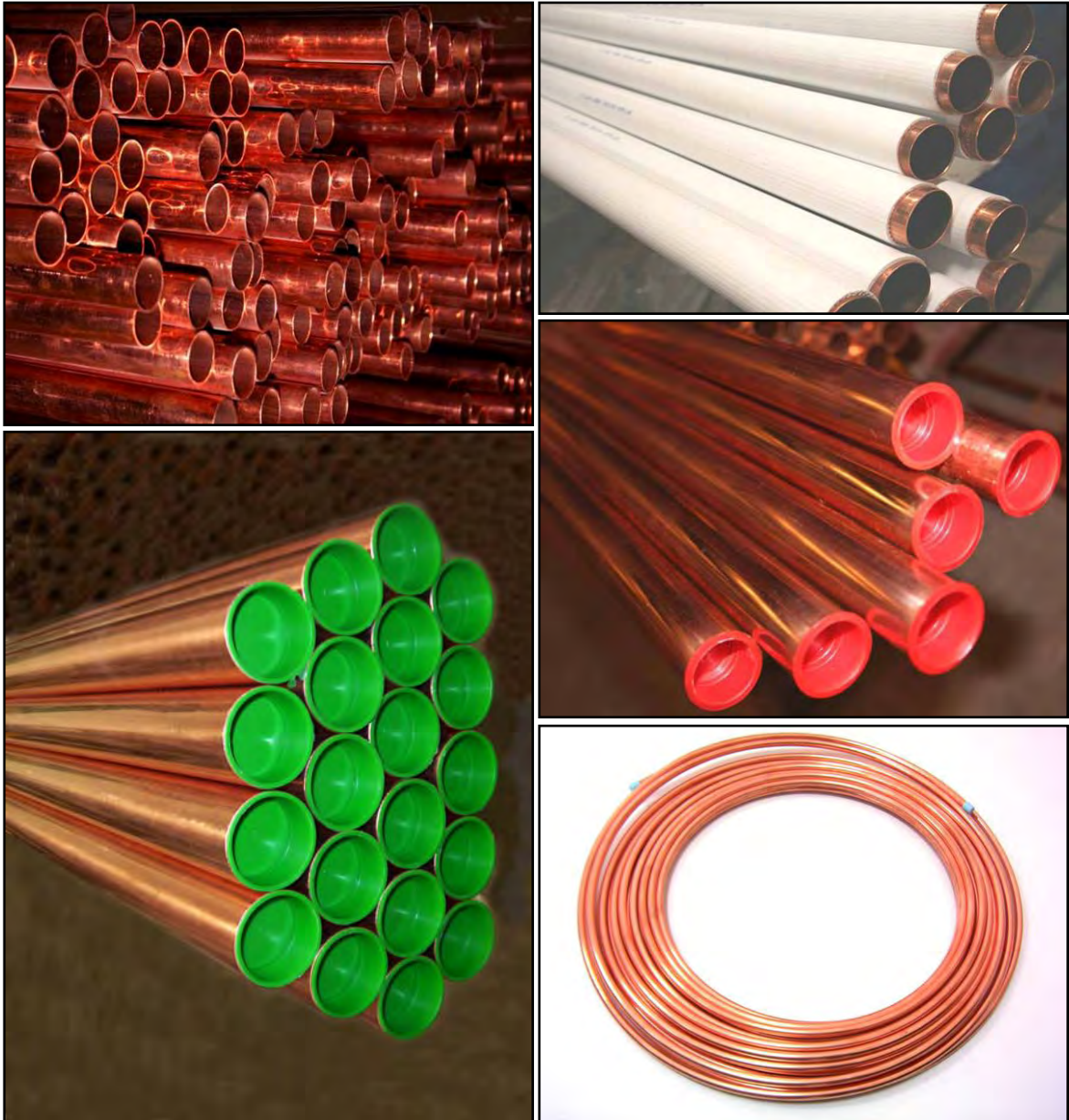




Copper Tubes for Plumbing, Medical Gas, Air-conditioning & Refrigeration Applications.



