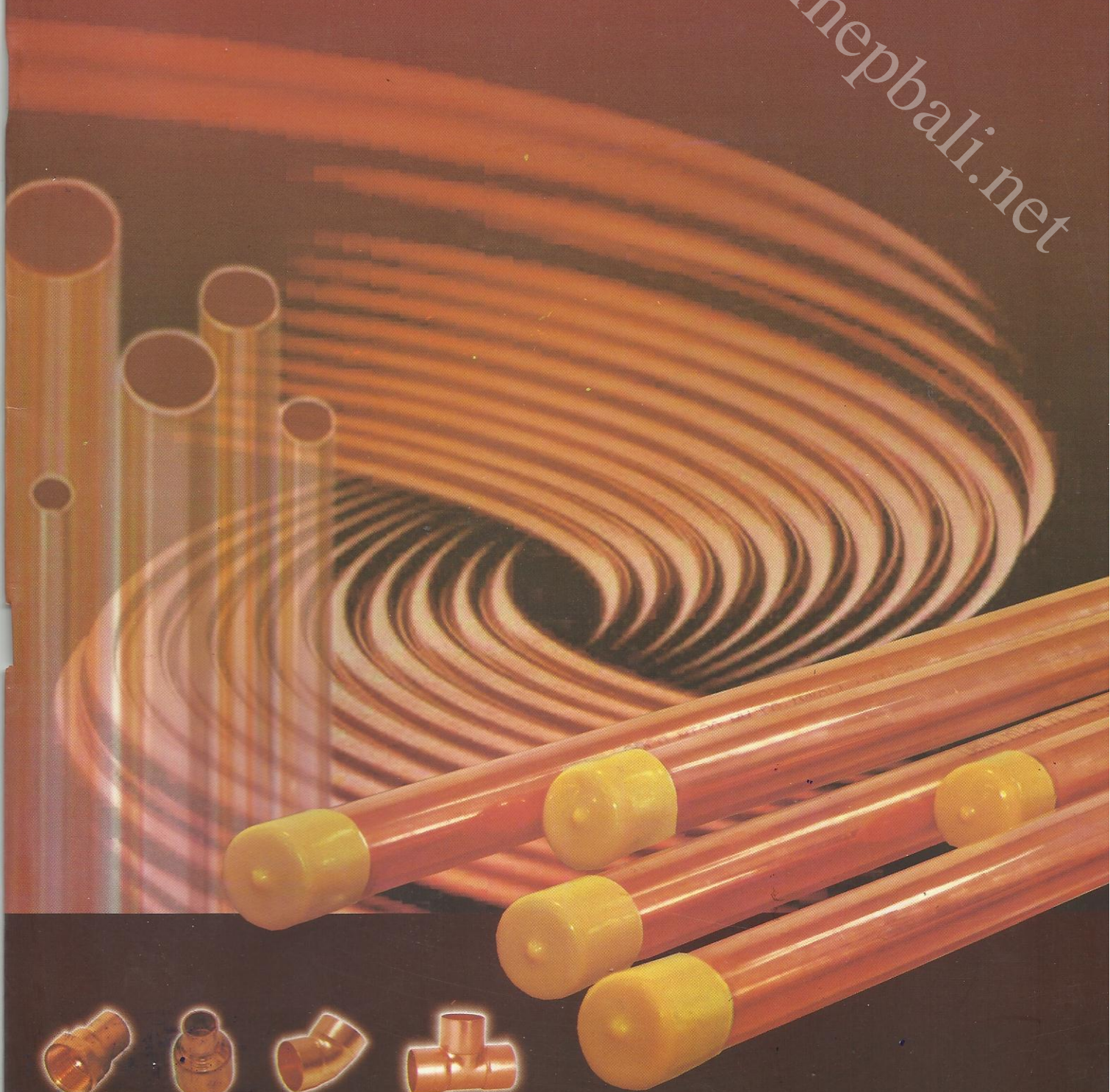


**DOENJI**<sup>®</sup>  
Copper Tube

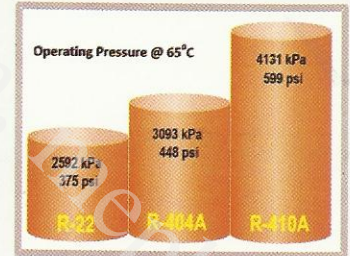
Download from, [mepbali.net](http://mepbali.net)



## OVERVIEW

Copper tube is a strong and versatile metal that has been used in various applications for thousands of years. With its unique properties and enviable performance records, copper tube is the leading choice of modern contractors for plumbing, heating systems and mechanical systems in all kinds of building and industrial facilities.

