

HEATING VENTILATING AIR CONDITIONING GUIDE 1944

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. Dimen-

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 Plain Ends
			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		
1/4	0.405	27	-----	-----	0.068	0.25	-----	-----	0.095	0.31	-----	-----
1/4	0.540	18	-----	-----	0.083	0.45	-----	-----	0.119	0.54	-----	-----
1/2	0.675	18	-----	-----	0.091	0.57	-----	-----	0.126	0.74	-----	-----
1/2	0.840	14	-----	-----	0.109	0.85	-----	-----	0.147	1.09	0.294	1.71
3/4	1.050	14	-----	-----	0.113	1.13	-----	-----	0.154	1.47	0.308	2.44
1	1.315	11 1/2	-----	-----	0.133	1.68	-----	-----	0.179	2.17	0.358	3.66
1 1/4	1.660	11 1/2	-----	-----	0.140	2.28	-----	-----	0.191	3.00	0.383	5.21
1 1/2	1.900	11 1/2	-----	-----	0.145	2.73	-----	-----	0.200	3.63	0.400	6.41
2	2.375	8	-----	-----	0.154	3.68	-----	-----	0.218	5.02	0.436	9.03
2 1/2	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
3 1/2	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	-----	-----	0.253	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.

^aSizes 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.

^bThe 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.

^cA 10 in. Standard Weight pipe is also available with 0.279 in. wall thickness, but this wall is not covered by a Schedule Number.

^dOwing 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.

sions of copper water tubing intended for plumbing, underground water service, fuel-oil lines, gas lines, etc., have been standardized by the U. S. Government and the *American Society for Testing Materials*. There are three standard wall-thickness schedules of copper water tubing classified in accordance with their principal uses as follows:

Type *K*—Designed for underground services and general plumbing service

Type *L*—Designed for general plumbing purposes.

Type *M*—Designed for use with soldered fittings only

In general, Type *K* is used where corrosion conditions are severe, and Types *L* and *M* where such conditions may be considered normal as, for

CHAPTER 17. PIPE, FITTINGS, WELDING

instance, in heating work. Types *K* and *L* are available in both hard and soft tempers; Type *M* is available only in hard temper. Where flexibility is essential as in hidden replacement work or where as few joints as possible are desired as in fuel-oil lines, the soft temper is commonly used. New or

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		WALL THICKNESS, IN.						THEORETICAL WEIGHT, LB PER FT		
		TOLERANCE, IN.		TYPE K		TYPE L		TYPE M		Type K	Type L	Type M
		Annealed	Drawn Temper	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance	Type K	Type L	Type M
1/4	0.250	0.002	0.001	0.032	0.003	0.025	0.0025	0.025	0.0025	0.085	0.068	0.068
1/4	0.375	0.002	0.001	0.032	0.003	0.030	0.0035	0.025	0.0025	0.134	0.126	0.107
1/2	0.500	0.0025	0.001	0.049	0.004	0.035	0.0035	0.025	0.0025	0.269	0.198	0.145
1/2	0.625	0.0025	0.001	0.049	0.004	0.040	0.0035	0.028	0.0025	0.344	0.285	0.204
3/4	0.750	0.0025	0.001	0.049	0.004	0.042	0.0035	0.030	0.0025	0.418	0.362	0.263
3/4	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	0.859	0.655	0.465
1 1/4	1.375	0.004	0.0015	0.065	0.0045	0.055	0.0045	0.042	0.0035	1.04	0.884	0.682
1 1/2	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
2 1/2	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
3 1/2	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	5.35	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

^aFrom 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.

exposed work generally employs copper pipe of a hard temper. All three classes are extensively used with soldered fittings.

Standard dimensions, weights, and diameter and wall-thickness tolerances for these classes of copper tubing are given in Table 3. Copper pipe is also available with dimensions of steel pipe.

Refrigeration lines used in connection with air conditioning equipment also employ copper tubing extensively. For refrigeration use where tubing absolutely free from scale and dirt is required, bright annealed copper tubing that has been deoxidized is used. This tubing is available in a variety of sizes and wall thicknesses.