



# Copper Guide for Industrial & Commercial Tubes / Pipes Application

Exclusive Distributor





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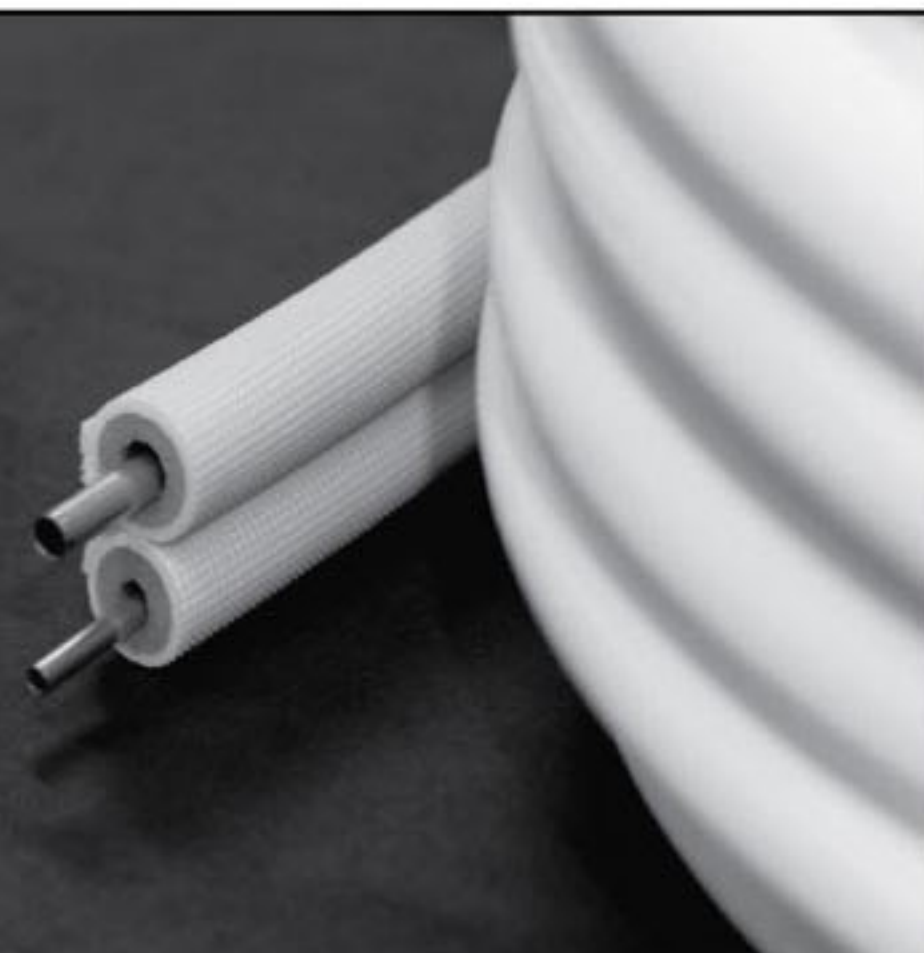
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# Seamless Copper Tube for Air Conditioning and Refrigeration Field Service

## ASTM B280

Sampo Industrial manufactures a range of seamless copper tube in soft and hard drawn straight lengths supplied for use in manufacture, installation and maintain of refrigeration & air-conditioning field service This tube is dehydrated, cleaned & capped to reduce refrigerant contamination.

Coil type	Actual Size	Outside diameter			Wall Thickness			Theoretical Weight	
		inch	mm	Tolerance(inch)	inch	mm	Tolerance(inch)	lb/ft	kg/m
	$\frac{1}{4}$ "	0.25	6.35	0.002	0.03	0.762	0.003	0.0804	0.12
	$\frac{5}{16}$ "	0.312	7.92	0.002	0.032	0.813	0.003	0.109	0.162
	$\frac{3}{8}$ "	0.375	9.52	0.002	0.032	0.813	0.003	0.134	0.199
	$\frac{1}{2}$ "	0.5	12.7	0.002	0.032	0.813	0.003	0.182	0.271
	$\frac{5}{8}$ "	0.625	15.9	0.002	0.035	0.889	0.004	0.251	0.373
	$\frac{3}{4}$ "	0.75	19.1	0.0025	0.035	0.889	0.004	0.305	0.454
	$\frac{3}{4}$ "	0.75	19.1	0.0025	0.042	1.07	0.004	0.362	0.539
	$\frac{7}{8}$ "	0.875	22.2	0.003	0.045	1.14	0.004	0.455	0.677

Straight type	Actual Size	Outside diameter			Wall Thickness			Theoretical Weight	
		inch	mm	Tolerance(inch)	inch	mm	Tolerance(inch)	lb/ft	kg/m
	$\frac{3}{8}$ "	0.375	9.52	0.001	0.03	0.762	0.003	0.126	0.187
	$\frac{1}{2}$ "	0.5	12.7	0.001	0.035	0.889	0.004	0.198	0.295
	$\frac{5}{8}$ "	0.625	15.9	0.001	0.04	1.02	0.004	0.285	0.424
	$\frac{3}{4}$ "	0.75	19.1	0.001	0.042	1.07	0.004	0.362	0.539
	$\frac{7}{8}$ "	0.875	22.2	0.001	0.045	1.14	0.004	0.455	0.677
	1 $\frac{1}{8}$ "	1.125	28.6	0.0015	0.05	1.27	0.005	0.655	0.975
	1 $\frac{3}{8}$ "	1.375	34.9	0.0015	0.055	1.4	0.006	0.884	1.32
	1 $\frac{5}{8}$ "	1.625	41.3	0.002	0.06	1.52	0.006	1.14	1.7
	2 $\frac{1}{8}$ "	2.125	54	0.002	0.07	1.78	0.007	1.75	2.6
	2 $\frac{5}{8}$ "	2.625	66.7	0.002	0.08	2.03	0.008	2.48	3.69
	3 $\frac{1}{8}$ "	3.125	79.4	0.002	0.09	2.29	0.009	3.33	4.96
	3 $\frac{5}{8}$ "	3.625	92.1	0.002	0.1	2.54	0.01	4.29	6.38
	4 $\frac{1}{8}$ "	4.125	105	0.002	0.11	2.79	0.011	5.38	8.01

A The average outside diameter of a tube is the average of the maximum and minimum outside diameters as determined at any one cross section of the tube.

B The tolerances listed represent the maximum deviation at any point denotes tube made to order where minimum order quantities required.

\* Physical Properties of this copper tube is same as determined from ASTM B88.

### Capping & Ink Marking

The standard air-conditioning and refrigeration grade copper tube is distinguished by blue colored capping. The tube is also continuously identified with blue ink-marking along its lengths indicating "ACR", manufacturer's name, country of origin, conforming standard, size and lot number which enable to the tubing to be traced back to the origin of manufacture.

- **END- CAP** BLUE
- **INK MARKING** (1) PANCAKE COIL - NO MARK (2) STRAIGHT - BLUE
- **INCISION** Trademark of the manufacturer + ACR





# SMARTCO COPPER TUBE TO AS/NZS 1571 : 1995

Seamless copper tubes for airconditioning and refrigeration

These tubes are supplied in both hard drawn straight lengths and annealed coils, after meticulous cleaning, dehydrating and capping, to ensure that the internal cleanliness standards are fully met. The intended use for this product is in airconditioning and refrigeration applications.