As the industry rapidly changes and evolves with more efficient products, so must the standards, specifications and design equations for copper systems. The gradual phase-out of refrigerants harmful to environmental has ushered in newer, more efficient systems which operate a higher pressure. It is important not only to be cost effective but also to provide a safe environment for the public.

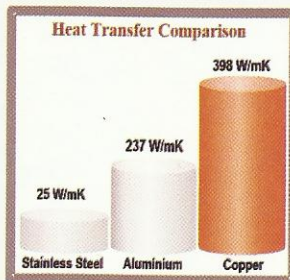


## Why choose Copper?

**1. Superior performance at reasonable cost.** Copper piping systems have proven to be durable and reliable for over 90 years.

- Copper has excellent resistance to corrosion and scaling, high mechanical strength, high-temperature resistance and lifetime resistance to UV degradation. Copper assure long, trouble-free service, which translates to satisfied customers and systems that last

Copper piping is installed in 80% of U.S. buildings. (Duane Craig)



- The workability of soft or annealed copper allows it to be run, without joints, through the building spaces where other materials would be difficult to use. Copper tube can be bent and formed, it is frequently possible to eliminate elbows and joints
- Copper tube does not require the heavy thickness of ferrous or threaded pipe of the same internal diameter. This means copper permits easier handling and prefabrication. It costs less to transport and takes less space when installed.
- The process of joining Copper is easier, more efficient and reliable than other materials. Copper tube can be joined with capillary fittings. These fittings save material and make smooth, neat, strong and leak-proof joints. No extra thickness or weight is necessary to compensate for material removed by threading.
- Copper is antimicrobial properties. It is the only solid surface material registered by the U.S Environmental Protection Agency to continuously and naturally inhibits the growth of harmful pathogens including bacteria, mould, algae and fungi.
- Copper's smooth interior means minimum resistance to flow. Fittings do not restrict flow.
- Copper can resist decay from internal attack and can withstand physical damage in service
- The combination of easy handling, forming and joining permits savings in installation time, material and overall costs.



- Copper is safe.** Copper tube will not burn or support combustion or de-compose to toxic gases. Therefore, it will not carry fire through floors, walls and ceiling. Volatile organic compounds are not required for installation
- Copper is dependable.** Copper tube is manufactured to well-defined composition standards and marked with permanent identification so you know exactly what it is and who made it. It is accepted by virtually every plumbing code
- Copper is 100% recyclable.** Copper can be recycled over and over without degradation in content or properties.

40% of the world's copper demand is met by recycled copper.

### Work Hardening

When copper stretches or strains (the deformation due to stress) the grain structure is reoriented and made stronger by work hardening. As more is applied, up to a point, copper simply get stronger



A smaller, tighter grain structure can result in greatly improved performance. In these samples, the one on the right outperforms by over 20% (viewed at 100x magnification)

# TECHNICAL DATA

## Physical and Mechanical Properties



DENJI® seamless copper tube is manufactured from phosphorus deoxidized copper alloy C12200. The melting point of copper is 1981°F (1083°C) and it has density of 8,890 kg/m<sup>3</sup>. DENJI® provide a wide range of seamless copper tubes, supplied in both hard drawn and bright annealed to meet customer's requirements.

DENJI® copper tube is made of pure electrolysis copper, precise in size and smooth on surface.

### Tolerances

All DENJI® copper tubes are manufactured to the highest standard with the wall thickness within a tolerance of max 10%.

### Cleanliness

All DENJI® copper tubes are 100% carbon free. All tubes are cleaned and sample tested to meet the internal residue requirement of  $\leq 0.038\text{g/m}^2$ .

