Ruby® COPPER

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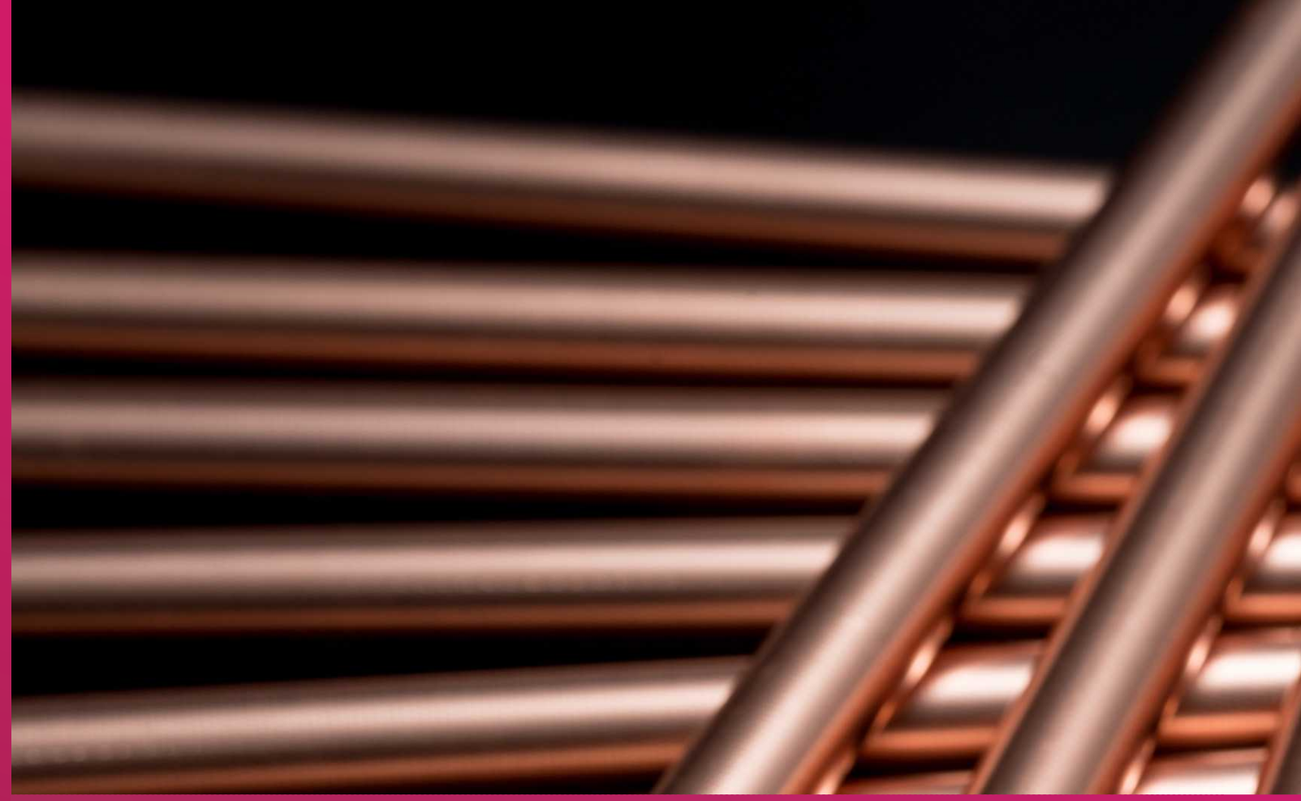

Ruby® COPPER

Products of Vietnam

INTRODUCTION

Officially established in 2006, over 10 years of continuous effort and innovation, Toan Phat Copper Tube Company has transformed itself from a local copper facility to a full-fledged leading copper tube manufacturer in Vietnam. With the orientation of continuous enhancing product quality and customer services, Toan Phat and our global brand - Ruby Copper - have won the heart of clients and have proven to be a reliable partner for international businesses.

Ruby Copper reputation is built on quality, commitment and accomplishment to our clients. Products, including Pancake Coil, Straight Tube, Level Wound Coil and Insulated Copper Tube, are manufactured by advanced production lines, supervised by strict testing processes. With the orientation of sustainable development, we learn and invest in advanced machineries for further enhancing product quality that meet international standards and customers' requirements. Since 2009, Ruby Copper have achieved a large number of certificates: Quacert JIS H3300:2006 (Japan), ASTM B68, ASTM B280 (USA), AZ/NZS 1571 (Australia). Along with enhancing product quality, Ruby Copper expand to global markets with 19 countries exported, including demanding market such as United States, India, Korea and Australia.

The year of 2018 becomes a milestone in the development of Ruby Copper that the second copper tube manufacturer is officially put into operation with expected production power of 50,000 tons per year, located at E3 - Pho Noi A, Van Lam, Hung Yen. This is the result of years of striving efforts and Ruby Copper products have achieved customers recognition in domestic and international markets.