## STRAIGHT LENGTHS

OD (inch)	OD (mm)	W/T (mm)	Nominal kg/m	Safe Working Pressure KPa		
				50°C < 75°C	75°C < 125°C	125°C < 150°C
1/4"	6.35	0.71	0.12	8,560	8,309	8,057
	6.35	0.81	0.13	9,942	9,650	9,357
5/16"	7.94	0.81	0.17	7,725	7,498	7,271
3/8"	9.52	0.71	0.18	5,480	5,319	5,158
	9.52	0.81	0.20	6,324	6,138	5,952
1/2"	12.70	0.71	0.24	4,027	3,908	3,790
	12.70	0.81	0.28	4,632	4,496	4,360
5/8"	15.88	0.81	0.35	3,655	3,547	3,440
	15.88	1.02	0.43	4,668	4,530	4,393
3/4"	19.05	0.91	0.46	3,333	3,235	3,137
	19.05	1.02	0.52	3,847	3,734	3,621
	19.05	1.14	0.58	4,328	4,201	4,074
7/8"	22.22	0.91	0.55	2,904	2,818	2,733
	22.22	1.4	0.82	4,573	4,438	4,304
1"	25.40	0.91	0.63	2,527	2,452	2,378
	25.40	1.22	0.83	3,431	3,330	3,229
	25.40	1.63	1.09	4,663	4,526	4,389
1 1/8"	28.58	0.91	0.71	2,236	2,171	2,105
	28.58	1.22	0.94	3,032	2,943	2,854
	28.58	1.83	1.38	4,652	4,515	4,378
1 1/4"	31.75	0.91	0.79	2,006	1,947	1,888
	31.75	1.22	1.05	2,717	2,637	2,557
	31.75	2.03	1.70	4,645	4,508	4,371
1 3/8"	34.92	0.91	0.87	1,819	1,766	1,712
	34.92	1.22	1.16	2,462	2,389	2,317
	34.92	2.03	1.88	4,197	4,047	3,950
1 1/2"	38.10	1.22	1.27	2,249	2,183	2,117
	38.10	2.29	2.31	4,349	4,221	4,093
1 5/8"	41.28	0.91	1.04	1,533	1,488	1,443
	41.28	1.22	1.38	2,071	2,010	1,949
	41.28	2.41	2.64	4,216	4,092	3,968
2"	50.80	1.22	1.70	1,673	1,624	1,575
2 1/8"	53.98	0.91	1.36	1,166	1,132	1,097
	53.98	1.22	1.81	1,572	1,526	1,480
2 5/8"	66.68	1.22	2.25	1,267	1,230	1,193
3"	76.20	1.63	3.42	1,486	1,443	1,399
4"	101.60	1.63	4.58	1,109	1,076	1,044
4 1/8"	104.78	2.79	8.00	1,860	1,805	1,751

SMARTCO COPPER TUBE COMPLY TO AS/NZS 1571 : 1995



## ANNEALED COIL

OD(inch)	OD(mm)	Wall thickness	Nominal kg/m	Safe Working Pressure KPa		
				50°C < 75°C	75°C < 125°C	125°C < 150°C
1/4"	6.35	1.22	0.18	16,172	15,696	15,220
	6.35	0.81	0.13	11,375	11,040	10,706
	6.35	0.71	0.12	8,560	8,309	8,057
	6.35	0.56	0.10	6,577	6,383	6,190
5/16"	7.94	0.81	0.16	8,802	8,543	8,284
	7.94	0.71	0.15	6,678	6,481	6,285
	7.94	0.56	0.12	5,160	5,008	4,856
3/8"	9.52	0.81	0.20	7,187	6,976	6,764
	9.52	0.71	0.18	5,480	5,319	5,158
	9.52	0.56	0.15	4,250	4,125	4,000
1/2"	12.70	1.02	0.33	5,249	5,094	4,940
	12.70	0.81	0.28	4,632	4,496	4,360
	12.70	0.71	0.24	4,027	3,908	3,790
	12.70	0.56	0.20	3,137	3,044	2,952
5/8"	15.88	0.91	0.39	4,134	4,012	3,890
	15.88	0.81	0.35	3,655	3,547	3,440
	15.88	0.71	0.31	3,183	3,089	2,995
	15.88	0.56	0.25	2,486	2,413	2,339
3/4"	19.05	0.91	0.47	3,411	3,311	3,211
	19.05	0.71	0.37	2,632	2,555	2,478
7/8"	22.22	0.91	0.55	2,904	2,818	2,733

- Safe working pressures calculated for annealed copper.
- The average outside diameter of a tube is the average of the maximum and minimum outside diameters as determined at any one cross section of the tube.
- The tolerances listed represent the maximum deviation at any point denotes tube made to order where minimum order quantities required.

Specified outside diameter	Tolerance*	
	Straight lengths	Coils
> 3.18 ≤ 12.70	+0, -0.08	+0, -0.13
> 12.70 ≤ 19.05	+0, -0.08	+0, -0.20
> 19.05 ≤ 25.40	+0, -0.08	+0, -0.31
> 25.40 ≤ 31.75	+0, -0.08	+0, -0.38
> 31.75 ≤ 50.80	+0, -0.08	+0, -0.46
> 50.80 ≤ 101.60	+0, -0.15	—
> 101.60 ≤ 155.58	+0, -0.30	—

HARDNESS REQUIREMENTS		
Temper	Vickness hardness, HV	
	Min.	Max.
H	100	—
1/2H	75	100
O	—	75

\* Allowable deviation of mean outside diameter.

### physical properties

Composition	Alloy C12200 Copper=99.90% min Phosphorus = 0.015~0.040%
Melting point	981°F(1083°C)
Density	558lb/ft <sup>3</sup> (8.94X10 <sup>3</sup> kg/m <sup>3</sup> )
Thermal Expansion	0.00118in/10°F.ft(0.177mm/10°C.m)
Modulus of Elasticity	2.46 10 <sup>6</sup> psi(17,000MPa)





# Paircoil

## Pair Coil Specifications

Sampo Industrial manufactures a range of insulated copper tube supplied for use in field connection split system air-conditioners and heat pumps.

The insulated copper tube is extruded to ensure close tube contact to enhance dew point proofing properties.

The insulation is covered with embossed polyethylene film to prevent foam creasing. The polyethylene film contains UV protection additives built for the harsh conditions.

