

of manufacture. Note that the joint factor, *c*, is not included for plain end non-ferrous pipe as listed in Table 2.

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. Government and the *American Society for Testing Materials*.

TABLE 4. THREADING DATA FOR PIPE

NOMINAL SIZE ^a	PIPE O. D.	STANDARD WEIGHT			EXTRA AND DOUBLE EXTRA STRONG		
		THREADS PER INCH ^b	COUPLING O. D.	COUPLING LENGTH	THREADS PER INCH	COUPLING O. D.	COUPLING LENGTH
1/8	0.405	27	0.563	1 3/4	27	0.563	1 3/4
1/4	0.540	18	0.719	1 3/4	18	0.719	1 3/4
3/8	0.675	18	0.875	1 3/4	18	0.875	1 3/4
1/2	0.840	14	1.063	1 3/4	14	1.063	2 1/4
3/4	1.050	14	1.313	1 3/4	14	1.313	2 3/4
1	1.315	11 1/2	1.576	2	11 1/2	1.576	2 3/4
1 1/4	1.660	11 1/2	1.900	2 1/4	11 1/2	2.054	2 3/4
1 1/2	1.990	11 1/2	2.200	2 1/4	11 1/2	2.200	2 3/4
2	2.375	11 1/2	2.750	2 3/4	11 1/2	2.875	2 3/4
2 1/4	2.875	8	3.250	3 1/4	8	3.375	4 1/4
3	3.500	8	4.000	3 1/4	8	4.000	4 1/4
3 1/4	4.000	8	4.625	3 3/4	8	4.625	4 3/4
4	4.500	8	5.000	3 3/4	8	5.200	4 3/4
5	5.563 ^c	8	6.296	3 3/4	8	6.296	4 3/4
6	6.625	8	7.390	4	8	7.390	4 3/4
8	8.625	—	—	—	8	9.625	5 1/4
10	10.750	—	—	—	8	11.750	5 1/4
12	12.750	—	—	—	8	14.000	6 1/4
14	14.000	—	—	—	8	15.000	6 3/4
16	16.000	—	—	—	8	17.000	6 3/4
18	18.000	—	—	—	8	19.000	7 1/4
20	20.000	—	—	—	8	21.000	7 3/4

^a All dimensions in inches.

^b Taper of threads is 3/4 in. per ft on diameter on all sizes of pipe, and in couplings of 2 1/4 in. and over. Couplings 2 in. and smaller are straight tapped.

^c 5.562 for copper and red brass pipe.

Note: The wall thickness and inside diameter shown in Table 1 do not apply to copper and red brass pipe.

Copper tube is classified in accordance with the wall thickness as follows:

Type K—Heavy Wall.

Type L—Medium Wall.

Type M—Light Wall.

Type DWV—Light Wall—for drainage, waste, and vent service.

In general, Type K is used for underground services and for general plumbing service where corrosion conditions are severe. Type L is used for general plumbing and heating service where conditions may be considered normal. Type M is used for sanitary drainage and other non-pressure applications, for heating, and sometimes for other services less severe than those for which Types K or L are recommended. Type DWV is of lighter weight than Type M, and is used for sanitary drainage and

other non-pressure applications. Type DWV tube should not be used underground. Type L is suitable for underground drainage applications. Unless adequately protected, no copper tube should be embedded in a cinder fill. 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. In new or exposed work copper tube of a hard temper is generally used. All three types are extensively used with soldered fittings.

Standard dimensions, weights, and diameter and wall-thickness tolerances for these classes of copper tube are obtainable from Table 2. Copper pipe is also available with dimensions of steel pipe.

In refrigeration lines, used in connection with air conditioning equipment, copper tube is used extensively. For refrigeration use where tube absolutely free from scale and dirt is required, bright annealed copper tube that has been cleaned, dehydrated and sealed is used. This tube is available in a variety of sizes and wall thicknesses.

TABLE 5. NORMAL ENGAGEMENT OF TIGHT-FIT MALE AND FEMALE PIPE THREADS

For American Standard and API Pipe Threads

PIPE SIZE	ENGAGED LENGTH ^a IN.	PIPE SIZES	ENGAGED LENGTH ^a IN.	PIPE SIZES	ENGAGED LENGTH ^a IN.
1/8	1/4	1 1/4	1 1/4	4	1 1/4
1/4	3/8	1 1/2	1 1/4	5	1 1/4
3/8	3/8	2	3/4	6	1 1/4
1/2	1/2	2 1/4	1 1/4	8	1 1/4
3/4	3/4	3	1	10	1 1/4
1	1 1/4	3 1/4	1 1/4	12	1 1/4

^a Dimension shown is the normal tight-fit thread engagement from the leading edge of the female thread back to the leading edge of the male thread. No allowance has been made for threading variations.

THREADING PRACTICE

In all threaded pipe for heating and ventilating installations the American Standard taper pipe thread, ASA B2.1-1945 is used. This thread is cut with a taper of 1 in 16 measured on the diameter of the pipe so as to secure a tight joint. The number of threads per inch varies with the pipe size. Threads for fittings are the same, except that it is regular practice to furnish straight tapped couplings for Schedule 40 pipe 2 in. and smaller. For steam pressures in excess of 25 psi, it is recommended that taper-tapped couplings be used to obtain a tight joint. These may be secured by ordering *line* pipe² which is used for oil piping, the couplings of which are provided with taper-tapped threads and may be used with regular mill-threaded standard weight pipe. Thread lengths should be in accordance with ASA B2.1. Right-hand threads are used unless otherwise ordered. To facilitate drainage, some elbows have the thread tapped at an angle to provide a pitch of the connecting pipe of 1/4 in. to the foot. These elbows are known to the trade as pitch elbows and are commercially available. All threaded pipe joints should be made up with a thread paste suitable for the service for which the pipe is to be used.

Table 4 contains pertinent threading data for standard weight, extra strong and double extra strong steel, and wrought-iron pipe. The normal engagement of pipe threads is given in Table 5.