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Scope and Application:

Copper is one of the oldest metals known to mankind. The first recorded use of copper for conveying water goes back to some 5000 years. Modern technology recognising the advantage and the superiority of copper over other materials has accepted it as the material of choice for conveying water, gas, refrigerates etc. Professional installers have been using copper for plumbing and heating systems for generations having chosen it for its high performance, reliability, durability, excellent quality, value for money and good-looks. Copper continues to enjoy a prominent position in the market place where it is a tried, tested and proven metal for use in water, gas and oil industry. It also resists heat, corrosion, pressure and fire. In Europe, copper tube has been manufactured and installed for over 100 years and there have been continuous improvements in the quality and other aspects of copper usage. Copper is a natural mineral and 99% recyclable. Between recycling processes, copper can be used for several decades.

Standards and Specification:

Allpex offers following types of copper tube:

- Plain and plastic coated metric copper tubes to BS/EN standards.
- Air-conditioning and refrigeration copper tubes/coils to ASTM standards.

The applicable standards for various Allpex copper tubes are given below.

BS EN 1057:1996 (replacing BS 2871.1) - for Plumbing, Heating, Natural Gas and Fire Protection (plain or plastic coated).

BS EN 1057:1996 and BS EN 13348:2001 - Seamless Round Copper Tubes for Medical Gas/Vacuum applications (Degreased).

BS EN 12735-1 / ASTM B280 - Seamless Copper Tube for Air-conditioning and Refrigeration applications (Straight tubes and coils).

Allpex copper tubes are supplied in straight lengths of 3.0 & 5.8 meters and coils of 50ft (15.24 meters).

Marking:

Tubes are marked as per the BS EN/ASTM requirements.

e.g.: (Brand Name) - (Standard) - (Diameter x Thickness) - (Temper) - (Mfg. Date and / or Batch Number)

Guidelines for Joining Copper Tubes and Fittings.

Copper tubes can be easily joined using some of the popular methods such as mechanical joints (compression, press/crimp & push fit fittings) and soldering/brazing joints (capillary fittings & brazing fittings). Large range of fittings available offers a variety of connections to be made to the tube.

It is a recommended good practice to check all fittings and tube for defects or damage before the installation. The material should be free of damage, distortion and internal obstruction.

To minimise stress corrosion (by constant stress and specific corrodent) and corrosion fatigue (by fluctuating stresses) in a copper tube systems, it is important that the water velocities, expansion and contraction in restrained tube work, vibrations, tube support spacing, pressure variation and corrosive environment is controlled. Flow regulators, stop, non return & pressure control valves, water hammer arrestors etc. should be used where appropriate.

Recommended maximum water velocities for copper tube (meters/sec)

Temp Deg C	10	50	70	90
Tubes that can be replaced	4.0	3.0	2.5	2.0
Tubes that can not be replaced	2.0	1.5	1.3	1.0
Short connections (Tap, valves etc.)	16.0	12.0	10.0	8.0

Installer should take into account actual site conditions such as flow rates, water temperatures, length of run (expansion), joints, connected equipment and vibration when considering spacing and apply appropriate reduction in maximum spacing to compensate these criteria. Additional considerations for tube supports are noted below.

- 1) Tubes should be supported at joints, valve and flange connections, change of flow direction points to reduce stress and fatigue.
- 2) Suitable clamps made of plastic, copper or brass or other metal may be used. In case of using steel or galvanised steel the clamps should be fully covered to avoid electrolytic corrosion.
- 3) Brass or copper pipe clips are recommended where the system is integrated with electrical earthing.

Maximum recommended spacing between copper tube supports (Hot and cold water tubes & Gas tubes)

Tube Size OD (mm)	Spacing for Horizontal (mm)	Spacing for Vertical (mm)
12 or less	1.2	1.8
15 to 28	1.8	2.4
35 to 42	2.4	3.0
54 to 67	2.7	3.0
76 to 133	3.0	3.6
159 to 219	3.6	4.2

(Source: Institute of plumbing.)



