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, A.S.A.* B36.10. The same external diameter is used for both weights of each nominal size for manufacturing reasons as well

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				Extra-Strong Pipe				Double Extra-Strong Pipe[b]	
			Schedule 30		Schedule 40		Schedule 60		Schedule 80			
			Wall Thickness, In.	Weight per Ft, Lb T & C	Wall Thickness, In.	Weight per Ft, Lb T & C	Wall Thickness, In.	Weight per Ft, Lb Plain Ends	Wall Thickness, In.	Weight per Ft, Lb Plain Ends	Wall Thickness In.	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.

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 of pipe by welding sometimes warrants using lighter wall thicknesses. The considerations governing pipe wall thickness and its relation to joint design are covered in the *American Standard Code for Pressure Piping, A.S.A.* B31.1-1942, see Section 122. Standard schedules of pipe thick-

nesses are contained in the *American Standard for Wrought-Iron and Wrought-Steel Pipe, A.S.A.* B36.10, which includes standard-weight and extra-strong thicknesses in Schedules 40 and 80, respectively, and eight other schedules of varying wall thickness to provide for different service conditions. Dimensions and other useful data for Schedules 30 and 40 pipe are given in Table 1. Table 2 from *A.S.T.M.* Specifications A53 and

TABLE 3. STANDARD DIMENSIONS AND WEIGHTS, AND TOLERANCES IN DIAMETER AND WALL THICKNESS FOR COPPER WATER TUBES[a]

(All tolerances in this table are plus and minus except as otherwise indicated)

Standard Water Tube Size, In.	Actual Outside Diameter In.	Average Outside Diameter Tolerance, In.		Wall Thickness, In.						Theoretical Weight, Lb per Ft		
				Type K		Type L		Type M				
		Annealed	Drawn Temper	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Type K	Type L	Type M
⅛	0.250	0.002	0.001	0.032	0.003	0.025	0.0025	0.025	0.0025	0.085	0.068	0.068
¼	0.375	0.002	0.001	0.032	0.004	0.030	0.0035	0.025	0.0025	0.134	0.126	0.107
⅜	0.500	0.0025	0.001	0.049	0.004	0.035	0.0035	0.025	0.0025	0.269	0.198	0.145
½	0.625	0.0025	0.001	0.049	0.004	0.040	0.0035	0.028	0.0025	0.344	0.285	0.204
⅝	0.750	0.0025	0.001	0.049	0.004	0.042	0.0035	0.030	0.0025	0.418	0.362	0.263
¾	0.875	0.003	0.001	0.065	0.0045	0.045	0.004	0.032	0.003	0.641	0.455	0.328
1	1.125	0.0035	0.0015	0.065	0.0045	0.050	0.004	0.035	0.0035	0.839	0.655	0.465
1¼	1.375	0.004	0.0015	0.065	0.0045	0.055	0.0045	0.042	0.0035	1.04	0.884	0.682
1½	1.625	0.0045	0.002	0.072	0.005	0.060	0.0045	0.049	0.004	1.36	1.14	0.940
2	2.125	0.005	0.002	0.083	0.007	0.070	0.006	0.058	0.006	2.06	1.75	1.46
2½	2.625	0.005	0.002	0.095	0.007	0.080	0.006	0.065	0.006	2.93	2.48	2.03
3	3.125	0.005	0.002	0.109	0.007	0.090	0.007	0.072	0.006	4.00	3.33	2.68
3½	3.625	0.005	0.002	0.120	0.008	0.100	0.007	0.083	0.007	5.12	4.29	3.58
4	4.125	0.005	0.002	0.134	0.010	0.110	0.009	0.095	0.009	6.51	5.38	4.66
5	5.125	0.005	0.002	0.160	0.010	0.125	0.010	0.109	0.009	9.67	7.61	6.66
6	6.125	0.005	0.002	0.192	0.012	0.140	0.010	0.122	0.010	13.9	10.2	8.92
8	8.125	0.006	+0.002 −0.004	0.271	0.016	0.200	0.014	0.170	0.014	25.9	19.3	16.5
10	10.125	0.008	+0.002 −0.006	0.338	0.018	0.250	0.016	0.212	0.015	40.3	30.1	25.6
12	12.125	0.008	+0.002 −0.006	0.405	0.020	0.280	0.018	0.254	0.016	57.8	40.4	36.7

[a]From Standard Specifications for Copper Water Tube of the *American Society for Testing Materials, A.S.T.M.* Designation B88-41.

NOTE 1:—For copper gas and oil burner tubes, the tolerances shown above for various wall thicknesses (type K) apply irrespective of diameter.

NOTE 2:—For tubes other than round no standard tolerances are established. These tolerances do not apply to condenser and heat exchanger tubes.

A120 combines the schedule thicknesses of *A.S.A.* B36.10 and the old series designations.

Standard-weight pipe is generally furnished with threaded ends in random lengths of 16 to 22 ft, although when ordered with plain ends, 5 per cent may be in lengths of 12 to 16 ft. Five per cent of the total number of lengths ordered may be *jointers* which are two pieces coupled together. Extra-strong pipe is generally furnished with plain ends in random lengths of 12 to 22 ft, although 5 per cent may be in lengths of 6 to 12 ft.

In addition to *IPS* copper pipe, several varieties of copper tubing are in use with either flared or compression couplings or soldered joints. Dimensions of copper water tubing intended for plumbing, underground water service, fuel-oil lines, gas lines, etc., have been standardized by the U. S.