### Benefits

- Easy and quick to install
- Save time and money on installation
- No seams which can open to allow moisture entry, bothersome dripping
- Easy to transport

### Reaction to fire classification : D-s3-d0

This classification has been carried out in accordance with EN 13501-1:2007

### Copper Tubes Properties

	O.D.		W.T.		Safe Working Pressure Over 50°C up to 65°C	
	inch	mm	mm	mm	Psi	Kpa
Annealed	1/4"	6.35	0.024	0.61	1,101	7,592
	1/4"	6.35	0.031	0.8	1,650	11,375
	3/8"	9.52	0.024	0.61	712	4,909
	3/8"	9.52	0.031	0.8	1,042	7,187
	1/2"	12.7	0.024	0.61	526	3,624
	1/2"	12.7	0.031	0.8	672	4,632
	5/8"	15.88	0.032	0.81	530	3,655
	3/4"	19.05	0.039	1	577	3,978





Tube 1			Tube 2			Length	Coils per carton	Weight percoil (kg)
Outside diameter		Wall Thickness	Outside diameter		Wall Thickness			
inch	mm	mm	inch	mm	mm			
$\frac{1}{4}$ "	6.35	0.61	$\frac{3}{8}$ "	9.52	0.61	20	1	5.02
$\frac{1}{4}$ "	6.35	0.61	$\frac{1}{2}$ "	12.7	0.61	20	1	6.11
$\frac{1}{4}$ "	6.35	0.61	$\frac{5}{8}$ "	15.88	0.81	20	1	8.82
$\frac{3}{8}$ "	9.52	0.8	$\frac{1}{2}$ "	12.7	0.8	20	1	9.26
$\frac{3}{8}$ "	9.52	0.8	$\frac{5}{8}$ "	15.88	1	20	1	12.27
$\frac{3}{8}$ "	9.52	0.8	$\frac{3}{4}$ "	19.05	1	20	1	14.05
$\frac{1}{2}$ "	12.7	0.8	$\frac{3}{4}$ "	19.05	1	20	1	15.48
$\frac{1}{4}$ "	6.35	0.8	$\frac{3}{8}$ "	9.52	0.8	20	1	6.41
$\frac{1}{4}$ "	6.35	0.8	$\frac{1}{2}$ "	12.7	0.8	20	1	7.83
$\frac{3}{8}$ "	9.52	0.8	$\frac{5}{8}$ "	15.88	1	20	1	12.27
$\frac{3}{8}$ "	9.52	0.8	$\frac{5}{8}$ "	15.88	0.8	20	1	10.69
$\frac{1}{4}$ "	6.35	0.8	$\frac{3}{8}$ "	9.52	0.8	20	1	6.41
$\frac{1}{4}$ "	6.35	0.8	$\frac{1}{2}$ "	12.37	0.8	20	1	7.69

## Insulation Properties

Tube 1		Tube 2		Thermal Conductivity kcal/mhrC	Surface Heat Tensile Coefficient kcal/m <sup>2</sup> hrC	Tensile Strength	Water Absorption	Shrinkage (120+5%)
Outer diameter inch	Wall Thickness	Outer diameter inch	Wall Thickness					
$\frac{1}{4}$ "	0.61	$\frac{3}{8}$ "	0.61	0.043 Max	7	24.5 Min	0.01 Max	7% Max
$\frac{1}{4}$ "	0.61	$\frac{1}{2}$ "	0.61					
$\frac{1}{4}$ "	0.61	$\frac{5}{8}$ "	0.81					
$\frac{3}{8}$ "	0.8	$\frac{1}{2}$ "	0.8					
$\frac{3}{8}$ "	0.8	$\frac{5}{8}$ "	1					
$\frac{3}{8}$ "	0.8	$\frac{3}{4}$ "	1					
$\frac{1}{2}$ "	0.8	$\frac{3}{4}$ "	1					
$\frac{1}{4}$ "	0.8	$\frac{3}{8}$ "	0.8					
$\frac{1}{4}$ "	0.8	$\frac{1}{2}$ "	0.8					
$\frac{3}{8}$ "	0.8	$\frac{5}{8}$ "	1					
$\frac{3}{8}$ "	0.8	$\frac{5}{8}$ "	0.8					
$\frac{1}{4}$ "	0.8	$\frac{3}{8}$ "	0.8					
$\frac{1}{4}$ "	0.8	$\frac{1}{2}$ "	0.8					

Sampo Copper Tube Pair Coil insulation is heat resistant to 120°C and superior pre-insulated copper tube ideal for rapid cost effective split air-conditioning installation. Pair Coil uses soft annealed copper tube, and flexible and easily bent for quick and easy installation



# Seamless, Round Copper Tubes for Water and Gas in Sanitary and Heating Applications

## EN 1057

EN 1057 (formerly BS 2871) specifies the requirements, sampling, test methods and conditions of delivery for seamless round copper tubes.

It is applicable to tubes having an outside diameter from 6mm up to and including 267mm for:

- Distributing networks for hot water and cold water
- Hot water heating systems, including panel heating systems (under-floor, wall, overhead)
- Domestic gas and liquid fuel distribution
- Waste water sanitation.

It also applies to seamless round copper tubes intended to be pre-insulated before use for any of the above purposes.

Size mm	Nominal Diameter (Outside) mm	Nominal Wall Thickness mm			Hard Maximum Working Pressure* Bar		
		Type Y	Type X	Type Z	Type Y	Type X	Type Z
6	6	0.8	0.6	0.5	223	161	113
8	8	0.8	0.6	0.5	161	118	98
10	10	0.8	0.6	0.5	126	93	78
12	12	0.8	0.6	0.5	104	76	64
15	15	1.0	0.7	0.5	104	71	50
18	18	1.0	0.8	0.6	85	67	50
22	22	1.2	0.9	0.6	84	62	41
28	28	1.2	0.9	0.6	65	48	32
35	35	1.5	1.2	0.7	65	51	30
42	42	1.5	1.2	0.8	54	43	28
54	54	2.0	1.2	0.9	56	33	25
66.7	66.7	2.0	1.2	1.0	45	27	20
76.1	76.1	2.0	1.5	1.2	39	29	19
108	108	2.5	1.5	1.2	34	20	17
133	133	-	1.5	1.5	-	17	16
159	159	-	2.0	1.5	-	18	15

For more details for half hard and annealed maximum working pressure, please consult our sales office.

\* Based on material in hard drawn condition at 65°C

\* 1 Bar = 0.1N/mm<sup>2</sup> = 10<sup>5</sup> Nm<sup>2</sup>



## Composition

The composition shall conform to the following requirements :

CU + Ag: min. 99.90%;

0.015% ≤ P ≤ 0.040%.

This copper grade is designed either Cu-DHP or CW024A.

## Mechanical Properties

Material Condition		Nominal Outside Diameter		Tensile Strength	Elongation	Hardness (indicative)
Designation in accordance with EN 1173	Common Term	$d$ mm		$R_m$ MPa	$A$ %	HV5
		Min	Max	Min	Min	
R220	Annealed	6	54	220	40	(40 to 70)
R250 <sup>a</sup>	Half Hard <sup>a</sup>	6	66.7	250	30 <sup>a</sup>	(75 to 100)
		6	159		20 <sup>a</sup>	
R290	Hard	6	267	290	3	(min. 100)
Note 1	Hardness figures in parentheses are not requirements of this European Standard but given for guidance purpose only.					
Note 2	1 Mpa is equivalent to 1 N/min <sup>2</sup>					
Note 3	Brittle fracture prevention : Copper, having a face-centred cubic crystal structure, does not suffer a transition from ductile to brittle failure like some other materials					

## Tolerances on Wall Thickness

The tolerances on wall thickness expressed in percentage of the nominal thickness as measured at any point shall conform to the requirement as stated below.

### Standardized Dimensions

Values in mm

Nominal Outside Diameter $d$	Nominal Wall Thickness $e$											
	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.5	2.0	2.5	3.0
6		R		R		R						
8		R		R		R						
10		R	R	R		R						
12		R	R	R		R						
14				R		R						
15			R	R		R						
16						R						
18				R		R						
22					R	R	R	R	R			
28					R	R		R	R			
35						R		R	R			
40						R						
42						R		R	R			
54						R		R	R	R		
64						R				R		
66.7								R		R		
76.1									R	R		
88.9										R		
108									R		R	
133									R			R
159										R		R
219												R
267												R

R Indicates the dimensions recommended for consideration in national codes of practice.