INSTALLATION & FIXING OF COPPER TUBE

It is a recommended good practice to check all fittings and tube for defects or damage before the installation. The material should be free of damage, distortion and internal obstruction.

Tubes may be fixed in horizontal and or vertical configuration. Choose size and support spacing referring to tables in the guideline section.

TUBE PREPARATION

Select the correct size of tube & fittings for the job and check for damage, distortion and internal obstruction. Discard all the tubes & fittings which are damaged.

Sawing & / or Cutting:

- Mark the tube with correct length for cutting. Cutting may be done by either a fine tooth metal hacksaw or a proprietary orbital tube cutter.
- Tube should be cut true and perpendicular to its length. If using tube cutter avoid crushing the tube by not cutting too fast. The cut should be clean and deburred both internally and externally using Allpex cleaning pad, deburring tool and wire wool. De-burring enables perfect socket-ends to be made, and avoids flakes of metal circulating in the system.

Bending:

- Annealed tubes can be bent by hand, possibly using a spring bender, so as not to choke the tube.
- Half-hard tempered tubes up to a diameter of 28 mm should be bent with a manual or electric tube-bender. Above 28 mm, an industrial pipe-bender needs to be used.

INSTALLATION OF CONNECTIONS

There are four main methods for assembling copper tube joints:

- 1) Assembly of the tubes using capillary soldered joints: Simple and economical jointing for tubes up to 54mm diameter, using capillary endfeed or solder ring fittings.
- 2) Mechanically assembled fittings such as compression joints and flare fittings: These types of connections are used where servicing subsequent to installation may be required. e.g.: connection of appliances, valves, connection of copper tubes with a pipe made of another material.
- 3) Assembly by using brazing joints: These joints are made connecting by brazing copper tube and socket fittings using copper alloys as filler brazing material.
- 4) Connecting by crimping: This technique uses a connector containing an EPDM seal and crimping it on the tube by using a special mechanical clamp. (Please refer fitting manufacturer's guidelines.)

Capillary Soft Soldering:

- Tubes are prepared as noted above.
- All oxidation is removed from contact surfaces of the tube and fittings using Allpex cleaning pads or wire wool.
- Apply flux to contact areas of the joint. Fluxes containing ammonium compounds, amines or its derivatives must not be used. Allpex self-cleaning flux helps ensure surface oxidation is removed and makes the surface "wetable", which encourages the solder to spread evenly. Wipe off excessive flux.
- Heat evenly around the joint, just enough to allow the solder metal to melt when it comes into contact with the copper tube. The flame should be moved away once the joint is heated, overheating can be harmful because it causes deterioration of the flux and prevents it from playing its role. It is the hot tube that should make the solder melt and not the flame. The solder should flow into the joint by capillary action.
- The joint is completed when a ring of solder is formed all around the joint end. Wipe the excess flux and solder away with a wet rag. Soft soldering is carried out at a temperature below 450°C. The filler metals are tin/copper or tin/silver alloys.

Hard Soldering (Brazing)

- Hard soldering is carried out at above 450°C. The filler metal is a copper/phosphorus or copper/silver alloys.
- Apply heat in a uniform manner to the tube and joint area.
- Offer the brazing rod all round the joint melting the filler and allowing it to flow into the joint.
- Avoid overheating and the formation of filler metal globules inside and outside the joint.
- When the joint is complete, either allow cooling in air or if necessary, wipe with a damp cloth (do not immerse in water as it may cause localised annealing).
- The silver brazing filler metal must contain a minimum of 5% silver and maximum 0.05% cadmium (cadmium is not recommended for potable water use). If using copper/phosphorous alloy we recommend minimum 7% phosphorous content. Flux is not necessary for copper-to-copper joints when silver/phosphorus/copper filler metal is used but must be used for brass, bronze/gunmetal fittings & pipes.
- Hard soldering performs localised annealing of the copper tube, which increases the grain-size of the metal and reduces its mechanical properties. Controlled cooling can limit some of the problems as well as using lower temperature brazing alloys (higher silver content 15 to 40%) and avoiding over heating of the joints.