With first-class copper materials, advanced production equipments and skillful engineers, Ruby Copper commit to provide excellent quality, fast delivery and professional customer service. We endeavour to meet beyond the expectations of our clients through honesty, professionalism with the willing to build a sustainable relationship with our partners and customers.

Global Market: 19 countries exported

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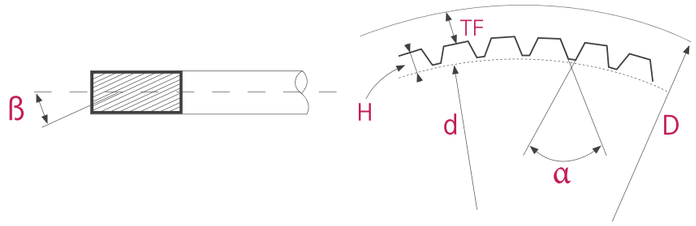
Inner-Grooved Tube



Inner-Grooved Tube Definitions

- **D** : Outer Diameter
- **TF** : Thickness of the Bottom Wall
- **H** : Groove Depth
- **α** : Groove Angle
- **ß** : Helix Angle
- **d** : Inner Diameter at Groove Tip

INNER GROOVED - TUBE

High Thermal performance provides higher efficiency in Refrigeration systems.
Used in Air Conditioning and Cooling systems in Refrigeration industry.

Specifications	Unit Weight (g/m)	O.D (D)	I.D	Bottom Wall Thickness (TF)	Groove Depth (H)	Total Wall Thickness (TF + H)	Groove Angle α	Helix Angle ß	Number of Tooth
Ø7.0-0.22+0.10-16°	47	7	6.36	0.22	0.10	0.32	35	16	65
Ø7.0-0.23+0.12-17°	47.5	7	6.30	0.23	0.12	0.35	40	17	65
Ø7.00-0.25+0.10-15°	52	7.00	6.30	0.25	0.10	0.35	40	15	65
Ø7.00-0.25+0.18-18°	57	7.00	6.14	0.25	0.18	0.43	40	18	50
Ø7.00-0.25+0.22-16°	58	7.00	6.06	0.25	0.22	0.47	22	16	54
Ø7.00-0.27+0.15-18°	60	7.00	6.16	0.27	0.15	0.42	53	18	60
Ø7.94-0.24+0.13-18°	60.5	7.94	7.2	0.24	0.13	0.37	33	18	70
Ø7.94-0.25+0.18-18°	65	7.94	7.08	0.25	0.18	0.48	40	18	50
Ø7.94-0.25+0.20-18°	66	7.94	7.04	0.25	0.20	0.45	40	18	50
Ø7.94-0.26+0.17-18°	66	7.94	7.08	0.26	0.17	0.43	40	18	50
Ø7.94-0.28+0.20-18°	72	7.94	6.98	0.28	0.20	0.48	40	18	50
Ø7.94-0.30+0.20-18°	76	7.94	6.94	0.30	0.20	0.50	40	18	50
Ø9.52-0.27+0.16-18°	82	9.52	8.66	0.27	0.16	0.43	30	18	70
Ø9.52-0.28+0.12-15°	80	9.52	8.72	0.28	0.12	0.40	53	15	65
Ø9.52-0.28+0.15-18°	83	9.52	8.66	0.28	0.15	0.43	53	18	60
Ø9.52-0.28+0.15-25°	88	9.52	8.66	0.28	0.15	0.43	90	25	65
Ø9.52-0.28+0.20-18°	85	9.52	8.56	0.28	0.20	0.48	25	18	55
Ø9.52-0.28+0.20-18°	88	9.52	8.56	0.28	0.20	0.48	40	18	60
Ø9.52-0.30+0.20-18°	90	9.52	8.52	0.30	0.20	0.50	30	18	60
Ø9.52-0.30+0.20-18°	94	9.52	8.52	0.30	0.20	0.50	53	18	60
Ø9.52-0.34+0.15-25°	104	9.52	8.54	0.34	0.15	0.49	90	25	65
Ø9.52-0.40+0.25-18°	123	9.52	8.22	0.40	0.25	0.65	40	18	60
Ø12.00-0.36+0.25-18°	140	12.00	10.78	0.36	0.25	0.61	40	18	70
Ø12.70-0.35+0.25-18°	155	12.70	11.50	0.35	0.25	0.60	53	18	70
Ø12.70-0.40+0.25-18°	170	12.70	11.40	0.40	0.25	0.65	53	18	70
Ø12.70-0.50+0.25-18°	201	12.70	11.20	0.50	0.25	0.75	53	18	75
Ø12.75-0.36+0.21/0.25-20°	150	12.75	11.53	0.36	0.25	0.61	48	20	70