### Tolerances on Wall Thickness

Nominal Outside Diameter	Tolerances on Wall Thickness	
$d$ mm	$e^a$	
	$e < 1$ mm %	$e \geq 1$ mm %
< 18	±10	±13
≥ 18	±10	±15 <sup>b</sup>
NOTE Concentricity (uniformity of wall thickness) is controlled by tolerance on wall thickness		
a	Including deviation from concentricity	
b	±10% for R250 (half hard) tubes of 35mm, 42mm and 54mm diameters with a wall thickness of 1.2mm	



# Copper Tube for construction applications

## ASTM B88

This is the original copper tube for plumbing, air conditioning and refrigeration applications in residential, commercial and institutional installations. We provide a complete range of sizes and types, engineered to exact specifications to meet the highest standards of performance.

All tubing is manufactured from phosphorus deoxidized copper (DHP) complying with UNS C12200

### Typical uses includes:

**Type K** underground residential, commercial and industrial uses.

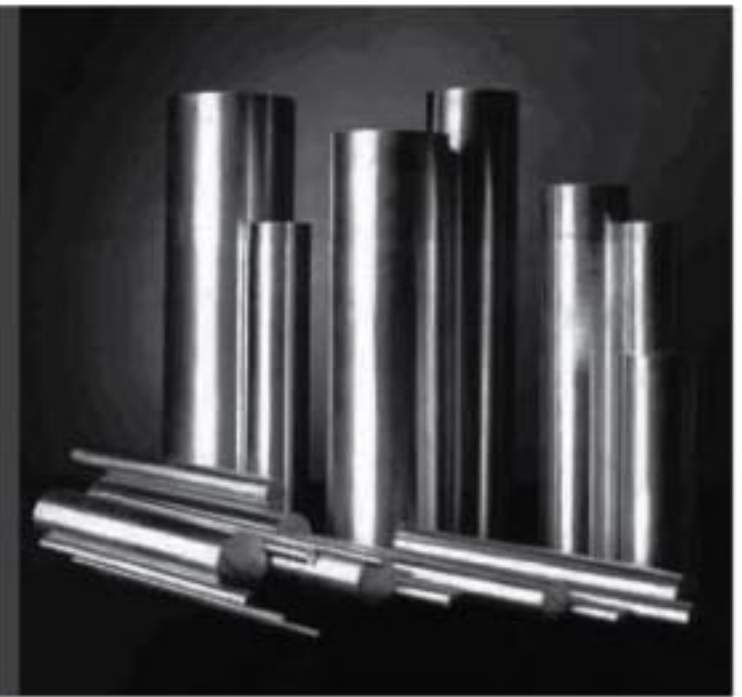
(Sizes range from 1/4" ~8" diameter)

**Type L** residential and commercial uses.

(Sizes range from 1/4" ~8" diameter)

**Type M** above ground residential and light commercial uses.

(Sizes range from 3/8" ~8" diameter)



### Physical Properties of Copper Tube

Composition	Alloy C12200 Copper = 99.90% min Phosphorus = 0.015~0.040%
Melting Point	0981°F (1083°C)
Density	558lb/ft <sup>3</sup> (8.94 × 10 <sup>3</sup> kg/m <sup>3</sup> )
Thermal Expansion	0.00118 in/10°F.ft (0.177mm/10°C.m)
Modulus of Elasticity	2.46 10 <sup>6</sup> psi (17,000MPa)

### Type K (STRAIGHT, DRAWN)

Nominal Size	Actual Size	Outside diameter			Wall Thickness			Theoretical Weight	
		inch	mm	Tolerance(inch)	inch	mm	Tolerance(inch)	lb/ft	kg/m
1/4"	3/8"	0.375	9.52	0.001	0.035	0.89	0.0035	0.145	0.216
3/8"	1/2"	0.500	12.7	0.001	0.049	1.24	0.005	0.269	0.4
1/2"	5/8"	0.625	15.9	0.001	0.049	1.24	0.005	0.344	0.512
5/8"	3/4"	0.750	19.1	0.001	0.049	1.24	0.005	0.419	0.624
3/4"	7/8"	0.875	22.2	0.001	0.065	1.65	0.006	0.639	0.953
1"	1 1/8"	1.125	28.6	0.0015	0.065	1.65	0.006	0.838	1.25
1 1/4"	1 3/8"	1.375	34.9	0.0015	0.065	1.65	0.006	1.034	1.54
1 1/2"	1 5/8"	1.625	41.3	0.002	0.072	1.83	0.007	1.359	2.03
2"	2 1/8"	2.125	54.0	0.002	0.083	2.11	0.008	2.060	3.07
2 1/2"	2 5/8"	2.625	66.7	0.002	0.095	2.41	0.01	2.922	4.36
3"	3 1/8"	3.125	79.4	0.002	0.109	2.77	0.011	3.996	5.96
3 1/2"	3 5/8"	3.625	92.1	0.002	0.120	3.05	0.012	5.112	7.62
4"	4 1/8"	4.125	104.8	0.002	0.134	3.40	0.013	6.500	9.69
5"	5 1/8"	5.125	130.2	0.002	0.160	4.06	0.016	9.654	14.4
6"	6 1/8"	6.125	155.6	0.002	0.192	4.88	0.019	13.843	20.64



## Type L (STRAIGHT, DRAWN)

Nominal Size	Actual Size	Outside diameter			Wall Thickness			Theoretical Weight	
		inch	mm	Tolerance(inch)	inch	mm	Tolerance(inch)	lb/ft	kg/m
$\frac{1}{4}$ "	$\frac{3}{8}$ "	0.375	9.52	0.001	0.030	0.76	0.003	0.126	0.187
$\frac{3}{8}$ "	$\frac{1}{2}$ "	0.500	12.7	0.001	0.035	0.89	0.004	0.198	0.295
$\frac{1}{2}$ "	$\frac{5}{8}$ "	0.625	15.9	0.001	0.040	1.02	0.004	0.285	0.425
$\frac{5}{8}$ "	$\frac{3}{4}$ "	0.750	19.1	0.001	0.042	1.07	0.004	0.362	0.54
$\frac{3}{4}$ "	$\frac{7}{8}$ "	0.875	22.2	0.001	0.045	1.14	0.004	0.453	0.676
1"	1 $\frac{1}{8}$ "	1.125	28.6	0.0015	0.050	1.27	0.005	0.654	0.975
1 $\frac{1}{4}$ "	1 $\frac{3}{8}$ "	1.375	34.9	0.0015	0.055	1.40	0.006	0.881	1.31
1 $\frac{1}{2}$ "	1 $\frac{5}{8}$ "	1.625	41.3	0.002	0.060	1.52	0.006	1.142	1.7
2"	2 $\frac{1}{8}$ "	2.125	54.0	0.002	0.070	1.78	0.007	1.749	2.61
2 $\frac{1}{2}$ "	2 $\frac{5}{8}$ "	2.625	66.7	0.002	0.080	2.03	0.008	2.475	3.69
3"	3 $\frac{1}{8}$ "	3.125	79.4	0.002	0.090	2.29	0.009	3.32	4.95
3 $\frac{1}{2}$ "	3 $\frac{5}{8}$ "	3.625	92.1	0.002	0.100	2.54	0.01	4.284	6.39
4"	4 $\frac{1}{8}$ "	4.125	104.8	0.002	0.114	2.79	0.011	5.368	8.01
5"	5 $\frac{1}{8}$ "	5.125	130.2	0.002	0.125	3.18	0.012	7.596	11.33
6"	6 $\frac{1}{8}$ "	6.125	155.6	0.002	0.140	3.56	0.014	10.183	15.19

