metal pipe made of a good grade of cast-iron with or without additions of nickel, chromium, or other alloy. This pipe is available in sizes from 1½ in. to 6 in., and in standard lengths of 5 or 6 ft, with external and internal diameters closely approximating those of extra strong wrought pipe. Cast-ferrous pipe may be obtained coupled, beveled for welding, or with ends plain or grooved for the several types of couplings. It is easily cut and threaded as well as welded. The fact that it is readily welded enables the manufacturers to supply the pipe in any lengths practicable for handling.

Alloy Metal Pipe. Steel pipe bearing a small alloy of copper or other alloying element, and iron pipe bearing a small amount of copper and molyb-

TABLE 1. DIMENSIONS OF SCHEDULES 30 AND 40 AND STANDARD WEIGHT PIPE[a]

Size	Diameter, In. External	Diameter, In. Internal	Thickness[b], In.	Weight per Ft, Lb Plain Ends	Weight per Ft, Lb Threads and Couplings	Threads per In.	Circumference, In. External	Circumference, In. Internal	Transverse Area, Sq In. External	Transverse Area, Sq In. Internal	Transverse Area, Sq In. Metal	Length of Pipe, Ft per Sq Ft External Surface	Length of Pipe, Ft per Sq Ft Internal Surface	Length of Pipe, Ft Containing 1 Cu Ft	Weight of Water, Lb per Ft
⅛	0.405	0.269	0.068	0.244	0.245	27	1.272	0.845	0.129	0.057	0.072	9.431	14.199	2533.775	0.025
¼	0.540	0.364	0.088	0.424	0.425	18	1.696	1.144	0.229	0.104	0.125	7.073	10.493	1383.789	0.045
⅜	0.675	0.493	0.091	0.567	0.568	18	2.121	1.549	0.358	0.191	0.167	5.658	7.748	754.360	0.083
½	0.840	0.622	0.109	0.850	0.852	14	2.639	1.954	0.554	0.304	0.250	4.547	6.141	473.906	0.132
¾	1.050	0.824	0.113	1.130	1.134	14	3.299	2.589	0.866	0.533	0.333	3.637	4.635	270.034	0.231
1	1.315	1.049	0.133	1.678	1.684	11½	4.131	3.296	1.358	0.864	0.494	2.904	3.641	166.618	0.375
1¼	1.660	1.380	0.140	2.272	2.281	11½	5.215	4.335	2.164	1.495	0.669	2.301	2.768	96.275	0.65
1½	1.900	1.610	0.145	2.717	2.731	11½	5.969	5.058	2.835	2.036	0.799	2.010	2.372	70.733	0.88
2	2.375	2.067	0.154	3.652	3.678	11½	7.461	6.494	4.430	3.355	1.075	1.608	1.847	42.913	1.45
2½	2.875	2.469	0.203	5.793	5.819	8	9.032	7.757	6.492	4.788	1.704	1.328	1.547	30.077	2.07
3	3.500	3.068	0.216	7.575	7.616	8	10.996	9.636	9.621	7.393	2.228	1.091	1.245	19.479	3.20
3½	4.000	3.548	0.226	9.109	9.202	8	12.566	11.146	12.566	9.886	2.680	0.954	1.076	14.565	4.29
4	4.500	4.026	0.237	10.790	10.889	8	14.137	12.648	15.904	12.730	3.174	0.848	0.948	11.312	5.50
5	5.563	5.047	0.258	14.617	14.810	8	17.477	15.856	24.306	20.006	4.300	0.686	0.756	7.198	8.67
6	6.625	6.065	0.280	18.974	19.185	8	20.813	19.054	34.472	28.891	5.581	0.576	0.629	4.984	12.51
8c	8.625	8.071	0.277	24.696	25.000	8	27 096	25.356	58.426	51.161	7.265	0.443	0.473	2 815	22.18
8	8.625	7.981	0.322	28.554	28.809	8	27.096	25.073	58.426	50.027	8.399	0.443	0.478	2.878	21.70
10c	10.750	10.136	0.307	34.240	35.000	8	33.772	31.843	90.763	80.691	10.072	0.355	0.376	1.785	34.95
10	10.750	10.020	0.365	40.483	41.132	8	33.772	31.479	90.763	78.855	11.908	0.355	0.381	1.826	34.20
12c	12.750	12.090	0.330	43.773	45.000	8	40.055	37.982	127.676	114.800	12 876	0.299	0.315	1.254	49.70
12	12.750	12.000	0.375	49.562	50.706	8	40.055	37.699	127.676	113.097	14.579	0.299	0.318	1.273	49.00

[a] Standard-weight wrought-iron pipe has approximately the same wall thicknesses and weights as contained herein for steel pipe. For exact dimensions, see *American Standard for Wrought-Iron and Wrought-Steel Pipe, A.S.A.* B36.10.

[b] Thicknesses shown in bold face type are identical with thicknesses for Schedule 40 pipe of *A.S.A.* B36.10.

[c] Same as Schedule 30, *A.S.A.* B36.10.

denum, have been claimed to possess more resistance to corrosion than plain steel pipe and they are advertised and sold under various trade names.

Copper Pipe and Fittings. Owing to inherent resistance to corrosion, copper and brass pipe have always been used in heating, ventilating, and water supply installations, but the cost with standard dimensions for threaded connections has been high. The recent introduction of fittings which permit erection by soldering or sweating, allows the use of pipe with thinner walls than are possible with threaded connections, thereby reducing the cost of installations.

