



Figure 1 Copper Tube

One of the products of Chuan Kok Hardware are copper tubes. Copper tubes are the favorite choice for cooling, plumbing, heating and other systems.

Introduction:

Copper tubes are manufactured based on the requirements of specifications under ASTM B88 or JIS H3300. ASTM B88 is a standard specification for seamless copper tube that suitable for general plumbing, similar applications for the conveyance of fluids, and commonly used with solder, flared, or compression-type fittings. While for JIS H3300, it is a standard that specifies expanded copper and copper alloy seamless pipes and tubes, having a round section.

Copper Tube Attributes:

Under ASTM B88, the minimum tensile strength for copper tube is 250 N/mm², while for copper tube under JIS H3300, the minimum tensile strength is 315 N/mm². For Chuan Kok's copper tubes, those that are under this two standards contains a minimum 99.90% of copper (CU) and phosphorus (P) in range of 0.15% to 0.40%.

As there are few grades under ASTM B88 and JIS H3300, the copper tubes that Chuan Kok carries are ASTM B88 C12200 and JIS H3300 C1220T. Specified above mentioned standards are phosphorus deoxidized copper tube.

Copper tubes are deoxidized with phosphorus to clear out porosity and decrease the cuprous oxide. Deoxidization is the removal of oxygen content during manufacturing process. It is important as oxygen is unfavorable to the quality of produced tubes. This phosphorus deoxidized copper tubes are good in flaring, welding and bending, strong corrosion resistance with good heat conductivity.



Figure 2 JIS H3300 Copper Tube



Figure 3 ASTM B88 Type K Copper Tube

Types of Copper Tube:

Under ASTM B88, there are a few types of copper tubes that are usually consumed: Type K, Type L, and Type M. For copper tubes under ASTM B88, the outer diameter is always 1/8" larger than the designated sizes. Different types of copper tube also represent a series of sizes with different wall thickness. For any outer diameter, wall thickness of Type K tube are thicker than Type L tube, and wall thickness of Type L are thicker than Type M.

Another factor that determines the types of copper tube is temper, which is used to describe the degree of strength and hardness of copper tubes. In the market, drawn temper copper tubes are always referred to as "hard" tube and annealed as "soft" tube.

Hard temper tubes are often joined by brazing, usually using capillary fittings or by welding. While soft temper tubes can be joined by using flare type fittings and compression fittings.

For JIS H3300, copper tubes are available in two types: Inches & Metric. Outer diameter of copper tubes under this standard, are measured by Inches OD or Metric OD. Copper tubes under JIS H3300 are suitable as heat exchanger, in chemical industry, and water supply applications. Copper tubes are also available in coil form under JIS H3300, known as copper coil.



Outer Diameter and Tube Thickness specifications:

Dimensions of copper tubes are according to ASTM B88 standard specifications. The table below will show the outer diameter and tube thickness of copper tubes:

Nominal Size (N.B.)	Outer Diameter		Type K Thickness (Inch)	Type L Thickness (Inch)	Type M Thickness (Inch)
	Inch OD	Metric OD			
1/8"	1/4"	6.35	0.035"	0.030"	–
1/4"	3/8"	9.53	0.035"	0.030"	–
3/8"	1/2"	12.7	0.049"	0.035"	0.025"
1/2"	5/8"	15.88	0.049"	0.040"	0.028"
5/8"	3/4"	19.05	0.049"	0.042"	0.028"
3/4"	7/8"	22.23	0.065"	0.045"	0.032"
7/8"	1"	25.4	0.065"	0.050"	0.035"
1"	1 1/8"	28.58	0.065"	0.050"	0.035"
1 1/4"	1 3/8"	34.93	0.065"	0.055"	0.042"
1 1/2"	1 5/8"	41.28	0.072"	0.060"	0.049"
2"	2 1/8"	53.98	0.083"	0.070"	0.058"
2 1/2"	2 5/8"	66.68	0.095"	0.080"	0.065"
3"	3 1/8"	79.38	0.109"	0.090"	0.072"
3 1/2"	3 5/8"	92.08	0.120"	0.100"	0.083"
4"	4 1/8"	104.78	0.134"	0.110"	0.095"
5"	5 1/8"	130.18	0.160"	0.125"	0.109"
6"	6 1/8"	155.58	0.192"	0.140"	0.122"

Table below illustrates the OD tolerance under standard JIS H3300.

Tube OD	Tolerance
4mm to 15mm	± 0.08mm
16mm to 25mm	± 0.09mm
26mm to 50mm	± 0.12mm

Chuan Kok Hardware & Machinery Pte Ltd

Address: 1783 Geylang Bahru #01-02, Kallang Distripark Singapore 339708

Telephone Number: +65 6294 2566

Fax Number: +65 6295 7013

Email Address: info@chuankok.com

Website: www.chuankok.com

Business Registration Number: 198201577Z

Country of Registration: Singapore

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