Compression joints:

- Compression fittings allow a joint to be made simply, effectively and quickly using only a spanner.
- After loading the nut and olive in logical order, the tube is inserted up to the tube stop in the fitting.
- When the nut is correctly tightened, the compression ring (olive) wedges inside the fitting and will give a strong and effective seal between the tube and the fitting. The joint formed is strong enough to easily withstand normal operating pressure.
- Tube ends should be square and de-burred.
- Flaring and swaging tools should be well maintained and free from scores or damage. Care must be taken to avoid twisting or distortion of tube by over-tightening.



Allpex Copper Tubes - Product Information.

Allpex Metric Copper Tubes to BS EN 1057-1996 (Replaces : BS 2871 Part 1) - Range and Technical Data

Nominal Outside Diameter (O.D.) (mm)	Nominal Wall Thickness for BS 2871.1 Tables					Maximum Working Pressure @ 65 deg. C				Wall Thickness Tolerances in mm		Elongation (%) (Min)
	Table W (mm)	Table X (mm)	Table Y (mm)	Table Z (mm)	Equivalent to ASTM B 280 Type L (mm)	Soft Coil Annealed R220 (bar)	Soft Straight Lengths R220 (bar)	Half Hard R250 (bar)	Hard R290 (bar)	(Max)	(Min)	
6	0.6					90.0	90.0			0.66	0.54	40
8		0.6						97.3		0.66	0.54	30
8	0.6					66.0	66.0			0.66	0.54	40
10		0.6						76.6		0.66	0.54	30
10	0.7					62.0	62.0			0.77	0.63	40
10					0.7	75.7				0.84	0.68	40
12		0.6						63.2		0.66	0.54	30
15				0.5 #					50.0	0.55	0.45	3
15		0.7						58.7		0.77	0.63	30
15			1.0			65.7	65.7	85.7		1.13	0.87	20
15					1.0	65.7	65.7		85.7	1.10	0.90	20
18		0.8						55.8		0.88	0.72	30
18			1.0			54.1	54.1	70.6		1.13	0.87	30
22				0.6 #					40.7	0.66	0.54	3
22		0.9						51.2		0.99	0.81	30
22			1.2			53.1	53.1	69.2		1.38	1.02	20
22					1.1		48.4	63.2		1.21	0.99	20
28				0.6 #					31.8	0.66	0.54	3
28		0.9						39.9		0.99	0.81	30
28			1.2				41.2	53.7		1.38	1.02	20
28					1.3		44.8	58.4		1.43	1.17	20
35		1.2						42.6	51.5	1.32	1.08	3
35			1.5					53.7	64.9	1.72	1.27	3
35					1.4			50.0	60.4	1.54	1.26	3
42		1.2						35.3	42.6	1.32	1.08	3
42			1.5					44.4	53.7	1.72	1.27	3
42					1.5			44.4	53.7	1.65	1.35	3
54		1.2						27.3	33.0	1.32	1.08	3
54			2.0					46.2	55.8	2.30	1.80	3
54					1.8			41.4	50.0	1.98	1.62	3
66.7		1.2							26.6	1.38	1.02	3
66.7			2.0						44.8	2.30	1.70	3
66.7					1.8 *				40.2	2.07	1.53	3
76.1		1.5							29.2	1.72	1.27	3
76.1			2.0						39.1	2.30	1.70	3
76.1					2.3 *				45.2	2.65	1.96	3
108		1.5							20.4	1.72	1.27	3
108			2.5						34.4	2.87	2.12	3
108					2.8				38.6	3.22	2.38	3
133		1.5							16.5	1.72	1.27	3
159		2.0							18.5	2.30	1.70	3
159					3.5 *				32.6	4.02	2.97	3
219					5.0 *				33.9	5.75	4.25	3
267					6.0 *				33.3	6.90	5.10	3