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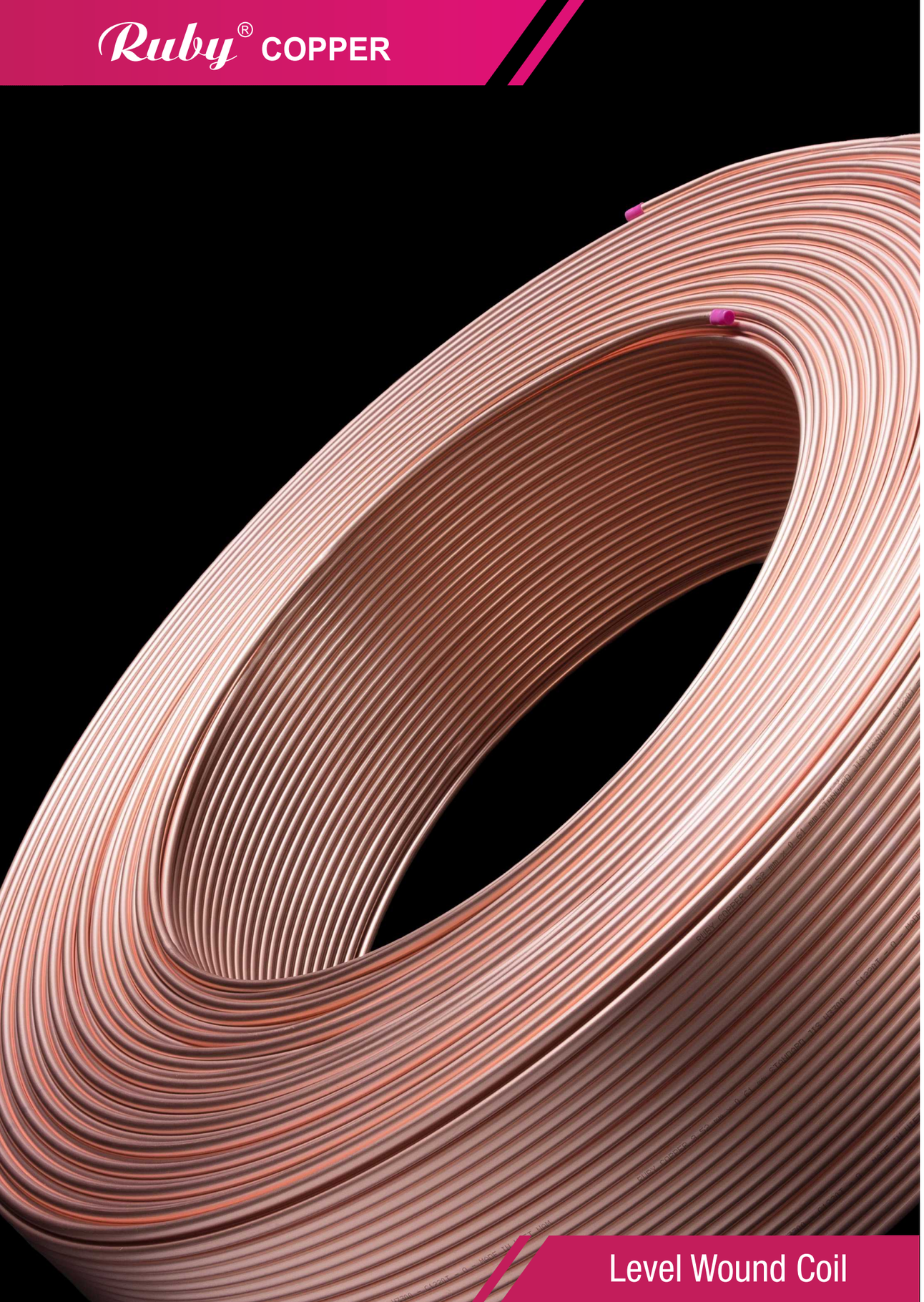

Level Wound Coil

LEVEL WOUND COIL

Used in air-conditioners, heat exchangers and freezers.
In conformity with ASTM B68 (USA) and JIS H3300 (Japan).

Outer Diameter		Wall Thickness (mm)											
mm	inch	0.27	0.31	0.35	0.41	0.51	0.56	0.61	0.71	0.81	0.91	1.00	1.20
4.00					●	●	●	●	●	●			
4.76	3/16"				●	●	●	●	●	●			
6.00					●	●	●	●	●	●			
6.35	1/4"	●	●	●	●	●	●	●	●	●	●	●	
7.00		●	●	●	●	●	●	●	●	●	●	●	
7.94	5/16"	●	●	●	●	●	●	●	●	●	●	●	
9.52	3/8"	●	●	●	●	●	●	●	●	●	●	●	●
10.00					●	●	●	●	●	●	●	●	●
12.00					●	●	●	●	●	●	●	●	●
12.70	1/2"		●	●	●	●	●	●	●	●	●	●	●
15.00						●	●	●	●	●	●	●	●
15.88	5/8"					●	●	●	●	●	●	●	●
19.05	3/4"							●	●	●	●	●	●
22.22	7/8"								●	●	●	●	●
25.40	1"								●	●	●	●	●
28.58	1 1/8"								●	●	●	●	●