## Type M (STRAIGHT, DRAWN)

Nominal Size	Actual Size	Outside diameter			Wall Thickness			Theoretical Weight	
		inch	mm	Tolerance(inch)	inch	mm	Tolerance(inch)	lb/ft	kg/m
$\frac{3}{8}$ "	$\frac{1}{2}$ "	0.500	12.7	0.001	0.025	0.64	0.002	0.144	0.215
$\frac{1}{2}$ "	$\frac{5}{8}$ "	0.625	15.9	0.001	0.028	0.71	0.003	0.203	0.303
$\frac{3}{4}$ "	$\frac{7}{8}$ "	0.875	22.2	0.001	0.032	0.81	0.003	0.327	0.488
1"	1 $\frac{1}{8}$ "	1.125	28.6	0.0015	0.035	0.89	0.004	0.464	0.692
1 $\frac{1}{4}$ "	1 $\frac{3}{8}$ "	1.375	34.9	0.0015	0.042	1.07	0.004	0.68	1.01
1 $\frac{1}{2}$ "	1 $\frac{5}{8}$ "	1.625	41.3	0.002	0.049	1.24	0.005	0.939	1.4
2"	2 $\frac{1}{8}$ "	2.125	54.0	0.002	0.058	1.47	0.006	1.457	2.17
2 $\frac{1}{2}$ "	2 $\frac{5}{8}$ "	2.625	66.7	0.002	0.065	1.65	0.006	2.023	3.02
3"	3 $\frac{1}{8}$ "	3.125	79.4	0.002	0.072	1.83	0.007	2.672	3.98
3 $\frac{1}{2}$ "	3 $\frac{5}{8}$ "	3.625	92.1	0.002	0.083	2.11	0.008	3.573	5.33
4"	4 $\frac{1}{8}$ "	4.125	104.8	0.002	0.095	2.41	0.01	4.653	6.94
5"	5 $\frac{1}{8}$ "	5.125	130.2	0.002	0.109	2.77	0.011	6.644	9.91
6"	6 $\frac{1}{8}$ "	6.125	155.6	0.002	0.122	3.01	0.012	8.9	13.27

### LENGTH of STRAIGHT TYPE DRAWN COPPER TUBE

The standard length for drawn temper ASTM B88 tube is 6.096 meters (20ft). However, it is available in 6.000 meter and 5.800 meter lengths. Also, custom made length is available as by order quantities.

Also, annealed copper tube - coil type is available. (K,L,M type, Nominal :  $\frac{1}{4}$ " ~ 1 $\frac{1}{4}$ ", Length:15~30m)  
If you have any question or need more specific information, feel free to contact us.



# SMARTCO COPPER TUBE COMPLY TO AS 1432:2004

Copper tubes intended for use in pressure and non-pressure plumbing, gasfitting and drainage applications

## TYPE A

NOMINAL SIZE	NOM. DIA. (OUTSIDE)	NOM. WALL THICKNESS	Safe Working Pressure	Annealed	Hard drawn	Bendable
DN 6	6.35	0.91	11,990			
DN 8	7.94	0.91	9,320			
DN 10	9.52	1.02	8,670			
DN 15	12.70	1.02	6,330			
DN 18	15.88	1.22	6,040			
DN 20	19.05	1.42	5,680			
DN 25	25.40	1.63	5,040			
DN 32	31.75	1.63	3,980			
DN 40	38.10	1.63	3,290			
DN 50	50.80	1.63	2,440			
DN 65	63.50	1.63	1,940			
DN 80	76.20	2.03	2,020			
DN 90	88.90	2.03	1,720			
DN 100	101.60	2.03	1,500			
DN 125	127.00	2.03	1,200			
DN 150	152.40	2.64	1,300			
DN 200	203.20	2.64	910			

## TYPE B

NOMINAL SIZE	NOM. DIA. (OUTSIDE)	NOM. WALL THICKNESS	Safe Working Pressure	Annealed	Hard drawn	Bendable
DN 6	6.35	0.71	8,710			
DN 8	7.94	0.71	6,820			
DN 10	9.52	0.91	7,630			
DN 15	12.70	0.91	5,590			
DN 18	15.88	1.02	4,980			
DN 20	19.05	1.02	4,110			
DN 25	25.40	1.22	3,680			
DN 32	31.75	1.22	2,920			
DN 40	38.10	1.22	2,420			
DN 50	50.80	1.22	1,800			
DN 65	63.50	1.22	1,430			
DN 80	76.20	1.63	1,610			
DN 90	88.90	1.63	1,380			
DN 100	101.60	1.63	1,200			
DN 125	127.00	1.63	960			
DN 150	152.40	2.03	1,000			
DN 200	203.20	2.03	720			

## TYPE C

NOMINAL SIZE	NOM. DIA. (OUTSIDE)	NOM. WALL THICKNESS	Safe Working Pressure	Annealed	Hard drawn	Bendable
DN 10	9.52	0.71	5,520			
DN 15	12.70	0.71	4,070			
DN 18	15.88	0.91	4,180			
DN 20	19.05	0.91	3,450			
DN 25	25.40	0.91	2,560			

SMARTCO COPPER TUBE COMPLY TO  
AS 1432:2004



## TYPE D

NOMINAL SIZE	NOM. DIA. (OUTSIDE)	NOM. WALL THICKNESS	Safe Working Pressure	Annealed	Hard drawn	Bendable
DN 32	31.75	0.91	2,150			
DN 40	38.10	0.91	1,780			
DN 50	50.80	0.91	1,330			
DN 65	63.50	0.91	1,060			
DN 80	76.20	1.22	1,190			
DN 90	88.90	1.22	1,020			
DN 100	101.60	1.22	890			
DN 125	127.00	1.42	830			
DN 150	152.40	1.63	800			



DN = DIAMETER NUMBER

## Safe Working Pressures

The safe working pressures for varying temperatures may be calculated from the following equation;

$$P_{sw} = \frac{2000 \times S_D \times t}{D - t}$$

where

$P_{sw}$  = safe working pressure, in kilopascals

$S_D$  = maximum allowable design tensile stress for annealed copper (KPa)

$t$  = minimum wall thickness (mm)

$D$  = maximum outside diameter of tube (mm)

Annealed

150° FS = 5,100psi, sizes 1 1/4" to 8"    300° FS = 4,700psi, sizes 1 1/4" to 8"

Hard Drawn

150° FS = 11,300psi, sizes 1 1/4" to 2", S = 9,00psi sizes 3" to 8"

300° FS = 11,000psi, sizes 1 1/4" to 2", S = 8,70psi sizes 3" to 8"

The figures provided are for guidance only, based on the indicated temperatures.

**Quality Certified:** Smartco copper tube is Korean made, and is certified to comply with AS1432 - Copper tube for plumbing, gasfitting and drainage applications.

