	⅛	¼	½	¾	1	2
¾	29	41	58	82	116	184
1	58	82	117	165	233	369
1¼	130	185	262	370	523	827
1½	203	287	407	575	813	1,290
2	412	583	825	1,167	1,650	2,600
2½	683	959	1,359	1,920	2,710	4,290
3	1,237	1,750	2,476	3,500	4,940	7,820
3½	1,855	2,626	3,715	5,250	7,420	11,740
4	2,625	3,718	5,260	7,430	10,500	16,620
5	4,858	6,875	9,725	13,750	19,450	30,750
6	7,960	11,275	15,950	22,550	31,850	50,400
8	16,590	23,475	33,200	46,950	66,400	105,000
10	30,820	43,430	61,700	87,250	123,400	195,000
12	48,600	68,750	97,250	137,600	194,400	307,400

TABLE 10. RETURN PIPE CAPACITIES FOR 30 PSI STEAM SYSTEMS

Capacity Expressed in Pounds per Hour

PIPE SIZE INCHES	DROP IN PRESSURE—POUNDS PER 100 FT IN LENGTH				
	⅛	¼	½	¾	1
¾	115	170	245	308	365
1	230	340	490	615	730
1¼	485	710	1,025	1,285	1,530
1½	790	1,155	1,670	2,100	2,500
2	1,575	2,355	3,400	4,300	5,050
2½	2,650	3,900	5,600	7,100	8,400
3	4,850	7,100	10,250	12,850	15,300
3½	7,200	10,550	15,250	19,150	22,750
4	10,200	15,000	21,600	27,000	32,250
5	19,000	27,750	40,250	55,500	60,000
6	31,000	45,500	65,500	83,000	98,000

after, and near, a reducing valve in such a manner as to cut off the passage of steam, the dead end type should be used.

It is common practice when the initial steam pressure is 100 lb or higher to install two-stage reduction. If the radiation served is cast-iron, the *A.S.M.E.* code requires two reducing valves when the inlet pressure exceeds 50 psi. This makes a quieter condition of steam flow, as it is apparent that with one reduction, as for example, from 150 to 2 lb, there is a smaller opening with greater velocity across the reducing valve, and consequently, more noise. A two-stage reduction also introduces a source of safety, since if one reducing valve were to build up its discharge pressure, this excess pressure would not be so great as the case might be in a one-stage reduction.

If an installation requires single seated valves, and the pilot type cannot be used, it is necessary to use two-stage reduction, as single seated valves require sufficient diaphragm area to overcome the unbalanced pressure underneath the single valve. In many cases the large diameter of diaphragm required would make it impractical in construction. With a two-stage reduction the diaphragm diameter required would be reduced. If a one-stage reduction is desired, it is necessary to use a pilot controlled pressure reducing valve, where low pressures are to be maintained closely.

TABLE 11. RETURN PIPE CAPACITIES FOR 150 PSI STEAM SYSTEMS

Capacity Expressed in Pounds per Hour

PIPE SIZE INCHES	DROP IN PRESSURE—POUNDS PER 100 FT IN LENGTH				
	⅛	¼	½	¾	1
¾	156	232	360	560	890
1	313	462	690	1,120	1,780
1¼	650	960	1,500	2,330	3,700
1½	1,070	1,580	2,460	3,800	6,100
2	2,160	3,300	4,950	7,700	12,300
2½	3,600	5,350	8,200	12,800	20,400
3	6,500	9,600	15,000	23,300	37,200
3½	9,600	14,400	22,300	34,500	55,000
4	13,700	20,500	31,600	49,200	78,500
5	25,600	38,100	58,500	91,500	146,000
6	42,000	62,500	96,000	150,000	238,000