### Mechanical Properties Table

Standar	Copper Alloy No.	Chemical Composition		Mechanical Properties			Hardness		
		CU%	P%	Temper	Tensile strength (Mpa)	Elongation in (%)	Grain Size (mm)	Scale	Hardness
ASTM B280	C12200	99.90	0.015 - 0.040	H58	>250	-	-	30T	30 Min
				050 Annealed	>205	>40	0.015-0.040	15 t	65 Max
				060 Annealed	>205	>40	>0.035	F	55 Max
ASTM B88	C11000	99.90	-	060 Annealed	>200	-	> 0.040	15T	55 Max
				050 Annealed	>200	-	> 0.025	15T	60 Max
	C12200	99.90	0.015 - 0.040	H 58	> 250	-	-	30T	30 Min
JIS H3300	C1100	99.90	0.015 - 0.040	O	>205	>40	-	-	-
				OL	245 ~ 325	-	-	-	-
				H	>265	-	-	-	-
	C12200	99.90	0.015 - 0.040	O	>205	>40	0.025~0.060	-	-
				OL	>205	>40	>0.040	-	-
				1/2H	245 ~ 325	-	-	-	-
				H	>255	-	-	-	-
EN1057	-	99.90	0.015 - 0.040	R220	>220	>40	-	-	-
				R250	>250	>30 or 20	-	-	-
				R290	>290	>3	-	-	-

## Type of Copper Tubes and Standards

Tube Type	Standar	Application	Commercially Available Lengths			
			Nominal or Standard Size	Drawn	Annealed	
ACR	ASTM B280	Air Conditioning, Refrigeration, Natural Gas, Liquefied Petroleum Gas, Compressed Air	Straight Lengths Coils	3/8" to 4 1/8" 1/4" to 3/4"	5.8 m -	- 15 m
	AS1571	Air Conditioning, Refrigeration, Compressed Air	Straight Lengths Coils	1/2" to 4 1/8" 1/4" to 3/4"	5.8 m -	- 15 m
TYPE K	ASTM B88	Domestic Water Services and Distribution, Fire Protection, Solar, Fuel / Fuel Oil, Natural Gas, LPG, HVAC, Snow Melting, Compressed Air, Vacuum System	Straight Lengths	3/8" to 4 1/8"	5.8 m	-
TYPE L	ASTM B88	Domestic Water Services and Distribution, Fire Protection, Solar, Fuel / Fuel Oil, Natural Gas, LPG, HVAC, Snow Melting, Compressed Air, Vacuum System	Straight Lengths	3/8" to 4 1/8"	5.8 m	-
TYPE M	ASTM B88	Domestic Water Services and Distribution, Fire Protection, Solar, Fuel / Fuel Oil, HVAC, Snow Melting, Vacuum systems	Straight Lengths	1/2" to 4 1/8"	5.8 m	-
MEDICAL GAS TYPE K	ASTM B819	Medical Gas, Compressed Medical Air, Vacuum systems	Straight Lengths	3/8" to 4 1/8"	5.8 m	-
MEDICAL GAS TYPE L	ASTM B819	Medical Gas, Compressed Medical Air, Vacuum systems	Straight Lengths	3/8" to 4 1/8"	5.8 m	-



## ASTM B-280

### Seamless Copper Tubes for Air Conditioning and Refrigeration Field Service

This copper tube are widely used for heat exchangers, radiators, coolers, electro-heat-up pipe, air conditioner and refrigerators. The straight pipes can be used for oil transportation, brake pipes, water pipes and gas pipes for construction.

#### Standard sizes and data for Annealed Coil Copper Tubes (15 metres /coil)



Standard size	Outside Diameter		Wall Thickness		Nominal Weight	Safe Working Internal Pressures			
						150°F ~ S=5100psi		300°F ~ S=4700psi	
in	in	mm	in	mm	kgs /15 m	Psi	kPa	Psi	kPa
1/4"	0.250	6.35	0.030	0.76	1.79	1187	8184	1094	7543
3/8"	0.375	9.52	0.032	0.81	2.96	831	5729	766	5281
1/2"	0.500	12.70	0.032	0.81	4.04	614	4233	566	3902
5/8"	0.625	15.90	0.035	0.89	5.60	526	3626	484	3337
3/4"	0.750	19.10	0.035	0.89	6.80	435	2999	401	2764

