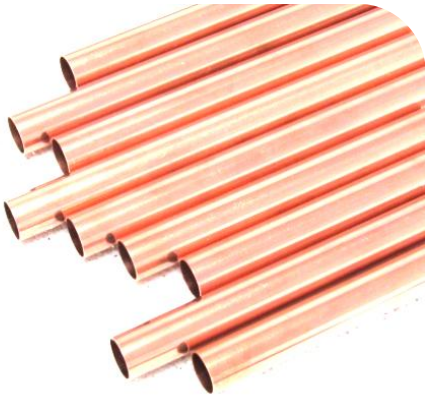




COPPER TUBES



 **ILSHIN TAEKWANG METAL CO., LTD.**

Chairman's Message

We will be number in the world with best quality and service.

We would like to express our gratitude for supporting Ilshin Taekwang. Over 40 years, with patriotism spirit, we have endeavored advancement of non-ferrous metal industries. Both in name and reality, we have now secured our name as leader in copper alloys, wires and copper tubes.

Furthermore, we are contributing nation's economy by exporting to countries such as USA, Canada, UK, Japan, Singapore, Malaysia, Indonesia, Australia and Thailand. We are establishing solid foothold in the world market.

We believe this is the fruition of profound affection and confidence by our trusted clients. It is also the result of support and encouragement by our customer that has inspired our development throughout the years.

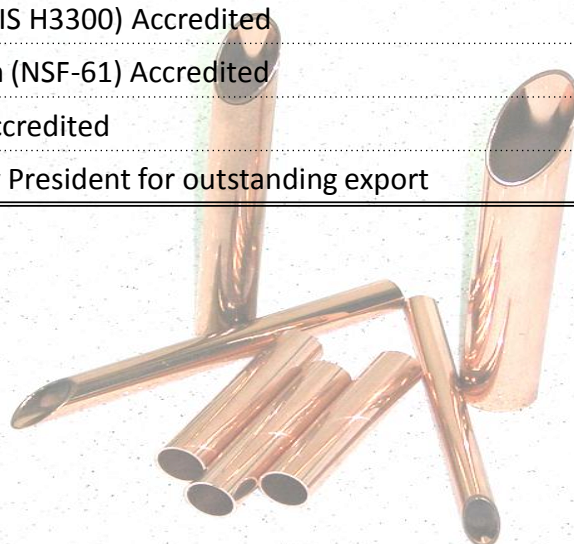
We, ILSHIN TAEKWANG, pledges to serve our clients with better quality and advanced technology. Our company motto of Harmony, Creativity and Sincerity, we promise to bring you the best quality and betterment of services.

In all aspects, we will be responsible for all of our products and we hope that our efforts be many assistance to all of our clients and we ask your help and encouragements.

2013. 2. 14
Chung J.

Company History

1963	Founded ILSHIN METAL
1975	Renamed to ILSHIN LIGHT METAL Co., Ltd.
1983	Acquisition of Daejin Elastic Metal Co.
1985	Korean Standard  Certified KSD 5102, KSD 5103 Certified
1987	Banwol Plant Construction Completed
1988	KSD 5301 Certified
1993	Acquisition of TAE KWANG DONG KWAN and renamed to ILSHIN TAEKWANG METAL CO., LTD.
1996	Second factory construction completed ISO9001 certified
1997	Awarded prospective enterprise (Gyeonggi State) Factory Expansion Completed
1999	Copper Anodes Plant Completed
2001	Awarded Outstanding Venture Business
2004	Australian Standard AS1432 Accredited
2007	Awarded Technological Innovative Enterprise by INNO BIZ
2011	Japanese Industrial Standard (JIS H3300) Accredited
2012	National Sanitation Foundation (NSF-61) Accredited Warnock Hersey (WH) Mark Accredited
2012-2013	Awarded Export Monument by President for outstanding export



Characteristics of Copper

Anti Corrosion

Being Highly resistant against atmosphere, water and soil, copper tube has semi-permanent life cycle. When copper tubes come into contact with water or cement, a compact oxidized film of copper monoxide(Cu_2O) or basic copper carbonate(CuCO_3 , $\text{Cu}(\text{OH})_2$) forms, deterring corrosion process.

Friction

Compared to steel tubes, the surface of a copper tube is much smoother, and liquid flow faces much less resistance, which allows no accumulation of corrosive residues.

Economical

The material cost of copper tube is not far more expensive than in the case of other plumbing materials, it excels in durability and is easy to transport, handle and bend, drastically reducing overall project cost and work hours. Its use eliminates need for frequent maintenance against corrosive materials or scales, and is thus very economical.

