



COPPER TUBES BROCHURE

COMPANY PROFILE

LG Electronics Inc. is market leading Company in consumer durables and recognized as a technology innovator in the consumer electronics and durables business. LG Electronics has been a trendsetter for the consumer durable industry in India in latest global technology and product innovation.

Hi-M.Solutek is the HVAC Service and Maintenance Subsidiary of LG Electronics Inc. which was established in 2006, Hi-M.Solutek has global presence with overseas Subsidiaries in U.S.A, Mexico, UAE, Germany, Poland, Hungary, Indonesia, Egypt, Philippines and India.

Through 18 years of know-how in the field of comprehensive air conditioning and ICT based systems, they have expanded business competitiveness by providing differentiated services.

Hi-M.Solutek has achieved Global turnover of 230 Mn USD in 2023. It provides optimized solutions for every sector and climate with a wide range of cutting edge systems that bring exceptional heating, ventilation and air conditioning performance to buildings worldwide.

Hi-M.Solutek has recently entered the India market as LG Electronics HVAC Service and maintenance Company, committed to providing expert technical support, genuine parts assurance, cutting edge expertise and streamlined operations for increasing the ease of doing business.

GLOBAL PRESENCE

KOREA (HQ) | PHILIPPINES | INDONESIA | VIETNAM | UAE
EGYPT | HUNGARY | POLAND | GERMANY | MEXICO | USA | INDIA



COPPER PRODUCTS

Hi-M.Solutek India Private Ltd is marketing high quality Copper in Soft Coil and Hard tubes which are manufactured in India using environment friendly technologies and passing stringent Quality tests of Global Standards.

TECHNICAL SPECIFICATIONS OF COPPER TUBES

MOTHER COPPER TUBE

Copper mother tube used for air conditioning and refrigeration system refrigerant tubing should be Copper tubes conforming to following specifications.

1. Material composition should be conforming to C – 1220 (JIS-H-3300) or C-12200 (ASTM) It should have a minimum copper content of 99.90% min. And Phosphorus content between 0.015% to 0.040%,
2. It should also be as per the RoHS norms specified by EU; that is Mercury, Chromium and lead contents below 1000 ppm, and cadmium content below 100 ppm.
3. Physical properties of the material should conform to JIS – H- 3300 / ASTM B-68 & B-75, IS 10773:1995, Should be tested for Tensile / elongation / hardness / grain size tests as per ASTM B-280.
4. Dimensional tolerance should be as per JIS-H-3300 / ASTM B-251 / IS 10773:1995.

FINISH COPPER TUBE

Copper Tube specification:

1. De-oxidized high phosphatized copper (DHP grade) raw material with chemical composition of copper = 99.9%; Phosphorus = 0.015 to 0.040%
2. RoHS compliant
3. 360-degree concentric wall thickness along the entire length of the tubes.
4. Half hard-drawn copper tube should confirm to ASTM B-75/ASTM 280 / (C 12200) / JIS H 3300 (C 1220)/BS2871 PART 3 (C 106), IS 10773:1995.
5. Soft copper tubes bright annealed (mirror finish) should confirm to s ASTM B68 / JIS-H-3300 / IS 10773
6. Low residue content below the permissible level of 0.20 mg/dm² compatibility with use of CFC free & CFC refrigerant.
7. 100% eddy current tested tubes are to be used.
8. Proper packaging storage and traceability of tubes.

QUALITY CONTROL

Hi-M. Solutek India offers standard Sizes of Soft Copper Coil and Hard Tubes as well as any customization required. Throughout the process, quality checks are done using relevant measuring instruments and Observations through global standards as applicable.

SPECIFICATIONS

- Indian Standard Specification (ISS)
- British Standard Specification (BSS)
- American Standard for Testing of Material (ASTM)
- EN Standards
- Japanese Industrial Standards (JIS)