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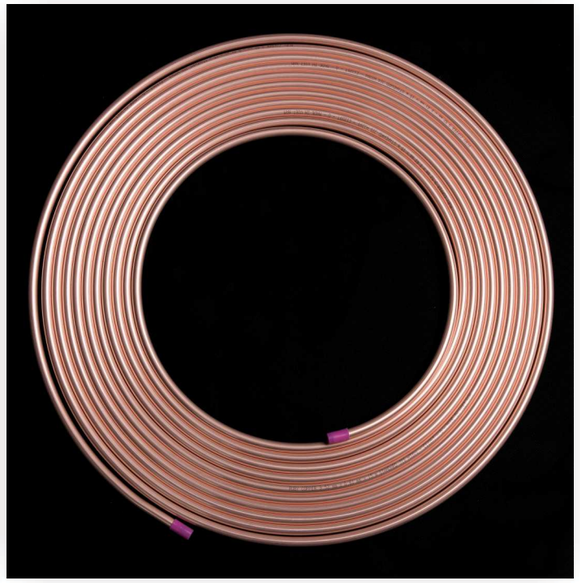
Pancake Coil



PANCAKE COIL

Used in civil and industrial piping system in air-conditioners.
Features: bright surface finish with high-precision size, easy for installation.
Suitable for used with R410A, R32 refrigerants with high working pressure.
In conformity with international standards ASTM B68 (USA) and JIS (HH3300 (Japan.).

Outer Diameter		Wall Thickness (mm)										
mm	inch	0.41	0.46	0.51	0.56	0.61	0.66	0.71	0.76	0.81	0.91	1.00
4.76	3/16"	●	●	●	●	●	●	●	●	●		
6.35	1/4"	●	●	●	●	●	●	●	●	●	●	●
7.94	5/16"			●	●	●	●	●	●	●	●	●
9.52	3/8"			●	●	●	●	●	●	●	●	●
12.70	1/2"			●	●	●	●	●	●	●	●	●
15.88	5/8"				●	●	●	●	●	●	●	●
19.05	3/4"					●	●	●	●	●	●	●
22.22	7/8"									●	●	●
25.40	1"											
28.58	1 1/8"											

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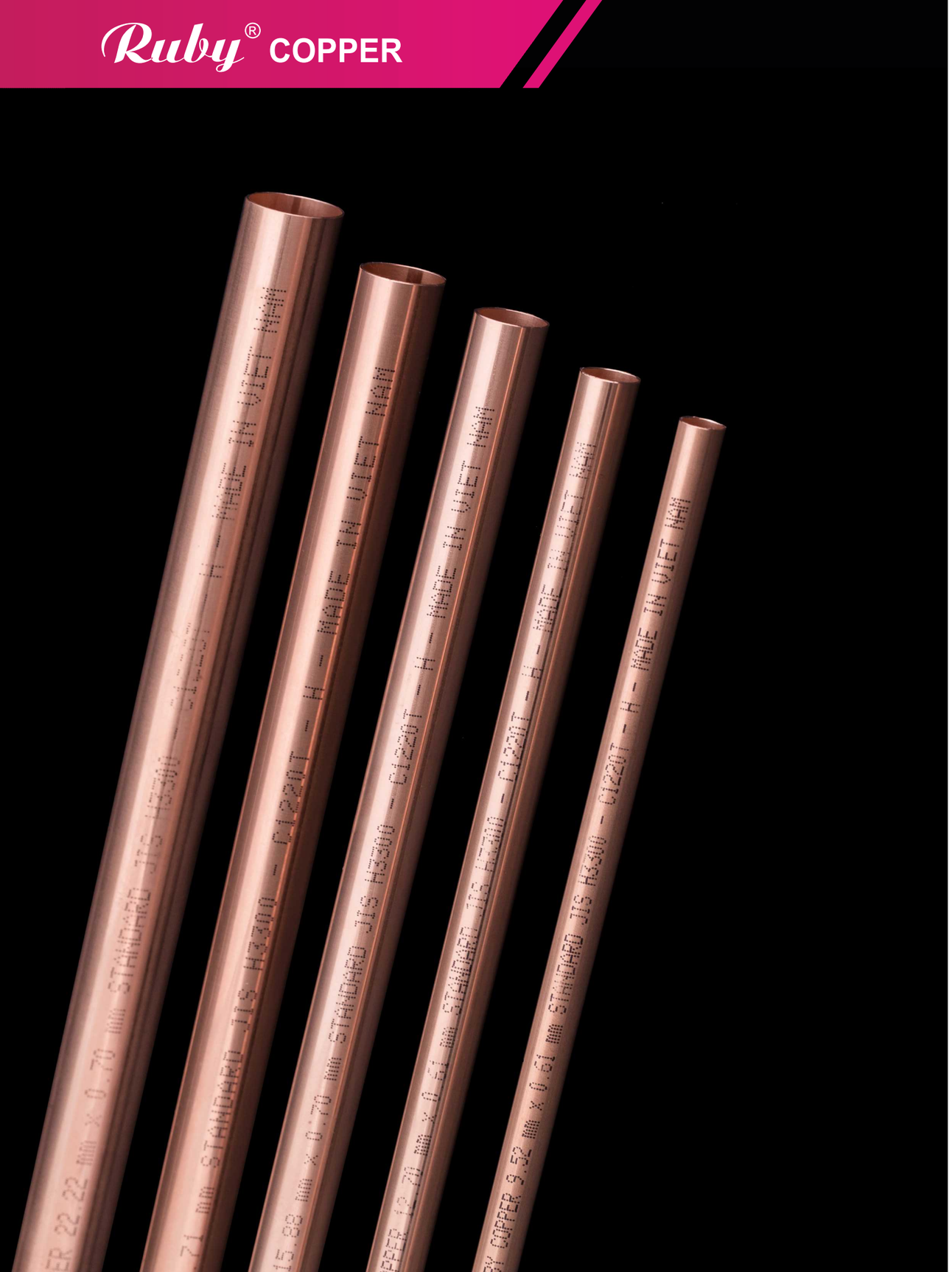