Weight

Practically, the thickness and diameter of copper tube can be reduced by more than 25% as compared to the occasion of steel tubes while it weighs only $\frac{1}{4}$ ~ $\frac{1}{2}$ of that of steel tubes. Carrying becomes far more easier and cost efficient.

Workability

Cutting can be easily accomplished with a small cutter while a soft copper tube can be bent freely at almost any place. You can also easily widen and the opening of a tube. There is no need for thread processing for connections as tubes can be butt-jointed simply by welding. Tubes jointed in this way demonstrates near hardness of a straight tube.

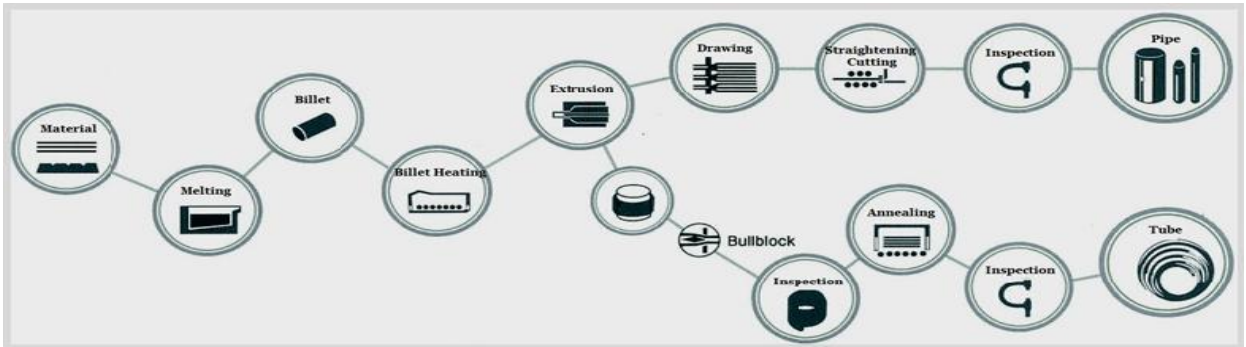
Progress Efficiency

Added to the copper tube's special characters is the flexibility in mixed use of soft and hard tubes, which can drastically shorten over all time length and reduce cost required for a project.

Hygienic

Copper tube is suitable from hygienic reasons. Usually, 80mg of copper ion is harmless to human body. A healthy man normally carries almost equal level of copper being generated by copper tube, which plays an important role in hematopoietic process of human body.

Manufacturing Process



■ Melting

The raw materials are melted in a furnace which, in a large tube mill, may hold up to 20 tons of metal. The furnace melts the copper charges.



■ Extrusion

Often compared with squeezing toothpaste from a tube. During extrusion, the billet, heated to the proper hot-working temperature, is placed in the chamber of an extrusion press. The horizontally mounted chamber contains a die at one end and a hydraulically driven ram at the other. As the ram moves forward, the copper is forced over the mandrel and through the hole in the die, causing a long hollow tube, about 2 3/4 inches (7mm) in a diameter and 87feet (26m) long to squirt out of the extrusion press (the length can vary depending of the capabilities of each mill).



■ Drawing

It simply involves pulling the hollow tube through a series of hardened steel dies to reduce its diameter.



■ Bull block

A process where wire is drawn to reduce its size.



■ Annealing

Tube that is in the soft condition, generally as coils, is passed through a continuous annealing furnace operating at 1300°F (704°C).

Plumbing Tube

USAGE: Suitable for use in general plumbing applications, such as underground water services, potable water distribution, gas distribution and fire sprinkler installations.

SPECIFICATION : KSD 5301, JIS H3300, ASTM B88, ASTM B306, AS1432
BS EN1057

PRODUCT RANGE:

Outer Diameter : 6mm ~ 250mm

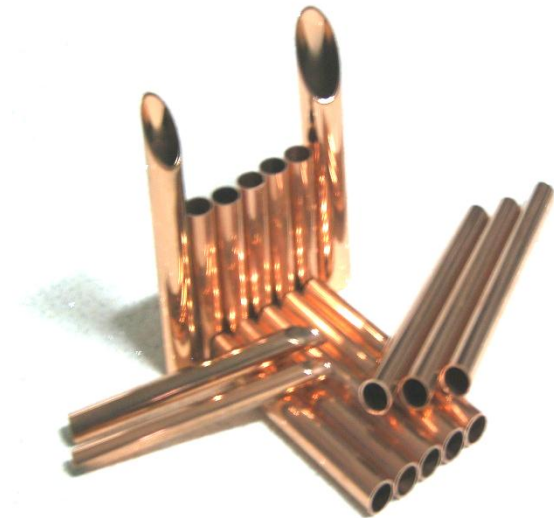
TYPE: ASTM B88 K, L, M

ASTM B306 DWV

AS1432 TYPE A, B, C

EN1057

Temper : Hard, Annealed, ½ hard



ASTM B88

Nominal Size	Outside Diameter		Wall Thickness by Type						Theoretical Weight		
			Type K		Type L		Type M		lb/ft		
	inch	mm	inch	mm	inch	mm	inch	mm	Type K	Type L	Type M
1/4	0.375	9.52	0.035	0.89	0.030	0.76	0.022	0.56	0.145	0.126	
3/8	0.5	12.70	0.049	1.24	0.035	0.89	0.025	0.64	0.269	0.198	0.145
1/2	0.625	15.88	0.049	1.24	0.040	1.02	0.028	0.71	0.344	0.285	0.204
5/8	0.75	19.05	0.049	1.24	0.042	1.07	0.030	0.76	0.418	0.362	
3/4	0.875	22.22	0.065	1.65	0.045	1.14	0.032	0.81	0.641	0.455	0.328
1	1.125	28.58	0.065	1.65	0.050	1.27	0.035	0.89	0.839	0.655	0.465
1-1/4	1.375	34.92	0.065	1.65	0.055	1.40	0.042	1.07	1.040	0.884	0.682
1-1/2	1.625	41.28	0.072	1.83	0.060	1.52	0.049	1.24	1.360	1.140	0.940
2	2.125	53.98	0.083	2.11	0.070	1.78	0.058	1.47	2.060	1.750	1.460
2-1/2	2.625	66.68	0.095	2.41	0.080	2.03	0.065	1.65	2.930	2.480	2.030
3	3.125	79.38	0.109	2.77	0.090	2.29	0.072	1.83	4.000	3.330	2.680
3-1/2	3.625	92.08	0.120	3.05	0.100	2.54	0.083	2.11	5.120	4.290	3.580
4	4.125	104.78	0.134	3.40	0.110	2.79	0.095	2.41	6.510	5.380	4.660
5	5.125	130.18	0.160	4.06	0.125	3.18	0.109	2.77	9.670	7.610	6.660
6	6.125	155.58	0.192	4.88	0.140	3.56	0.122	3.10	13.900	10.200	8.820
8	8.125	206.38	0.271	6.88	0.200	5.08	0.170	4.32	25.900	19.300	16.500
10	10.125	257.18	0.338	8.59	0.250	6.35	0.212	5.38	40.300	30.100	25.600

AS 1432

Nominal Size	Outside Diameter	Wall Thickness				Available Form	Temper
		A	B	C	D		
DN 6	6.35	0.91	0.71	-	-	30m coil, 18m coil, Straight	Annealed, Hard
DN 8	7.94	0.91	0.71	-	-	30m coil, 18m coil, Straight	Annealed, Hard
DN 10	9.52	1.02	0.91	0.71	-	30m coil, 18m coil, Straight	Annealed, Hard
DN 15	12.70	1.02	0.91	0.71	-	30m coil, 18m coil, Straight	Annealed, Hard, BQ
DN 18	15.88	1.22	1.02	0.91	-	30m coil, 18m coil, Straight	Annealed, Hard
DN 20	19.05	1.42	1.02	0.91	-	30m coil, 18m coil, Straight	Annealed, Hard, BQ
DN 25	25.40	1.63	1.22	0.91	-	18m coil, Straight	Annealed, Hard
DN 32	31.75	1.63	1.22	-	0.91	18m coil, Straight	Annealed, Hard
DN 40	38.10	1.63	1.22	-	0.91	18m coil, Straight	Annealed, Hard
DN 50	50.80	1.63	1.22	-	0.91	Straight	Hard
DN 65	63.50	1.63	1.22	-	0.91	Straight	Hard
DN 80	76.20	2.03	1.63	-	1.22	Straight	Hard
DN 90	88.90	2.03	1.63	-	1.22	Straight	Hard
DN 100	101.60	2.03	1.63	-	1.22	Straight	Hard
DN 125	127.00	2.03	1.63	-	1.42	Straight	Hard
DN 150	152.40	2.64	2.03	-	1.63	Straight	Hard
DN 200	203.20	2.64	2.03	-	-	Straight	Hard