COPPER TUBE PRODUCTION PROCESS CHECKS

A. Copper Tubes manufacturing process checks after procuring Mother Tube.

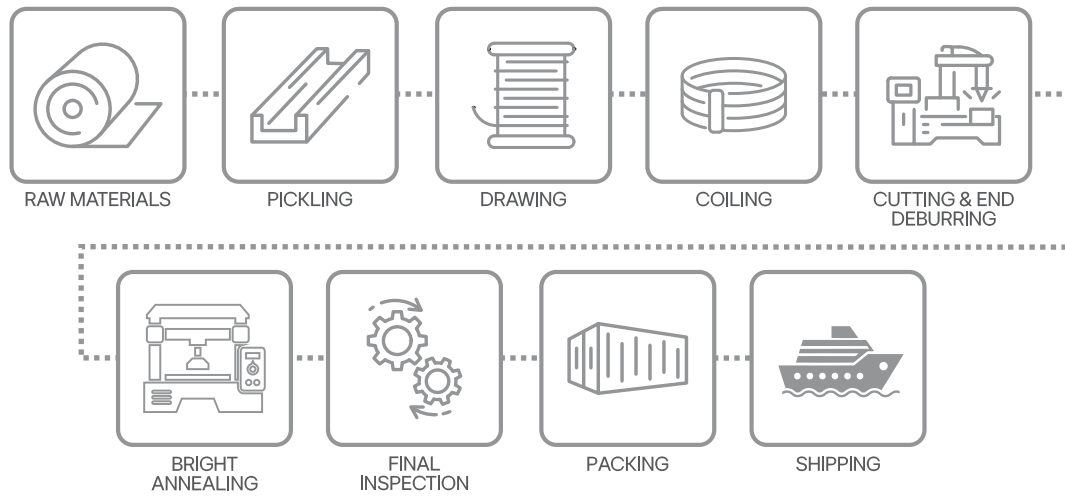
S No.	Process	Check Point	Measuring Instruments	Observation
1	Mother Tube Inspection	Dimensions	Micro Meter	As per specification JIS H3300, IS 10773 : 1995
		Chemical Composition	Spectro Meter	Cu.999% min, ph.0.015-0.040
		Appearance	Visual	Smooth
2	Drawing Process	Dimensions Diameter/ Thickness	Micro Meter Visual	As per specification JIS H3300. IS 10773 : 1995
		Surface		Smooth
3	Straightening / Coiling	Dimensions	Micro Meter Visual &	As per specification JIS H3300, IS 10773 : 1995
		Straightness	Measurements	Smooth
4	Eddy Current Testing	Surface & Internal Defects	Eddy Current Testing Machine	As per specifications JIS H3300. IS 10773 : 1995
5	Finish Cutting	Length	Measuring Tape	As per specification JIS H3300. IS 10773 : 1995
6	Pre - Inspection	Debarring	Visual	No burns/burs
		Dimensions	Micro Meter	As per specification JIS H3300.
		Length	Measuring Tape	IS 10773 : 1995
7	Annealing	Temperature	Thermo Couple	Batch Wise
8	Dimensional Check	Over Dia. Wall	Length,	As per specification JIS H3300.
		Thickness	Straightness	IS 10773 : 1995
		Micro Meter	Measuring Tape	
9	Visual Inspection	Surface	Visual	Smooth
10	Mechanical Property Test	Microscopic Examination	Microscope	0.015-0.040mm
		Expansion Test	UTM	30% extra
		Flattering Test	Visual	No crack found
		Hardness Strength Test	Hardness Tester	as per specification JIS H3300.
		Tensile Strength Test	Tensile Tester	IS 10773 : 1995
11	Packing	Marking & Packing	Customer's Requirement	As per customer requirement & transport worthy packing.

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PROCESS FLOWCHART - 1



TECHNICAL REQUIREMENTS

STANDARD	TEMPER	CHEMICAL COMPOSITION		MECHANICAL PROPERTIES		
		PHOSPHORUS	COPPER	TENSILE	% ELONGATION	HARDNESS
				N/mm2	MIN.	
ASTM B 68	Light Annealed (050)	0.015 - 0.40%	99.90% MIN	210	40	NA
	Soft Annealed (060)			210	40	NA
ASTM B 75	Half Hard (H55)			250-325	NA	30-60 (HR 30T)
	Hard (H80)			310 Min	NA	55 Min (HR 30T)
ASTM B 280	Soft Annealed (O60)			205	40	NA
	Hard (H58)			250	NA	NA
JIS H 3300	Light Annealed (OL)			205	40	73 VPN MAX
	Soft Annealed (O)			205	40	69 VPN MAX
	Half Hard			245-325	NA	70-110 VPN
	Hard			315 Min	NA	100 VPN Min
EN 12735	Annealed (R220)			220 Min	40	40-70 VPN
EN 12735	Annealed (R220)			220 Min	40	40-70 VPN
	Half Hard			250 Min	30	75-100 VPN
	Hard			290 Min	3	100 VPN Min