Notes:

- 1) Items marked as # are available only as plastic coated and in hard condition.
- 2) Preferred dimensions shown in bold.
- 3) Items marked as * are special thickness (near equivalent to ASTM B 280 Type L) made to order only (available in hard condition only).
- 4) Unless specified otherwise by buyer Allpex reserves the right to supply products with higher hardness if the softer product is not available.
- 5) All pressure ratings shown are only for tubes, specifiers are advised to also consider the pressure rating on the whole system including fittings, joining methods and flow configuration.



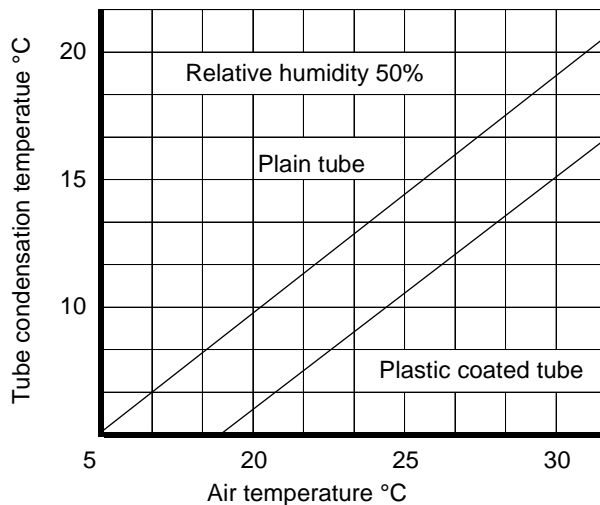
Plastic Coated Copper Tubes to BS EN 1057-R250/R290 (Replaces: BS 2871 Part 1)

Allpex offers plastic coated copper tubes to BS EN 1057:1996 from 15mm to 28mm (R250) and 35mm to 76mm (R250 & R290) castellated coating with air gaps are suitable for use with plumbing applications. The plastic coating is minimum 1 mm thick (with air gaps for insulation) and made of LEAD FREE PVC or PE coating as per EU Health & Safety requirements.

Note: Plastic coated copper tubes to BS 2871.1 Table Y are also available subject to special orders/quantities.

- Tubes are coated with PVC sheathing with air channels (gaps) on internal surface. The coating material conforms to BS 3412.1992 and has overall K factors of 0.292 w/m/k.
- Plastic coating also protects the tube against accidental damage and if buried in cement concrete or plaster is resistant to foaming agents, chemicals and other additives normally used.
- The coating which is flexible allows for expansion of copper without abrasion against embedding material. The lead free PVC coating has additional advantage of reduced toxicity, in case of fire it allows for water service temperature up to 95°C and external heat up to 140°C, it will also remain flexible in external temperatures of up to 60°C.
- The plastic coating with insulation gaps exhibits reduced condensation properties and surface temperatures.

Copper tubes at which condensation occurs:



Features and benefits of Allpex Plastic Coated Copper Tubes:

- Protects the copper tube against aggressive materials, accidental damage and abrasion.
- Reduces installation time.
- Plastic covering withstands water service temperatures up to 95°C
- Reduces condensation on exposed pipe work.
- Reduces surface temperature of the tube, thereby minimising the risk of burns or scalding.
- Reduces noise level in exposed pipe work.

Recommended Installation Tips for Plastic Coated Tubes

- Select the correct size of tube and fittings for the job and check for damage, distortion and internal obstruction.
- Cut tube with an orbital or a tube cutter.
- Make circular cut in plastic cover equal to socket depth of the fitting and remove the cut plastic from the end of the tube.