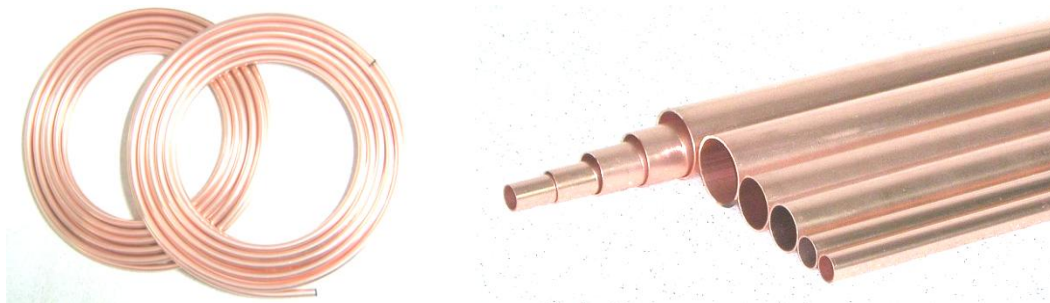
ACR Tube

USAGE: Copper tube intended for use in the connection, repairs of air conditioning or refrigeration units in the field. Also used in R410A and medical gas applications

SPECIFICATION : KSD 5301, JIS H3300, ASTM B280, AS/NZ 1571, BS EN 12735-1

PRODUCT RANGE:

Outer Diameter : 6mm ~ 105mm



Standard Size	Outside Diameter		Wall Thickness		Weight		Tolerance			
							Outside Diameter		Wall Thickness	
in.	in.	mm	in.	mm	lb/ft	kg/m	in.	mm	in.	mm
1/8	0.125	3.18	0.030	0.762	0.0347	0.0516	0.0020	0.051	0.003	0.08
3/16	0.187	4.75	0.030	0.762	0.0575	0.0856	0.0020	0.051	0.003	0.08
1/4	0.250	6.35	0.030	0.762	0.0804	0.1200	0.0020	0.051	0.003	0.08
5/16	0.312	7.92	0.032	0.813	0.1090	0.1620	0.0020	0.051	0.003	0.08
3/8	0.375	9.52	0.032	0.813	0.1340	0.1990	0.0020	0.051	0.003	0.08
1/2	0.500	12.70	0.032	0.813	0.1820	0.2710	0.0020	0.051	0.003	0.08
5/8	0.625	15.88	0.035	0.889	0.2510	0.3730	0.0020	0.051	0.004	0.11
3/4	0.750	19.05	0.035	0.889	0.3050	0.4540	0.0025	0.064	0.004	0.11
3/4	0.750	19.05	0.042	1.067	0.3620	0.5390	0.0025	0.064	0.004	0.11
7/8	0.875	22.22	0.045	1.143	0.4550	0.6770	0.0030	0.076	0.004	0.11
1 1/8	1.125	28.58	0.050	1.270	0.6650	0.9750	0.0035	0.089	0.005	0.13
1 3/8	1.375	34.92	0.055	1.397	0.8840	1.3200	0.0040	0.100	0.006	0.15
1 5/8	1.625	41.27	0.060	1.524	1.1400	1.7000	0.0045	0.110	0.006	0.15

Industrial Tube

Variant copper tubes – Square and Rectangular shaped tubes

Heavy walled tubes

Finned tubes – Grooved tubes, Inner grooved tubes



Bimetallic tube

Usage: (Al/Cu) for condenser and heat exchange tubes

(Cu/Al) for ACR tubes and copper tube replacement

Temper: Hard / Soft

Sizes: Outer diameter 6 mm ~ 44mm



Dimensions and specifications are available upon request.

Phosphorous Copper Ball for Plating

Specially developed for high quality Electro-plating purposes to give the free flowing properties, best handling of material to minimize sludge development during plating and extend the life of anode baskets.

Ball type Copper Anodes has maximized surface thus minimizing loss. It is highly productive and suitable for fully automated facility.



Usage : PCB, Electronic parts, plating

Composition

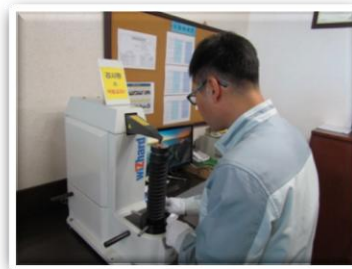
Copper > 99.94% ,Phosphorous = 400 - 650 ppm.

Specification	Ball Size			Weight	
	(mm)			(g)	
Φ 33	31	~	35	150	± 5
Φ 50	49	~	52	600	± 5

Quality Assurance

ILSHIN TAEKWANG is the first in the Korean non-ferrous metal industry to be accredited with KS and ISO 9001.

All of our products are thoroughly quality controlled even from the very first stage of raw material selection and every step of manufacturing process and to the very final stage of delivery.



Division	Inspection Subjects	Inspection facilities
Material Inspection	Analysis of Chemical ingredients	SPECTRO MAX-x
Process Inspection	Analysis of Chemical ingredients Verification of Dimensions Checking for Defects Visual inspection	Micrometer Eddy Current Tester
Finished Product Inspection	Verification of Dimensions Visual inspection Analysis of Physical ingredients	Universal Testing Machine Hardness Tester(HV,HR) Optical Emission Spectrometer



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