► **Internal Surface Quality:** Smartco Copper Tube uses special manufacturing processes to provide enhanced internal bore characteristics that offer improved corrosion resistance and levels of carbon residue well below the values set by the Standard.

► **Inherent Strength:** Copper tube has inherent strength, providing good resistance to external damage, puncture, abrasion, vibration bumps, and has a wide operating range for pressure and vacuum.

► **Impervious:** Copper tube is impervious to oxygen, insecticide, solvents and toxins.

► **Non-Flammable:** Copper tube is non-flammable and does not emit toxic fumes during fire.

► **Full Flow Joints:** Copper tube jointing does not reduce the bore of the tube.

► **Low Friction Loss:** Copper tube provides high flow rates with minimal external dimensions.

► **U.V. Resistant:** Copper tube does not degrade from direct sunlight or become brittle with age.

► **Resists Rodent Attack:** Copper tube is not prone to damage due to rodent attack.

► **Multi Applications:** Copper tube is made to universal size not

a unique brand size.

► **Stability:** Copper tube does not creep with age and has 7 to 15 times less lineal expansion than other materials with heat, and continues to perform at high temperatures.

► **Healthier & Non-Tainting:** Copper tube does not adversely affect the taste of water, and \*reduces the number of harmful microorganisms in water.

\*Study conducted by INCRA under project N<sup>o</sup>348-1984 using water contaminated with coliforms.

► **Proven Track Record:** Smartco copper tube is part of a superior system with a proven track record.

► **Add Value For Life:** Copper tube adds to home's resale value.

► **Recyclable:** Copper tube is a valuable recyclable material.

### Classification

Copper tube is classified into four different specification types based on wall thickness for a specific outside diameter. Products are colour coded as follows:

• Type A : Green • Type B : Blue • Type C : Red • Type D : Black

Each tube shall be permanently marked, at intervals not exceeding 0.5m, by incising containing the manufacturer's name nominal size, thickness type, the number of this standard and the letters 'BQ' if tube is bendable temper



# Standard Specification for Seamless Copper Tube for Medical Gas Systems

## ASTM B 819

Sampo Industrial manufactures a range of seamless copper tube supplied for use in medical gas systems, identified as type K & L - fitted with plastic caps after cleaning to maintain the clean interior surface. Our type K & L (cleaned and capped) is also specially cleaned for use in medical gas systems and meets the same allowable residue limit of 0.038g/m<sup>2</sup> of interior tube surface area.

### Physical Properties of Copper Tube

Composition	Alloy C12200 Copper = 99.90% min Phosphorus = 0.015 ~ 0.040%
Melting Point	981°F (1083°C)
Density	558lb/ft <sup>3</sup> (8.94 × 10 <sup>3</sup> kg/m <sup>3</sup> )
Thermal Expansion	0.00118 in/10°F .ft (0.177mm/10°C.m)
Modulus of Elasticity	2.46 10 <sup>6</sup> psi (17,000MPa)





## Type K

Nominal Size	Actual Size	Outside diameter			Wall Thickness			Theoretical Weight	
		inch	mm	Tolerance(inch)	inch	mm	Tolerance(inch)	lb/ft	kg/m
1/4"	3/8"	0.375	9.53	0.001	0.035	0.89	0.003	0.15	0.22
3/8"	1/2"	0.500	12.7	0.001	0.049	1.25	0.004	0.28	0.41
1/2"	5/8"	0.625	15.88	0.001	0.049	1.25	0.004	0.35	0.52
5/8"	3/4"	0.750	19.05	0.001	0.049	1.25	0.004	0.43	0.63
3/4"	7/8"	0.875	22.23	0.001	0.065	1.66	0.004	0.65	0.96
1"	1 1/8"	1.125	28.58	0.0015	0.065	1.66	0.005	0.85	1.26
1 1/4"	1 3/8"	1.375	34.93	0.0015	0.065	1.66	0.006	1.05	1.56
1 1/2"	1 5/8"	1.625	41.28	0.002	0.072	1.83	0.006	1.37	2.03
2"	2 1/8"	2.125	53.98	0.002	0.083	2.11	0.007	2.07	3.08
2 1/2"	2 5/8"	2.625	66.68	0.002	0.095	2.42	0.008	2.94	4.37

## Type L

Nominal Size	Actual Size	Outside diameter			Wall Thickness			Theoretical Weight	
		inch	mm	Tolerance(inch)	inch	mm	Tolerance(inch)	lb/ft	kg/m
1/4"	3/8"	0.375	9.53	0.001	0.030	0.77	0.003	0.13	0.19
3/8"	1/2"	0.500	12.7	0.001	0.035	0.89	0.004	0.21	0.3
1/2"	5/8"	0.625	15.88	0.001	0.040	1.02	0.004	0.29	0.43
5/8"	3/4"	0.750	19.05	0.001	0.042	1.07	0.004	0.37	0.55
3/4"	7/8"	0.875	22.23	0.001	0.045	1.15	0.004	0.47	0.69
1"	1 1/8"	1.125	28.58	0.0015	0.050	1.27	0.005	0.66	0.98
1 1/4"	1 3/8"	1.375	34.93	0.0015	0.055	1.40	0.006	0.89	1.32
1 1/2"	1 5/8"	1.625	41.28	0.002	0.060	1.53	0.006	1.15	1.71
2"	2 1/8"	2.125	53.98	0.002	0.070	1.78	0.007	1.76	2.61
2 1/2"	2 5/8"	2.625	66.68	0.002	0.080	2.04	0.008	2.5	3.71

## capping & ink marking

The medical gas copper tube is plugged with blue inner cap and identified with continuously ink marking along its length indicating the manufacturer's name, country of origin, conforming standard, size and lot number which enable the tubing to be traced back to the origin of manufacture.

- **END- CAP** BLUE
- **INK MARKING** (1) L TYPE - BLUE (2) K TYPE - GREEN
- **INCISION** Trademark of the manufacturer + TYPE K or L / ACR



# Medical Grade Copper Tubes to European Standard BS EN 13348

Medical Grade Copper Tubes to BS EN 13348				
Nominal Diameter (mm)	Nominal Thickness (mm)	Weight (kg) / tube (5.8m)	Temper*	Safe Working Pressure (kPa)
8	0.8	0.94	Hard	1020
10	0.8	1.20	Hard	8100
12	0.8	1.46	Hard	5230
15	0.7	1.63	1/2 Hard	4500
22	0.9	3.09	1/2 Hard	3900
28	0.9	3.98	1/2 Hard	3100
35	1.2	6.61	Hard	3300
42	1.2	7.98	Hard	2700
54	1.2	10.33	Hard	2100
67	1.2	12.81	Hard	1700
76	1.5	18.24	Hard	1800
108	1.5	26.04	Hard	1300
133	1.5	32.15	Hard	1000
159	2.0	51.18	Hard	1200

\* (R290 - Hard), (R250 - 1/2 Hard)

Medical Grade tubes are manufactured to conform to BS EN 13348. BS EN 13348 copper tube is the only copper tube specified in the Health Technical Memorandum 02-01 and ISO 7396-1, which emphasize on the current best practice for the installation of pipelines for compressed medical gas and vacuum systems.