#### Standard sizes and data for Hard Drawn Straight Copper Tubes (5.8 metres /length)



Standard size	Outside Diameter		Wall Thickness		Nominal Weight	Safe Working Internal Pressures			
						150°F ~ S=9000psi		300°F ~ S=8700psi	
in	in	mm	in	mm	kgs /5.8 m	Psi	kPa	Psi	kPa
3/8"	0.375	9.52	0.030	0.76	1.08	1363	9397	1317	9080
1/2"	0.500	12.70	0.035	0.89	1.71	1189	8198	1150	7929
5/8"	0.625	15.90	0.040	1.02	2.46	1087	7494	1050	7239
3/4"	0.750	19.10	0.042	1.07	3.12	940	6481	909	6267
7/8"	0.875	22.20	0.045	1.14	3.90	867	5977	838	5778
1 1/8"	1.125	28.60	0.050	1.27	5.63	740	5102	716	4936
1 3/8"	1.375	34.90	0.055	1.40	7.62	666	4592	644	4440
1 5/8"	1.625	41.30	0.060	1.52	9.81	614	4233	594	4095
2 1/8"	2.125	54.00	0.070	1.78	15.09	545	3757	527	3633
2 5/8"	2.625	66.70	0.080	2.03	21.31	505	3481	488	3364
3 1/8"	3.125	79.40	0.090	2.29	28.67	475	3275	459	3164
3 5/8"	3.625	92.10	0.100	2.54	36.93	456	3144	441	3040
4 1/8"	4.125	104.80	0.110	2.79	46.21	440	3033	425	2930

#### Safe Working Pressure

Safe working pressures for copper tube are calculated on the formula from ANSI B31 Standard Code for Pressure Piping. This formula includes the maximum allowable stress the pipe can be under, the wall thickness and the outside diameter of the tubing and also includes a working temperature.

The value of S in the formula is the maximum allowable stress (ASME B31) for continuous long term service of the tube material.

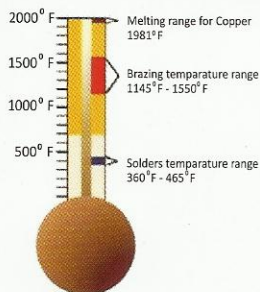
$$P = \frac{2 S t_m}{D_{max} - 0.8 t_m}$$

Where:

- P = allowable pressure, psi
- S = maximum allowable stress in tension, psi
- T<sub>min</sub> = wall thickness (min), mm
- D<sub>max</sub> = outside diameter (max), mm

#### Annealed Copper

Copper begins to anneal at 700°F and becomes soft with increasing time and temperature. Since the HVAC/R industry joins copper by brazing pieces together between 1150°F to 1550°F, all HVAC/R systems are considered to be annealed.



The allowable stress value depends on the service temperature and on the temper of the tube, drawn or annealed. The ratings for Drawn tube can be used for soldered systems and systems using properly designed mechanical joints.

The rating for Drawn working temperature of the copper tubing can be up to 400°F. Annealed copper tubing can have maximum stress from 3,000 to 6,000 pounds per square inch (psi). Drawn tubing can have stress from 8,200 to 10,300 psi.

# AS1571

## Seamless Copper Tubes for Air Conditioning and Refrigeration Field Service

DENJI® copper tube also manufactures another range of copper tube to comply with Australian Standards, AS/NZS 1571 Seamless Copper tubes for Air-conditioning and Refrigeration.

### Standard sizes and data for Annealed Coil Copper Tubes (15 metres /coil)

Standard size	Outside Diameter		Wall Thickness		Nominal Weight	Safe working internal pressures									
						50°C		55°C		60°C		65°C		70°C	
in	in	mm	in	mm	kgs/15m	psi	kPa	psi	kPa	psi	kPa	psi	kPa	psi	kPa
1/4	0.250	6.35	0.022	0.56	1.36	1005	6933	971	6696	937	6459	902	6222	868	5986
3/8	0.375	9.53	0.022	0.56	2.11	652	4495	630	4342	607	4188	585	4035	563	3881
1/2	0.500	12.70	0.024	0.61	3.10	528	3641	510	3517	492	3393	474	3268	456	3144
5/8	0.625	15.88	0.024	0.61	3.92	419	2888	405	2789	390	2690	376	2592	362	2493
3/4	0.750	19.05	0.028	0.71	5.48	413	2846	399	2749	385	2652	371	2554	356	2457