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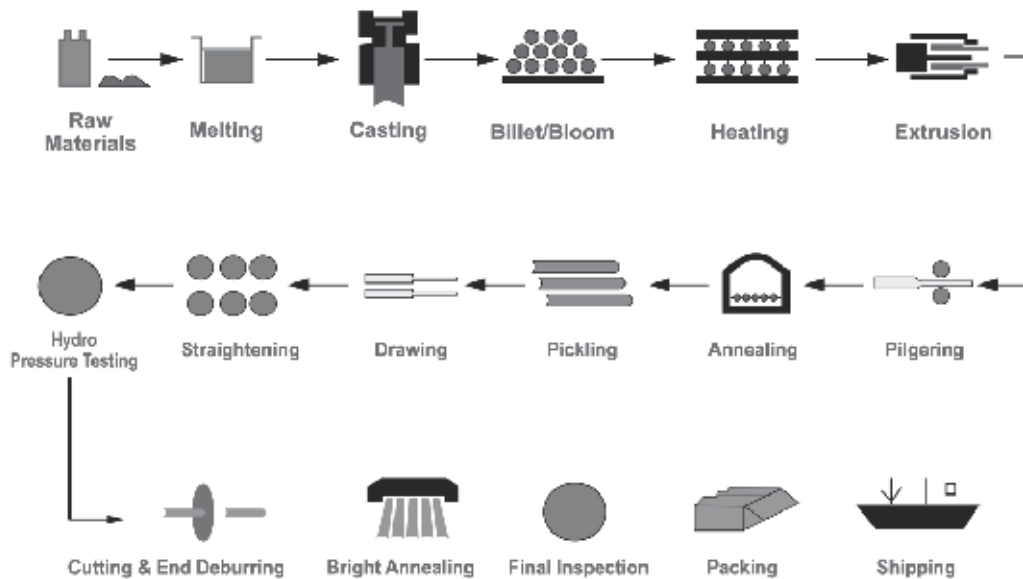
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B. Copper tubes manufacturing process checks after procuring Copper raw material.

Raw Material first melted with the help of electric furnace. The molten metal is poured into the casting cores to make billets. These Billets are heated to the required temperature and are proceeded to the extrusion table. Extruded tubes are further subjected to cold/hot drawing to get the required OD of Pipes/Tubes. Tubes/Pipes further annealed, pickled and straightened. in the next stage these tubes undergo various quality tests (destructive & non-destructive) before cutting to size, packing and despatch.

PROCESS FLOWCHART - 2



TECHNICAL REQUIREMENTS

STANDARD	TEMPER	CHEMICAL COMPOSITION		MECHANICAL PROPERTIES		
		COPPER (Cu)%	PHOSPHORUS (P)%	HARDNESS	TENSILE	ELONGATION
ASTM B 68	050 060	99.90%	0.015 TO 0.040%	- -	210 Mpa	40%
ASTM B 75	H55		0.015 TO 0.040%	30-60 HR 30 TD	250 - 310 Mpa	-
	H58	99.90%	0.015 TO 0.040%	30 HR 30 TD MIN	205 Mpa Min	-
	H80			55 HR 30 TD MIN	380 Mpa Min	-
	H60			50 HRF MAX	205 Mpa Min	-
	H50			55 HRF MAX	205 Mpa Min	-
ASTM B 88	H60	99.90%	0.015 TO 0.040%	50 HRF MAX	205 Mpa Min	-
	H50			55 HRF MAX	205 Mpa Min	-
	H58			-	250 Mpa Min	-
ASTM B 208	H60	99.90%	0.015 TO 0.040%	-	205 Mpa Min	40%
	H58			-	250 Mpa Min	-
	O			-	205 Mpa Min	40%
IS 2501	HB			-	235 Mpa Min	25%
	HD	99.90%	0.015 TO 0.040%	-	280 Mpa Min	-

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PRODUCT RANGE

SOFT COPPER COIL

S No.	Hi-M model	Description	Type	Inch		MM	Thickness (MM)	Length (Feet)	Weight Per pipe in kgs.
1	HIM6351508	1/4" (6.4mm) x 21 swg (0.8mm)	Soft	1/4"	0.25	6.35	0.8	50	1.85
2	HIM9531508	3/8" (9.5mm) x 21 swg (0.8mm)	Soft	3/8"	0.38	9.53	0.8	50	2.95
3	HIM1271508	1/2" (12.7mm) x 21 swg (0.8mm)	Soft	1/2"	0.5	12.7	0.8	50	3.95
4	HIM1591510	5/8" (15.9mm) x 19 swg (0.99mm)	Soft	5/8"	0.63	6.35	0.99	50	6.35
5	HIM1911510	3/4" (19.1mm) x 19 swg (0.99mm)	Soft	3/4"	0.75	9.53	0.99	50	7.55