Straight Tube

STRAIGHT TUBE

Used in piping system connection in air-conditioners and in heat exchangers.
Features: bright surface finish with high-precision size, easy for welding and installation.
In conformity with international standard JIS H3300 (Japan).
The annealed straight copper tube is in conformity with AS/NZS 1571 (Australia) and can be used for medical piping system.

Outer Diameter		(H I O) Hard/ Soft Annealed	Wall Thickness (mm)																		
mm	inch		0.27	0.31	0.35	0.41	0.51	0.56	0.61	0.71	0.81	0.91	1.00	1.10	1.14	1.2	1.27	1.4	1.43	1.5	1.8	2.0
4.76	3/16"	H I O	●	●	●	●	●	●	●	●	●											
6.35	1/4"	H I O	●	●	●	●	●	●	●	●	●	●	●									
7.94	5/16"	H I O	●	●	●		●	●	●	●	●	●	●									
9.52	3/8"	H I O	●	●	●		●	●	●	●	●	●	●									
12.70	1/2"	H I O		●	●		●	●	●	●	●	●	●									
15.88	5/8"	H I O					●	●	●	●	●	●	●	●	●	●						
19.05	3/4"	H I O							●	●	●	●	●	●	●	●						
22.22	7/8"	H I O								●	●	●	●	●	●	●						
25.40	1"	H I O								●	●	●	●	●	●	●						
28.58	1 1/8"	H I O								●	●	●	●	●	●	●	●	●	●			
31.75	1 1/4"	H I O								●	●	●	●	●	●	●	●	●	●	●		
34.93	1 3/8"	H I O								●	●	●	●	●	●	●	●	●	●	●		
38.10	1 1/2"	H I O									●	●	●	●	●	●	●	●	●	●	●	
41.28	1 5/8"	H I O									●	●	●	●	●	●	●	●	●	●	●	●

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Insulated Copper Coil

INSULATED COPPER COIL

Used in piping system connection in air-conditioners and in heat exchangers. The thermal insulation helps prevent refrigerant leakage during installation and operation.
The copper tube is insulated with high-class attached PE insulation with the length up to 30 meters per coil regarding to international standards suggested by Daikin, LG and Panasonic.
High quality insulation prevents condensation during air-conditioner operation, enhances efficiency and improves lifetime of the air-conditioning system.

Outer Diameter		Wall Thickness (optional)	Insulation thickness	Length per insulated coil	**Number of coil** per box
Pipe 1	Pipe 2				
6.35	9.52	0.61, 0.71, 0.81	10	3m, 5m, 10m, 15m, 30m	1
6.35	12.7	0.61, 0.71, 0.81	10	3m, 5m, 10m, 15m, 30m	1
6.35	15.88	0.61, 0.71, 0.81, 1.0	10	3m, 5m, 10m, 15m, 30m	1
9.52	15.88	0.61, 0.71, 0.81, 1.0	10	3m, 5m, 10m, 15m, 30m	1
9.52	19.05	0.61, 0.71, 0.81, 1.0	10	3m, 5m, 10m, 15m, 30m	1

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DIAMETER / WALL THICKNESS TOLERANCE COMPLY TO ATSM B280

Soft annealed copper coil

Outer Diameter		Diameter Tolerance	Wall thickness	Wall thickness Tolerance
mm	inch	+/- mm	mm	+/- mm
6.35	1/4"	0.051	0.76	0.08
7.94	5/16"	0.051	0.81	0.08
9.52	3/8"	0.051	0.81	0.08
12.70	1/2"	0.051	0.81	0.08
15.88	5/8"	0.051	0.89	0.11
19.05	3/4"	0.064	0.89	0.11