### Standard sizes and data for Hard Drawn Straight Copper Tubes (5.8 metres /length)

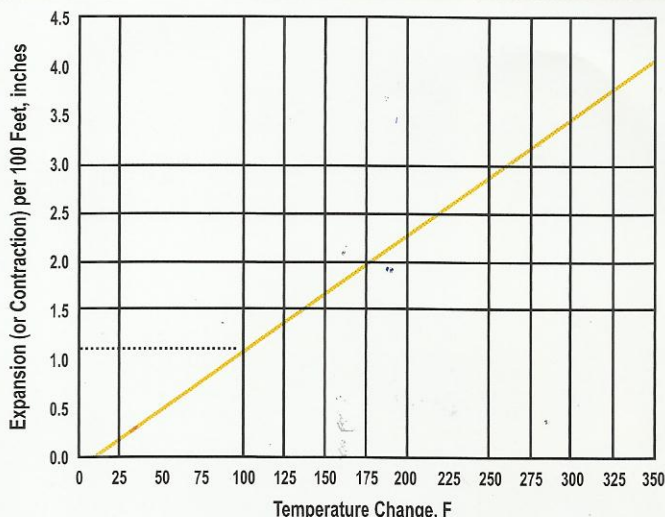
Standard size	Outside Diameter		Wall Thickness		Nominal Weight	Safe working internal pressures									
						50°C		55°C		60°C		65°C		70°C	
in	in	mm	in	mm	kgs/5.8m	psi	kPa	psi	kPa	psi	kPa	psi	kPa	psi	kPa
1/2	0.500	12.70	0.028	0.71	1.38	630	4344	609	4196	587	4048	566	3899	544	3751
5/8	0.625	15.88	0.028	0.71	1.75	499	3439	482	3322	465	3204	448	3087	431	2969
3/4	0.750	19.05	0.028	0.71	2.12	413	2846	399	2749	385	2652	371	2554	356	2457
7/8	0.875	22.23	0.032	0.81	2.82	403	2781	390	2686	376	2591	362	2496	348	2401
1	1.000	25.40	0.036	0.91	3.63	396	2732	383	2639	369	2546	356	2452	342	2359
1 1/8	1.125	28.58	0.036	0.91	4.10	351	2420	339	2337	327	2254	315	2172	303	2089
1 1/4	1.250	31.75	0.036	0.91	4.57	315	2171	304	2097	293	2023	283	1949	272	1875
1 3/8	1.375	34.93	0.048	1.22	6.70	386	2662	373	2571	360	2480	347	2389	333	2298
1 5/8	1.625	41.28	0.048	1.22	7.96	325	2241	314	2164	303	2088	292	2011	281	1935
2 1/8	2.125	53.98	0.048	1.22	10.48	247	1703	239	1645	230	1586	222	1528	213	1470
2 5/8	2.625	66.68	0.064	1.63	17.27	268	1845	258	1782	249	1719	240	1656	231	1593
3 1/8	3.125	79.38	0.072	1.83	23.13	252	1738	243	1678	235	1619	226	1560	218	1500
4 1/8	4.125	104.78	0.095	2.41	40.21	251	1733	243	1674	234	1615	226	1556	217	1497

### Expansion

Copper tube, like all piping materials, expands and contracts with temperature changes. Therefore, in a copper tube system subjected to excessive temperature changes, a long line tends to buckle or bend when it expands unless compensation is built into the system. The expansion of a length of copper tube may be calculated from the formula:

$$\text{Temperature Rise (degrees F)} \times \text{Length (feet)} \times 12 \text{ (inches per foot)} \times \text{Expansion Coefficient (inches per inch per degree F)} = \text{Expansion (inches)}$$

Calculation for expansion and contraction should be based on the average coefficient of expansion of copper which is 0.0000094 inch per inch per degree F, between 70 F and 212 F.



## ASTM B-88

This specification covers seamless copper water tube suitable for general plumbing, similar applications for the conveyance of fluids and commonly used with solder, flared, or compression type fittings. This standard is separated into three tube types : K – L – M.