The initial cost of brass and copper pipe installations generally runs higher than the corresponding job with steel pipe and screwed connections in spite of the use of thin wall pipe, but the corrosive nature of the fluid

conveyed or the inaccessibility of some of the piping may warrant use of a more expensive material than plain steel. The advantages of corrosion-resisting pipe and fittings should be weighed against the correspondingly higher initial cost.

COMMERCIAL PIPE DIMENSIONS

The two weights of steel and wrought-iron pipe commonly used are known as *standard weight* and *extra strong*, which correspond to Schedules 40 and 80, respectively, of the *American Standard for Wrought-Iron and Wrought-Steel Pipe, ASA* B36.10. The same external diameter is used for both

TABLE 2. STANDARD WEIGHTS AND DIMENSIONS OF WELDED AND SEAMLESS STEEL PIPE[a]

Size	Outside Diameter, In.	No. of Threads per In.	Standard-Weight Pipe: Schedule 30 Wall Thickness, In.	Standard-Weight Pipe: Schedule 30 Weight per Ft, Lb T & C	Standard-Weight Pipe: Schedule 40 Wall Thickness, In.	Standard-Weight Pipe: Schedule 40 Weight per Ft, Lb T & C	Extra-Strong Pipe: Schedule 60 Wall Thickness, In.	Extra-Strong Pipe: Schedule 60 Weight per Ft, Lb Plain Ends	Extra-Strong Pipe: Schedule 80 Wall Thickness, In.	Extra-Strong Pipe: Schedule 80 Weight per Ft, Lb Plain Ends	Double Extra-Strong Pipe[b] Wall Thickness In.	Double Extra-Strong Pipe[b] Weight per Ft, Lb Plain Ends
⅛	0.405	27	.....	.....	0.068	0.25	.....	.....	0.095	0.31	.....	.....
¼	0.540	18	.....	.....	0.088	0.43	.....	.....	0.119	0.54	.....	.....
⅜	0.675	18	.....	.....	0.091	0.57	.....	.....	0.126	0.74	.....	.....
½	0.840	14	.....	.....	0.109	0.85	.....	.....	0.147	1.09	0.294	1.71
¾	1.050	14	.....	.....	0.113	1.13	.....	.....	0.154	1.47	0.308	2.44
1	1.315	11½	.....	.....	0.133	1.68	.....	.....	0.179	2.17	0.358	3.66
1¼	1.660	11½	.....	.....	0.140	2.28	.....	.....	0.191	3.00	0.382	5.21
1½	1.900	11½	.....	.....	0.145	2.73	.....	.....	0.200	3.63	0.400	6.41
2	2.375	11½	.....	.....	0.154	3.68	.....	.....	0.218	5.02	0.436	9.03
2½	2.875	8	.....	.....	0.203	5.82	.....	.....	0.276	7.66	0.552	13.70
3	3.500	8	.....	.....	0.216	7.62	.....	.....	0.300	10.25	0.600	18.58
3½	4.000	8	.....	.....	0.226	9.20	.....	.....	0.318	12.51	0.636	22.85
4	4.500	8	.....	.....	0.237	10.89	.....	.....	0.337	14.98	0.674	27.54
5	5.563	8	.....	.....	0.258	14.81	.....	.....	0.375	20.78	0.750	38.55
6	6.625	8	.....	.....	0.280	19.19	.....	.....	0.432	28.57	0.864	53.16
8	8.625	8	0.277	25.00	0.322	28.81	.....	.....	0.500	43.39	0.875	72.42
10[c]	10.750	8	0.307	35.00	0.365	41.13	0.500	54.74	.....	.....	.....	.....
12[d]	12.750	8	0.330	45.00	0.375	50.71	0.500[d]	65.41	.....	.....	.....	.....

From Standard Specifications for Welded and Seamless Steel Pipe of the *American Society for Testing Materials, A.S.T.M.* Designation A120.

[a] Sizes larger than those shown in the table are measured by their outside diameter, such as 14 in. outside diameter, etc. These larger sizes will be furnished with plain ends, unless otherwise specified. The weights will correspond to the manufacturers' published standards although it is possible to calculate the theoretical weights for any given size and wall thickness on the basis of 1 cu in. of steel weighing 0.2833 lb.

[b] The American Standard for Wrought-Iron and Wrought-Steel Pipe *A.S.A.* B36.10-1939 has assigned no schedule number to *Double Extra-Strong* pipe.

[c] A 10 in. Standard Weight pipe is also available with 0.279 in. wall thickness, but this wall is not covered by a Schedule Number.

[d] Owing to a departure from the *Standard-Weight* and *Extra-Strong* wall thicknesses for the 12 in. nominal size, Schedules 40 and 60, Table 2 of the *A.S.A.* B36.10-1939, Standard for Wrought-Iron and Wrought-Steel Pipe, the regular *Standard* and *Extra-Strong* wall thicknesses (0.375 in. and 0.500 in.) have been substituted.

weights of each nominal size for manufacturing reasons, as well as to afford interchangeability in threading and other elements associated with fabrication and erection. Hence, the difference in wall thickness is accompanied by a corresponding change in inside diameter. In sizes up to 14 in., pipe is designated by its nominal size which corresponds roughly to the inside diameter of Schedule 40 pipe. In sizes 14 in. and upward, pipe is designated by its outside diameter (O.D.), and the wall thickness is specified.

While the demands for pipe for the heating and ventilating industry are reasonably well served by Schedule 40 (standard weight) pipe, the erection