Straight tube

Outer Diameter		Diameter Tolerance	Wall thickness	Wall thickness Tolerance
mm	inch	+/- mm	mm	+/- mm
9.52	3/8"	0.025	0.76	0.08
12.70	1/2"	0.025	0.89	0.09
15.88	5/8"	0.025	1.02	0.10
19.05	3/4"	0.025	1.07	0.11
22.22	7/8"	0.025	1.14	0.11
28.58	1 1/8"	0.038	1.27	0.13
34.93	1 3/8"	0.038	1.40	0.14
41.28	1 5/8"	0.051	1.52	0.15

DIAMETER / WALL THICKNESS TOLERANCE COMPLY TO JIS H3300

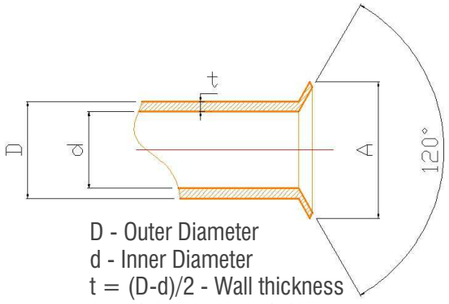
Unit: mm

Diameter	Diameter Tolerance	Wall thickness				
		From 0.25 to 0.4	Over 0.4 to 0.6	Over 0.6 to 0.8	Over 0.8 to 1.4	Over 1.4 to 2
From 4 to 15	0.08	0.06	0.07	0.10	0.13	0.15
Over 15 to 25	0.09	0.07	0.08	0.10	0.13	0.18
Over 25 to 50	0.12		0.09	0.11	0.15	0.18

Hardness

Unit: mm

Type	Hardness
O/OL	40 - 70
1/2H	70 - 100
H	>100



D - Outer Diameter
d - Inner Diameter
t = (D-d)/2 - Wall thickness
A = 1.3*D or A = 1.4*D

Flaring Ratio

Unit: mm

Alloy	Outer diameter & wall thickness	
	Diameter below 20mm with wall thickness over 0.5mm	Diameter from 20mm to 100mm OR thickness below 0.5mm
C1220	1.4	1.3

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WORKING PRESSURE

unit: bar

Outer Diameter x Wall Thickness (mm)		Soft Annealed / Temperature				Hard / Temperature
		40°C	70°C	100°C	120°C	From 40°C ~ 120°C
6.35	0.51	71	60	58	57	122
6.35	0.56	79	67	64	63	135
6.35	0.61	86	73	70	69	148
6.35	0.71	102	86	83	81	174
6.35	0.76	110	93	89	88	188
6.35	0.81	118	100	96	94	202
9.52	0.51	46	39	38	37	79
9.52	0.56	51	43	42	41	88
9.52	0.61	56	47	46	45	96
9.52	0.66	61	52	50	49	104
9.52	0.71	66	56	54	52	113
9.52	0.76	71	60	58	56	121
9.52	0.81	76	64	62	60	130
9.52	1.00	95	81	77	76	163
12.7	0.51	34	29	28	27	59
12.7	0.56	38	32	31	30	65
12.7	0.61	41	35	34	33	71
12.7	0.66	45	38	37	36	77
12.7	0.71	48	41	40	39	83
12.7	0.76	52	44	42	42	89
12.7	0.81	56	47	45	44	95
12.7	1.00	70	59	57	56	119
15.88	0.51	27	23	22	22	47
15.88	0.56	30	26	25	24	52
15.88	0.61	33	28	27	26	56
15.88	0.66	36	30	29	28	61
15.88	0.71	38	33	31	31	66
15.88	0.76	41	35	34	33	71
15.88	0.81	44	37	36	35	76
15.88	0.91	50	42	41	40	85
15.88	1.00	55	47	45	44	94
19.05	0.61	27	23	22	22	47
19.05	0.66	29	25	24	24	51
19.05	0.71	32	27	26	25	55
19.05	0.76	34	29	28	27	59
19.05	0.81	36	31	30	29	63
19.05	0.91	41	35	34	33	71
19.05	1.00	45	39	37	36	78
19.05	1.10	50	43	41	40	86
19.05	1.20	55	47	45	44	94
19.05	1.50	70	59	57	56	119
22.22	0.71	27	23	22	22	47
22.22	0.81	31	26	25	25	53
22.22	0.91	35	30	29	28	60
22.22	1.00	39	33	32	31	66
22.22	1.10	43	36	35	34	73
22.22	1.20	47	40	38	37	80
22.22	1.50	59	50	48	47	101
25.4	0.71	24	20	19	19	41
25.4	0.81	27	23	22	22	46
25.4	0.91	31	26	25	24	52
25.4	1.00	34	29	27	27	58
25.4	1.10	37	32	30	30	64
25.4	1.20	41	35	33	32	70
25.4	1.50	51	44	42	41	88
28.58	0.71	21	18	17	17	36
28.58	0.81	24	20	20	19	41

*** Pressure Unit:** unit: bar

1 bar ~ 14.5 Psi 1 bar = 0.1 Mpa

* **Pressure basis**: based on the physical properties of copper material according to the standards of copper tubes such as JIS H3300 (Japan), ASTM (USA), AS (Australia) and EN (Europe).