### Standard sizes and data for Hard Drawn Straight Copper Tubes (5.8 metres /length)

TYPE : K	Actual Size	Outside Diameter		Wall Thickness		Nominal Weight	Safe Working Internal Pressures			
		in	mm	in	mm		150°F		300°F	
							kg / 5.8 m	Psi	kPA	Psi
Types K are used for : water service and distribution, fire protection, solar, fuel / oil, HVAC, compressed air, oxygen, LPG gas, snow melting, steam and vacuum systems.	3/8"	0.375	9.52	0.035	0.89	1.25	1635	11273	1581	10900
	1/2"	0.500	12.70	0.049	1.24	2.32	1761	12142	1702	11735
	5/8"	0.625	15.90	0.049	1.24	2.97	1374	9473	1329	9163
	3/4"	0.750	19.10	0.049	1.24	3.62	1124	7749	1086	7487
	7/8"	0.875	22.22	0.065	1.65	5.53	1319	9094	1275	8791
	1 1/8"	1.125	28.60	0.065	1.65	7.25	999	6888	966	6660
	1 3/8"	1.375	34.90	0.065	1.65	8.93	805	5550	778	5364
	1 5/8"	1.625	41.30	0.072	1.83	11.77	755	5205	730	5033
	2 1/8"	2.125	54.00	0.083	2.11	17.81	661	4557	639	4405
	2 5/8"	2.625	66.70	0.095	2.41	25.29	613	4226	592	4081
	3 1/8"	3.125	79.40	0.109	2.77	34.57	590	4068	570	3930
	3 5/8"	3.625	92.10	0.120	3.05	44.20	560	3861	541	3730
	4 1/8"	4.125	104.80	0.134	3.40	56.20	549	3785	531	3661

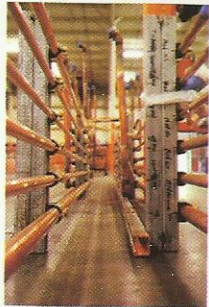
TYPE : L	Actual Size	Outside Diameter		Wall Thickness		Nominal Weight	Safe Working Internal Pressures			
		in	mm	in	mm		150°F		300°F	
							kg / 5.8 m	Psi	kPA	Psi
Types L are used for interior above ground plumbing domestic water service and distribution, fire protection, solar, fuel and oil, HVAC, compressed air, LPG gas, snow melting and vacuum systems.	3/8"	0.375	9.52	0.030	0.76	1.08	1363	9397	1317	9080
	1/2"	0.500	12.70	0.035	0.89	1.71	1189	8198	1150	7929
	5/8"	0.625	15.90	0.040	1.02	2.46	1087	7494	1050	7239
	3/4"	0.750	19.10	0.042	1.07	3.12	940	6481	909	6267
	7/8"	0.875	22.22	0.045	1.14	3.90	867	5977	838	5778
	1 1/8"	1.125	28.60	0.050	1.27	5.63	740	5102	716	4936
	1 3/8"	1.375	34.90	0.055	1.40	7.62	666	4592	644	4440
	1 5/8"	1.625	41.30	0.060	1.52	9.81	614	4233	594	4095
	2 1/8"	2.125	54.00	0.070	1.78	15.09	545	3757	527	3633
	2 5/8"	2.625	66.70	0.080	2.03	21.31	505	3481	488	3364
	3 1/8"	3.125	79.40	0.090	2.29	28.67	475	3275	459	3164
	3 5/8"	3.625	92.10	0.100	2.54	36.93	456	3144	441	3040
	4 1/8"	4.125	104.80	0.110	2.79	46.21	440	3033	425	2930


TYPE : M	Actual Size	Outside Diameter		Wall Thickness		Nominal Weight	Safe Working Internal Pressures			
		in	mm	in	mm		150°F		300°F	
							kg / 5.8 m	Psi	kPA	Psi
Types M are used for interior domestic water service and distribution, fire protection, solar, fuel and oil, HVAC, snow melting and vacuum systems. Wall thickness less than type K and L.	1/2"	0.500	12.70	0.025	0.64	1.25	798	5502	771	5316
	5/8"	0.625	15.90	0.028	0.71	1.76	713	4916	690	4757
	7/8"	0.875	22.22	0.032	0.81	2.83	573	3950	554	3819
	1 1/8"	1.125	28.60	0.035	0.89	4.01	487	3357	471	3247
	1 3/8"	1.375	34.90	0.042	1.07	5.86	487	3357	471	3247
	1 5/8"	1.625	41.30	0.049	1.24	8.12	487	3357	470	3240
	2 1/8"	2.125	54.00	0.058	1.47	12.59	439	3026	424	2923
	2 5/8"	2.625	66.70	0.065	1.65	17.52	398	2744	385	2654
	3 1/8"	3.125	79.40	0.072	1.83	23.08	368	2537	355	2447
	3 5/8"	3.625	92.10	0.083	2.11	30.91	369	2544	356	2454
4 1/8"	4.125	104.80	0.095	2.41	40.25	372	2564	359	2475	