- The composition shall conform to the following requirements :  
 CU + Ag: min. 99.90%;  
 0.015% ≤ P ≤ 0.040%.
- This copper grade is designed either Cu-DHP or CW024A.
- Carbon cleanliness does not exceed 0.02g/m<sup>2</sup>
- Packaging :  
 Each tube individually end capped, tube bundles polythene wrapped & sealed.
- Marking :  
 Size 12mm - 108mm copper tubes are stamped
  - Tube size
  - Kite mark
  - EN 13348
  - Temper
  - Manufacturer
  - Date & Batch Code and additional data to enable traceability



# ASTM B

# 837

## Standard Specification for Seamless Copper Tube for Natural Gas and Liquefied Petroleum Gas Fuel Distribution Systems

Sampo Industrial manufactures a range of seamless copper tubes supplied for use in above ground and indoor Natural Gas and Liquefied Petroleum (LP) Gas Fuel distribution systems installed in conformance with the requirements of National Fire Protection Association (NFPA) 54, National Fuel Gas Code and various state and regional codes that recognize and list this standard. These systems are commonly assembled with flare fitting or brazed fitting and special marked as Type GAS.

### Some Advantages of using copper in fuel gas piping include

- Flexibility
- Ease of jointing
- Ease of bending
- Compact sizing

Nominal Size	Actual Size	Outside diameter			Wall Thickness			Theoretical Weight	
		inch	mm	Tolerance(inch)	inch	mm	Tolerance(inch)	lb/ft	kg/m
1/4" G	3/8"	0.375	9.53	0.0025	0.030	0.77	0.003	0.13	0.190
3/8" G	1/2"	0.500	12.7	0.0025	0.035	0.89	0.004	0.21	0.300
1/2" G	5/8"	0.625	15.88	0.0025	0.040	1.02	0.004	0.29	0.430
5/8" G	3/4"	0.750	19.05	0.003	0.042	1.07	0.004	0.37	0.550

SampoTube supplies Certified Tube to meet all requirements of the applicable ASTM specification.

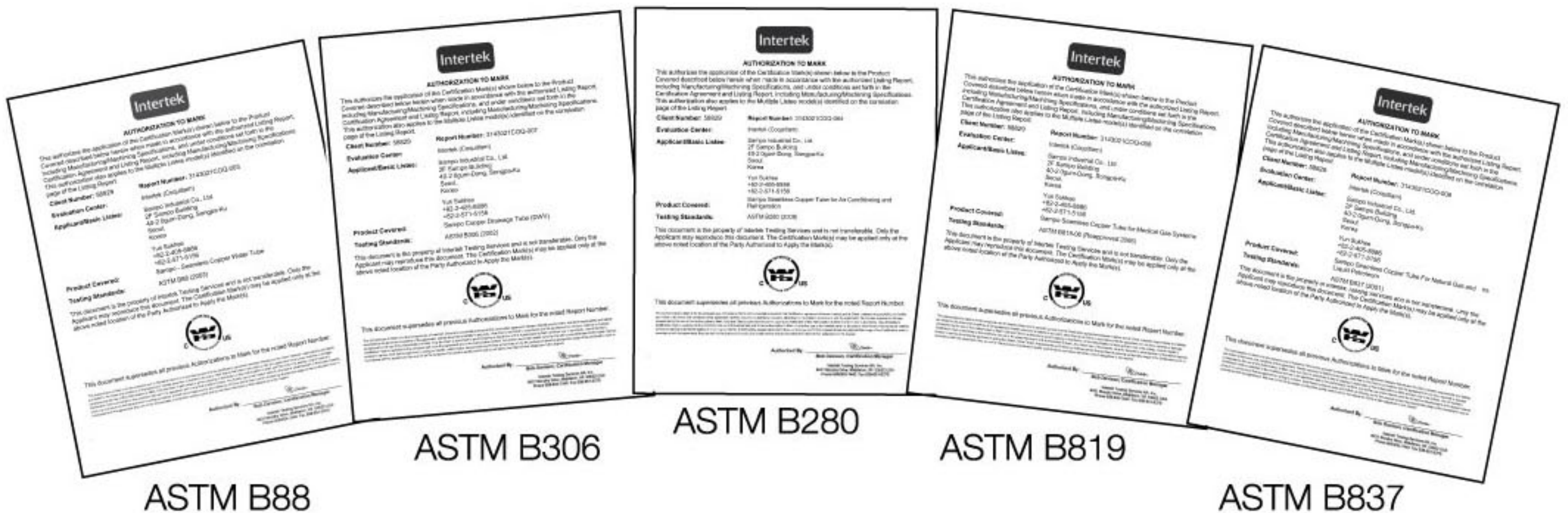
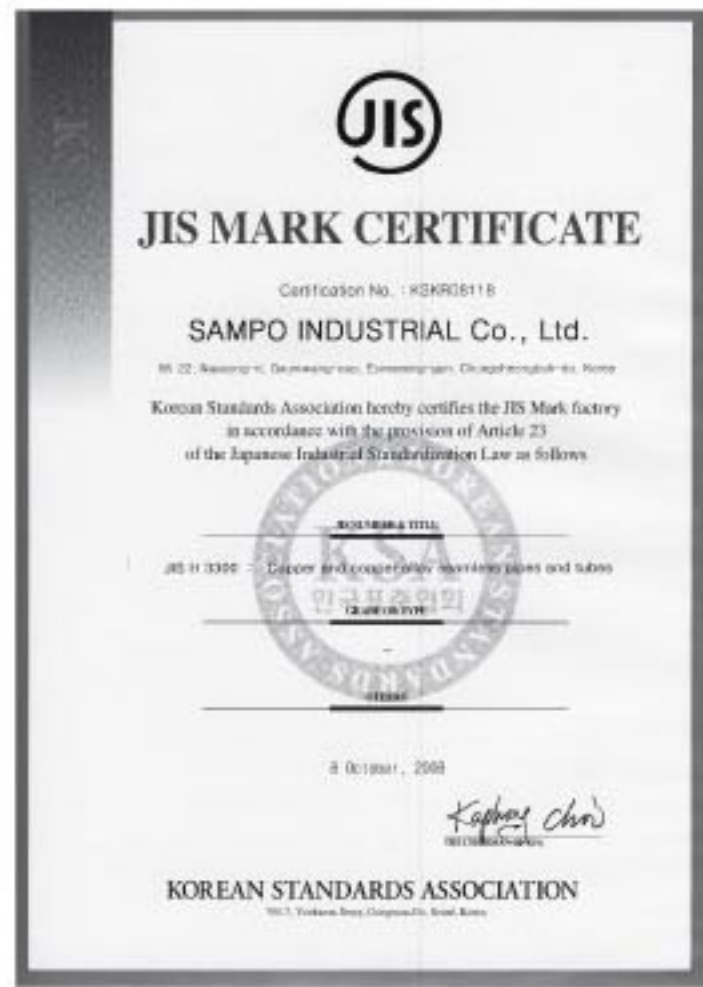
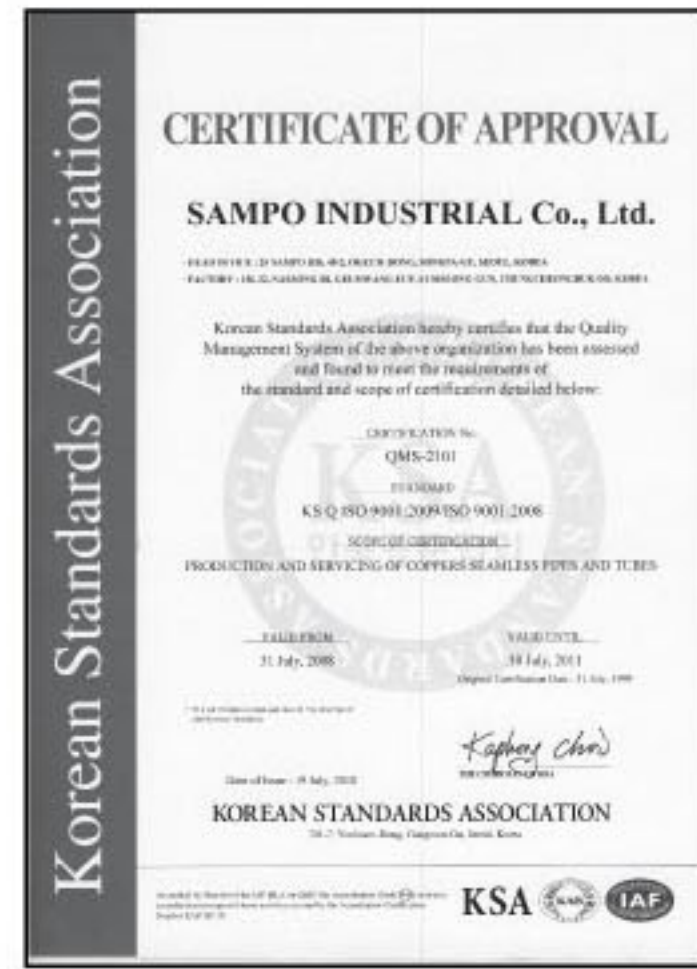