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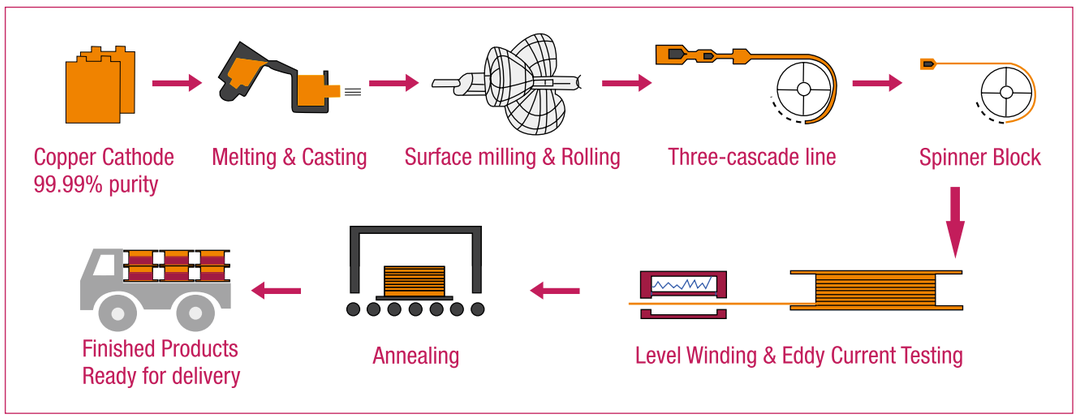
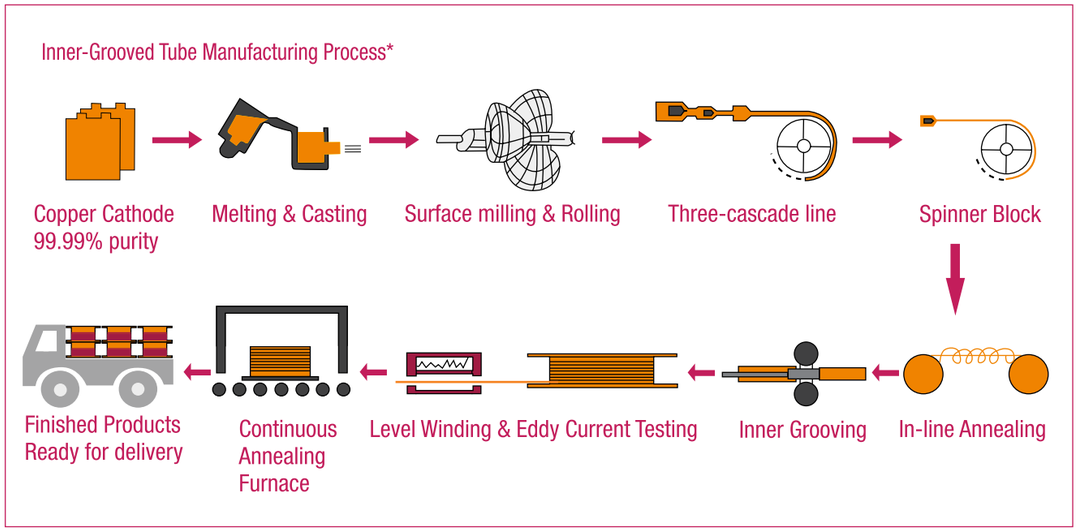
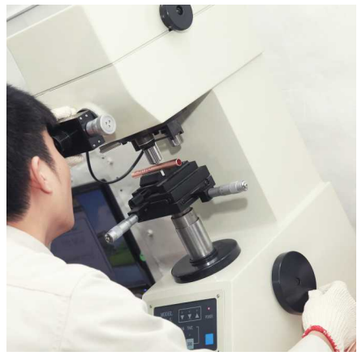
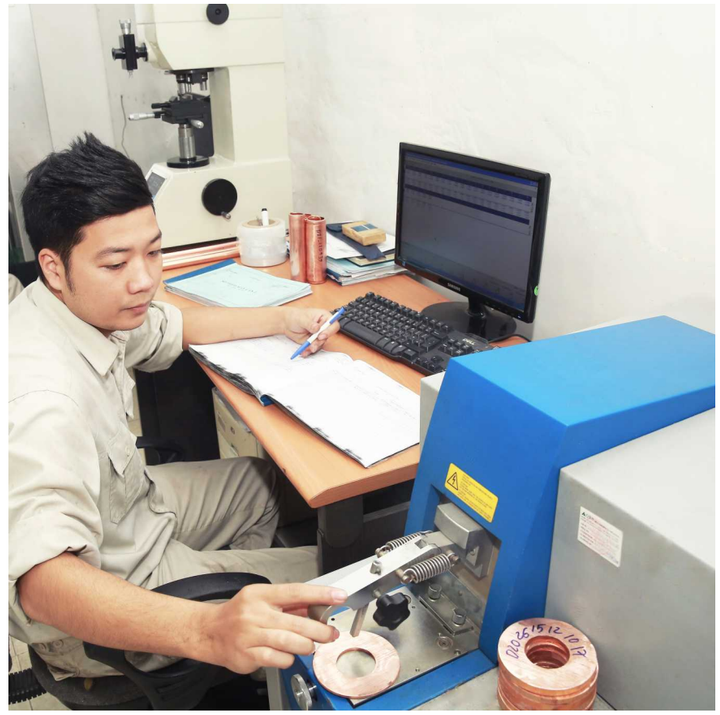
MANUFACTURING PROCESS