In case of soldered joint:

- Make the cut in plastic along the tube, fold back the plastic cover carefully and protect it with a wet cloth or tape.
- Clean the tube and fitting with a suitable cleaning pad and remove any burr from inside and outside.
- Apply flux on outer surface of the tube and connect the tube to the fitting.
- Remove the excess flux in order to prevent unsightly stains.
- Wrap the end of the plastic and part of the exposed copper with a wet rag to prevent over heating and possible damage.
- Heat the tube with blow lamp or an electric hot air gun.

Using compression fittings:

- When using compression fittings the plastic covering should be cut all round and removed to permit entry of the copper tube up to the tube stop in the body of the fitting.
- Do not cut the covering lengthwise when using compression, push fit or press fittings as this may create a lengthwise score along the copper's surface and this could prevent the 'O' ring from making a complete seal.
- When jointing is complete it is essential that any cut and folded plastics coverings are repositioned and the lengthways cut and any exposed tube and fitting are carefully and completely protected by spirally wrapping the joint with self-adhesive polyethylene or pvc waterproof tape.
- Moisture should be prevented from entering the channels in castellated plastic covering at positions where the covering has been terminated. Wrap all exposed ends of plastics covering with a suitable waterproof adhesive plastic tape to prevent moisture entering.



Allpex Copper Tubes - Product Information

Seamless Round Copper Tubes for Medical Gas/Vacuum to: BS EN 1057 and BS EN 13348:2001

Allpex tubes for medical gas applications are available in sizes from 12 mm O.D. to 108 mm O.D. Sizes from 12 mm to 54 mm are in accordance with BS EN 13348:2001 and sizes above 54 mm are cleaned to the requirements of BS EN 13348 which are suitable for installation requirements of HTM 2022 standards.

Allpex copper tubes for medical gas applications fulfil the high standards for purity, quality and safety. Medical gas copper tubes are used in pipeline systems for distributing medical gases which include medical compressed air (oil and moisture free), oxygen, nitrous oxide, oxygen/nitrous oxide mixtures, nitrogen, helium, carbon dioxide, xenon, air for breathing, air for driving surgical tools, anaesthetic gases & vapours, vacuum etc. Vacuum and compressed air are also used in dental surgeries, operating theatres for patient ventilators and powering surgical tools.

Specifications:

Chemical composition: Cu-DHP to ISO 1190-1 CW024A to EN 1412

Cleanliness: Maximum total carbon content 0.20 mg/dm².

Packaging:

Each tube individually cleaned, dried, degreased and sealed with plastic caps at the ends, bundles will be wrapped & sealed with polythene.

Marking:

Tubes are marked as per the BS EN requirements.

e.g.: (Brand Name) - (Standard) - (Diameter x Thickness) - (Temper) - (Mfg. Date and / or Batch Number)

Standard sizes and technical data

BS EN 13348:2001				
Size in mm	Wall Thickness	Available Lengths	Maximum Working Pressure up to 65° C	Bore Capacity
(mm)	(mm)	(5.8 mtrs)	(bar) #	(l/m)
12	0.6	HH	63.2	0.092
15	0.7	HH	58.7	0.145
22	0.9	HH	51.2	0.321
28	0.9	HH	39.9	0.539
35	1.2	H	51.5	0.835
42	1.2	H	42.6	1.232
54	1.2	H	33.0	2.091
BS EN 1057:1996 Cleaned to BS EN 13348:2001 requirements.				
66.7	1.2	H	26.6	3.248
76.1	1.5	H	29.2	4.197
108	1.5	H	20.4	8.660

HH - Supplied in Half Hard (R250) condition.

H - Supplied in Hard (R290) condition.

- Based on the tube in supplied hardness.

Recommended Installation tips for medical gas copper tubes:

- Select the correct size of tube and fittings for the job.
- Cut the tube with a tube cutter and not hacksaw to prevent cutting swarf.
- Ensure the ends of the tube are cut square and remove any burr from inside and outside.
- De-burr the tube, holding the end downwards to prevent swarf entry.
- Clean tube and fitting with an Allpex cleaning pad, not wire wool.
- Assemble the joints.
- Connect the shield gas, purge and then reduce the shield gas flow.
- Heat the joint quickly & add filler metal. Allow to cool before stopping the shield gas flow.
- Cap ends of tube to prevent the dirt entering into the tube.