## ASTM B 819

DENJI® copper tube which used for medical gas systems is identified as type K & L, manufactured by such hot working necessary to convert the billet to a tubular shape and cold worked to the finished size, furnished in the H58 (Drawn General Purpose) temper.

### Standard sizes and data for Hard Drawn Straight Copper Tubes (5.8 metres /length)

TYPE : K	Actual Size		Outside Diameter		Wall Thickness		Nominal Weight kgs / 5.8 m	Safe Working Internal Pressures			
								150°F		300°F	
	in	mm	in	mm	in	mm		Psi	kPA	Psi	kPA
	3/8"	9.52	0.375	9.52	0.035	0.89	1.25	1635	11273	1581	10900
	1/2"	12.70	0.500	12.70	0.049	1.24	2.32	1761	12142	1702	11735
	5/8"	15.90	0.625	15.90	0.049	1.24	2.97	1374	9473	1329	9163
	3/4"	19.10	0.750	19.10	0.049	1.24	3.62	1124	7749	1086	7487
	7/8"	22.22	0.875	22.22	0.065	1.65	5.53	1319	9094	1275	8791
	1 1/8"	28.60	1.125	28.60	0.065	1.65	7.25	999	6888	966	6660
	1 3/8"	34.90	1.375	34.90	0.065	1.65	8.93	805	5550	778	5364
	1 5/8"	41.30	1.625	41.30	0.072	1.83	11.77	755	5205	730	5033
	2 1/8"	54.00	2.125	54.00	0.083	2.11	17.81	661	4557	639	4405
	2 5/8"	66.70	2.625	66.70	0.095	2.41	25.29	613	4226	592	4081
	3 1/8"	79.40	3.125	79.40	0.109	2.77	34.57	590	4068	570	3930
	3 5/8"	92.10	3.625	92.10	0.120	3.05	44.20	560	3861	541	3730
	4 1/8"	104.80	4.125	104.80	0.134	3.40	56.20	549	3785	531	3661

TYPE : L	Actual Size		Outside Diameter		Wall Thickness		Nominal Weight kgs / 5.8 m	Safe Working Internal Pressures			
								150°F		300°F	
	in	mm	in	mm	in	mm		Psi	kPA	Psi	kPA
	3/8"	9.52	0.375	9.52	0.030	0.76	1.08	1363	9397	1317	9080
	1/2"	12.70	0.500	12.70	0.035	0.89	1.71	1189	8198	1150	7929
	5/8"	15.90	0.625	15.90	0.040	1.02	2.46	1087	7494	1050	7239
	3/4"	19.10	0.750	19.10	0.042	1.07	3.12	940	6481	909	6267
	7/8"	22.22	0.875	22.22	0.045	1.14	3.90	867	5977	838	5778
	1 1/8"	28.60	1.125	28.60	0.050	1.27	5.63	740	5102	716	4936
	1 3/8"	34.90	1.375	34.90	0.055	1.40	7.62	666	4592	644	4440
	1 5/8"	41.30	1.625	41.30	0.060	1.52	9.81	614	4233	594	4095
	2 1/8"	54.00	2.125	54.00	0.070	1.78	15.09	545	3757	527	3633
	2 5/8"	66.70	2.625	66.70	0.080	2.03	21.31	505	3481	488	3364
	3 1/8"	79.40	3.125	79.40	0.090	2.29	28.67	475	3275	459	3164
	3 5/8"	92.10	3.625	92.10	0.100	2.54	36.93	456	3144	441	3040
	4 1/8"	104.80	4.125	104.80	0.110	2.79	46.21	440	3033	425	2930

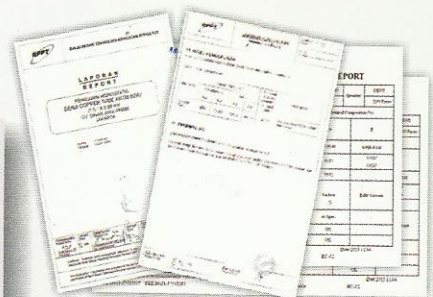
### Quality Control



In order to ensure high quality batch of products, DENJI® has a stringent and sophisticated Quality Control Test as dictated by International Standards. All products undergo self-inspection, scanning

inspections and final inspections before being approved for delivery to clients. These procedures are carried out strictly in accordance with ISO 9002 standards.