Ruby Copper's production process has always been strictly managed and examined. From importing raw materials to finishing the products, we take samples and strictly test in every stage of the production process to defect faulty and find solutions in the earliest time. The final products have been undergone over 10 technical examining processes before delivery.





QUALITY CHECKING PROCESS

Detection Project	Testing Equipments
Copper hardness testing	Vicker hardness tester HV5
Tensile strength and elongation properties testing	Pulling Vector
Grain size testing	Metallographic Microscope
Copper Tube chemical composition testing	Spectrometer
Inner-tube impurities testing	Inner-tube cleanliness machinery
Copper tube defects & oxygen content testing	Eddy current tester
Crack-tube testing	Bending flaring tube
Durability testing when the tube is put in operation	Pressure tester

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Manufacturing Output:

40,000 MT per year - Period 1
65,000 MT per year - Period 2

- 4 Smelting Furnaces
- 3 Surface Milling - Rolling - Three-Cascade lines
- 6 Pancake-Coil Machines
- 6 Level Winding Machines

- 7 Spinner Blocks
- 2 Straight - tube Machines
- 12 Annealing Machines
- 2 Inner Grooving Machines

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PRODUCTION STANDARDS

Standard	Alloy No	Chemical Composition		Mechanical Properties				
		% (Cu + Ag)	P %	Temper	Tensile Strength (Mpa)	Elongation (%)	Hardness	Average Grain size (mm)
ASTM B68	C12200	99.9	0.015 - 0.04	H58	min 250	/	/	/
				O60	min 205	min 40	/	min 0.04
				O50	min 210	min 40	/	0.015 - 0.04
				O60	min 210	min 40	/	min 0.04
ASTM B88	C12200	99.9	0.015 - 0.04	O60	min 205	/	max 50 HRF	min 0.04
				O50	min 205	/	max 55 HRF	min 0.025
				H58	min 250	/	min 30 HR30T	/
JIS H3300	C1220	99.9	0.015 - 0.04	H	min 315	/	min 55 HR30T	/
				1/2H	245 - 325	/	30 - 60 HR30T	/
				OL	min 205	min 40	max 55 HRF	max 0.04
				O	min 205	min 40	max 50 HRF	0.025 - 0.06
EN 1057	Cu-DHP/ CW024A	99.9	0.015 - 0.04	R220 (O)	min 220	min 40	40 - 70 HV5	/
				R250 (1/2H)	min 250	min 30	70 - 100 HV5	/
				R290 (H)	min 290	min 3	min 100 HV5	/
AS 1432		99.9	0.015 - 0.04	Hard drawn	/	/	min 100 HV	/
				Bendable	/	/	80 - 100 HV	/
				Annealed	/	/	max 70 HV	/
AS NZS 1571		99.9	0.015 - 0.04	H	/	/	min 100 HV	/
				1/2H	/	/	75 - 100 HV	/
				O	/	/	max 75 HV	max 0.065
EN 12735	Cu-DHP/ CW024A	99.9	0.015 - 0.04	R250a	min 250	min 30	75-100 HV	/
				R290a	min 290	min 3	min 100	/
				Y080a	min 220	min 400	/	0.015-0.04
				Y040	min 220	min 40	/	0.015-0.04
				Y035b	min 210	min 40	/	0.03-0.06

Cleanness of interior surface (after evaporation of the cleaning solvent): the residue weight shall not exceed **0.038g/m²**.
(applicable to annealed copper tube complied with ASTM B280 & AS NZS 1571 standards)

TYPICAL PARTNERS

TYPICAL CUSTOMERS

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