Allpex Copper Tubes - Product Information

Seamless Copper Tube for Air-Conditioning and Refrigeration to: EN 12735-1 / ASTM B280

Allpex offers dehydrated and nitrogen purged copper tubes to EN 12735-1/ASTM B 280 suitable for use with air-conditioning and refrigeration applications. Nitrogen filled copper tubes in soft annealed coils are available in sizes from 1/4" O.D. to 1 1/8" O.D. & straight lengths in sizes from 3/8" O.D. to 2 1/8" O.D. Straight lengths in sizes from 2 5/8" O.D. to 4 1/8" O.D. are cleaned and capped.

Standard Range & Technical data

Tube Size		Straight length ACR Tubes (Seamless, Hard Temper in 5.0/5.8 mtr)				ACR coils (Soft annealed refrigeration coils in 50ft /15.0 mtr)			
(O.D.)		Wall Thickness		Safe working internal pressures 150°F (65.5°C)		Wall Thickness		Safe working internal pressures 150°F (65.5°C)	
inch	mm	inch	mm	PSI	in bar	inch	mm	PSI	in bar
1/4	6.35	-	-	-	-	0.030	0.76	1282	88
5/16	7.94	-	-	-	-	0.032	0.81	1071	74
3/8	9.53	0.028	0.71	761	52	0.032	0.81	876	60
3/8	9.53	0.030	0.76	817	56	-	-	-	-
1/2	12.70	0.028	0.71	559	39	0.032	0.81	642	44
1/2	12.70	0.035	0.89	710	49	-	-	-	-
5/8	15.88	0.032	0.81	507	35	0.035	0.89	560	39
5/8	15.88	0.040	1.02	647	45	-	-	-	-
3/4	19.05	0.042	1.07	561	39	0.035	0.89	462	32
7/8	22.23	0.045	1.14	510	35	0.045	1.14	510	35
1	25.40	-	-	-	-	-	-	-	-
1 1/8	28.58	0.050	1.27	438	30	0.050	1.27	438	30
1 3/8	34.93	0.055	1.40	394	27	-	-	-	-
1 5/8	41.28	0.060	1.52	360	25	-	-	-	-
2 1/8	53.98	0.070	1.78	322	22	-	-	-	-
2 5/8	66.68	0.080	2.03	296	20	-	-	-	-
3 1/8	79.38	0.090	2.29	280	19	-	-	-	-
3 5/8	92.08	0.100	2.54	267	18	-	-	-	-
4 1/8	104.78	0.110	2.79	258	18	-	-	-	-

Note: Other thicknesses which are not listed above are available upon request. Availability of tube lengths subject to order only.

Temperature - Pressure Rating of Soldered Joints

Alloy used for joints	Service Temperature °F	Water and Non-Corrosive Liquids and Gases				Saturated ALL
		1/4" - 1"	1 1/4" - 2"	2 1/2" - 4"	5" - 8"	
95 - 5 Tin-Antimony Solder (a)	100	505	405	300	265	-
	150	405	350	275	240	-
	200	300	250	200	175	-
	250	200	175	150	130	15
Brazing Alloys (Melting at or above 1000°F)	100-150-200	(b)	(b)	(b)	(b)	-
	250	302	211	171	149	-
	350	271	189	149	149	120

Note: Ratings are those given in ASME/ANSI standard B16.22 wrought copper and copper alloy solder joint pressure fittings and ANSI B 16.18 cast copper alloy solder joint pressure fittings.

- (a) Solder alloys are covered by ASTM Standard specification B32.
- (b) Rated internal pressure is that of tube or fittings being joined (whichever is less).



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