**Please note :** The standard Type Gas grade copper tube is distinguished by yellow colored capping and identified with continuously ink-marking along its lengths indicating manufacturer's name, country of origin, conforming standard, size and lot number which enable to the tubing to be traced back to the origin of manufacture.

- **END- CAP** YELLOW
- **INK MARKING** (1) ANNEALED - NO MARK (2) HARD DRAWN - YELLOW
- **INCISION** Trademark of the manufacturer + Type GAS



# Certification








**LAN HOE Lan Hoe Enterprise (1979) Sdn. Bhd.**

OUR CUSTOMERS & OPERATIONS ?

Our business operation mainly involves:

- **Importing** high quality products at competitive pricing;
- **Wholesale & Distribution** with first class support & services;
- **Project Consultation, Management, Procurement & Commissioning;**
- **Manufacturing** facilities for Polyurethane (PU) Panels & Refrigeration Systems in order to stay competitive ahead of the industry;
- **Overseas** focus, including exports and turnkey projects related to HVAC & Refrigeration sector;
- Most, importantly, we take great pride to consistently **Share, Educate and Upgrade our customers with the latest technical developments & updates on new technical knowledge.**

With continuous vision to position Lan Hoe as a service-oriented distributor & supplier, we carry a wide range of products of world-class quality, hence only the best brands in this industry will fit into our products portfolio.

 Member of Lan Hoe Holdings

Authorized Master/Primary Distributor :

Copper Tubes / Pipes & Fittings



Evaporators & Condensers



Refrigeration Tools



Refrigeration CDU & Polyurethane (P.U.) Panels



Rubber Closed Cell Insulation



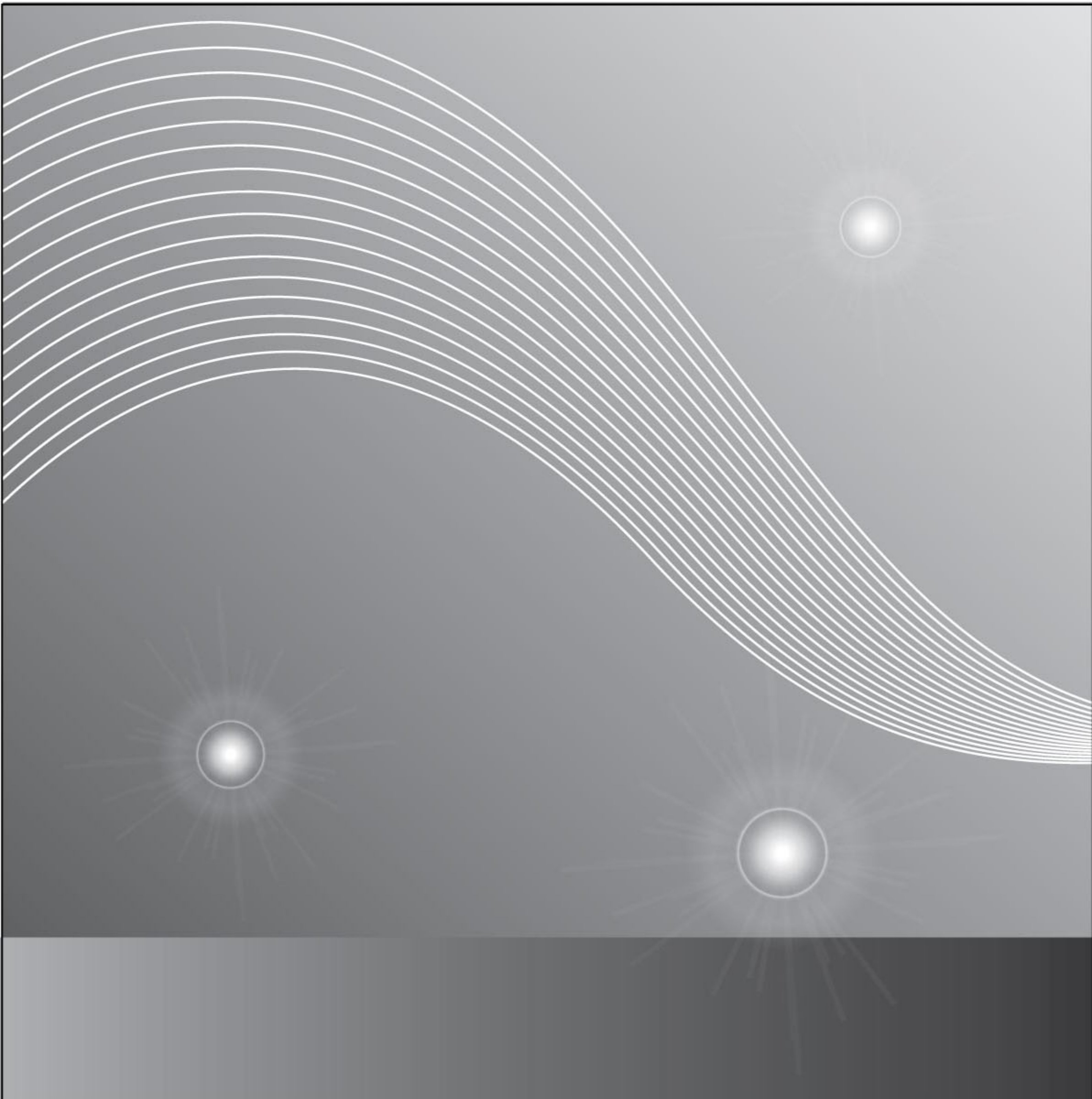
Water Pump



Refrigerant







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Contact :

聯和企業（一九七九）有限公司

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 Member of Lan Hoe Holdings