All DENJI® copper tubes are electronically tested by Eddy Current method, as per the requirements of ASTM E 243, to ensure tube integrity.



### PRESSURE – TEMPERATURE CONVERSION CHART

Temperature	45°C	50°C	55°C	60°C	65°C	70°C	45°C	50°C	55°C	60°C	65°C	70°C
	113°F	122°F	131°F	140°F	149°F	158°F	113°F	122°F	131°F	140°F	149°F	158°F
	Pressure in kPa						Pressure in psi					
R11	105	140	176	212	252	307	15.2	20.3	25.5	30.7	36.5	44.5
R12	981	1120	1268	1428	1586	1784	142.2	162.4	183.9	207.1	230.0	258.7
R123	78	114	147	182	228	276	11.3	16.5	21.3	26.4	33.1	40.0
R134a	1054	1234	1383	1571	1789	2016	152.8	178.9	200.5	227.8	259.4	292.3
R22	1649	1855	2095	2345	2592	2895	239.1	269.0	303.8	340.0	375.8	419.8
R404A	1967	2224	2503	2805	3093	3292	285.2	322.5	362.9	406.7	448.5	477.3
R407C	1735	1970	2235	2520	2933	3262	251.6	285.7	324.1	365.4	425.3	473.0
R408A	1822	2060	2319	2600	2842	3160	264.2	298.7	336.3	377.0	412.1	458.2
R409A	1037	1191	1363	1550	1990	2217	150.4	172.7	197.6	224.8	288.6	321.5
R410A	2609	2945	3308	3702	4131	4599	378.3	427.0	479.7	536.8	599.0	666.9
R502	1766	1977	2215	2475	2865	3090	256.1	286.7	321.2	358.9	415.4	448.1
R507	2021	2281	2572	2890	3236	3566	293.0	330.7	372.9	419.1	469.2	517.1

### Useful Conversion Factor

PRESSURE					
PSI	ATM	kgf/cm2	mmHg	Kpa	Bar
1	0.06805	0.07031	51.715	6.895	0.6895
14.696	1	1.0332	760	101.325	1.01325
14.2233	0.96784	1	735.559	98.096	0.98067
0.01934	0.00132	0.00136	1	0.1333	0.001333
0.145	0.00987	0.0102	7.5006	1	0.01
14.5038	0.98692	1.01972	750.062	100	1

VELOCITY					
in/s	ft/s	m/s	m/h	km/h	mph
1	0.0833374	0.0254	91.44	0.09144	0.0568187
12	1	0.3048	1097.3	1.097	0.68182
39.37	3.281	1	3600	3.6	2.237
0.01093613	0.0009113	0.000278	1	0.001	0.00062137
10.936	0.91134	0.27778	1000	1	0.62137
17.6	1.467	0.44704	1609.3	1.609	1

LENGTH					
mm	m	Inches	Feet	Yards	Mile
1	0.01	0.03937	0.00328	0.00109	0.0000006
100	1	39.37	3.2808	1.0936	0.0000062
25.4	0.0254	1	0.08333	0.02778	0.00001578
304.8	0.3048	12	1	0.3333	0.0001894
914.4	0.9144	36	3	1	0.0005682
1609300	1609.3	63360	5280	1760	1

from Celsius	to Kelvin	$T_K = t_C + 273.15$
	to Fahrenheit	$t_F = (1.8 \cdot t_C) + 32$
from Fahrenheit	to Kelvin	$T_K = \frac{t_F - 32}{1.8} + 273.15$
	to Celsius	$t_C = \frac{t_F - 32}{1.8}$
from Kelvin	to Celsius	$t_C = T_K - 273.15$
	to Fahrenheit	$t_F = 1.8 \cdot (T_K - 273.15) + 32$

### PROJECT REFERENCES :