COPPER HARD TUBE

S No.	Hi-M model	Description	Type	Inch		MM	Thickness (MM)	Length (Feet)	Weight Per pipe in kgs.
6	HIM6350308	1/4" (6.4mm) x 21 swg (0.8mm)	Hard	1/4"	0.25	6.4	0.8	10	0.386
7	HIM9530308	3/8" (9.5mm) x 21 swg (0.8mm)	Hard	3/8"	0.38	9.5	0.8	10	0.607
8	HIM1270308	1/2" (12.7mm) x 21 swg (0.8mm)	Hard	1/2"	0.5	12.7	0.8	10	0.829
9	HIM1590310	5/8" (15.9mm) x 19 swg (0.99mm)	Hard	5/8"	0.63	15.9	0.99	10	1.296
10	HIM1910310	3/4" (19.1mm) x 19 swg (1mm)	Hard	3/4"	0.75	19.1	1	10	1.549
11	HIM2220310	7/8" (22.2mm) x 19 swg (1mm)	Hard	7/8"	0.88	22.2	1	10	1.816
12	HIM2540310	1.0" (25.4mm) x 19 swg (0.99mm)	Hard	1.0"	1	25.4	0.99	10	2.1
13	HIM2860310	1.1/8" (28.6mm) x 19 swg (0.99mm)	Hard	1.1/8"	1.13	28.6	0.99	10	2.4
14	HIM3180311	1.1/4" (31.8mm) x 18.5 swg (1.1mm)	Hard	1.1/4"	1.25	31.8	1.1	10	2.869
15	HIM3490312	1.3/8" (34.9mm) x 18 swg (1.21mm)	Hard	1.3/8"	1.38	34.9	1.21	10	3.521
16	HIM3810313	1.1/2" (38.1mm) x 17.5 swg (1.3mm)	Hard	1.1/2"	1.5	38.1	1.3	10	4.085
17	HIM4130314	1.5/8" (41.3mm) x 17 swg (1.43mm)	Hard	1.5/8"	1.63	41.3	1.43	10	4.86

*Customised Sizes can also be made as per specifications

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TESTING & EQUIPMENTS

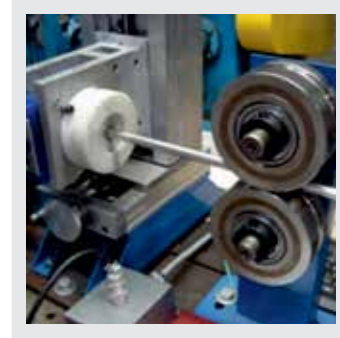
Stringent quality controls and procedures are established with continuous monitoring throughout the production process to minimize the range of possible deviation in the final output. Reliable testing and measuring equipment are used for destructive and non-destructive testing.



TENSILE TEST



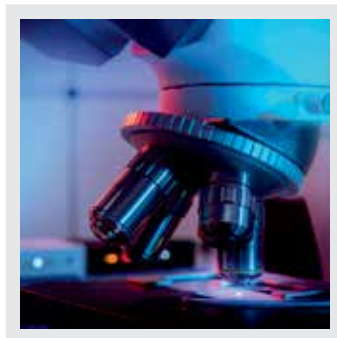
HARDNESS TEST



EDDY CURRENT
MACHINE



SPECTRO ANALYSIS
MACHINE



MICROSCOPE
(GRAIN SIZE TEST)



HYDRO TEST

Chemical Analysis

Spectro Analysis - 100% Heat are inspected for chemical composition and maintained as per standards

Mechanical Properties Inspection

Tubes are inspected to various mechanical testing i.e Hardness, Tensile, Elongation, Yield Test, Expansion and Flattening Test.

Non Destructive Inspection

Non destructive test is carried out on tubes to eliminate all surface flaws to avoid rupture and leakages in tubes on application.

Dimensional Inspection

In process and Final dimensional inspection is carried out in tubes for Outside Diameter, Inside Diameter, Wall Thickness and Length.

COPPER TUBES PRODUCT TRACEABILITY



PACKAGING



END CAP

Hi-M.Solutek -9.52 MM X 0.8 MM LIGHT DRAWN B.NO. 153/24-25 IS : 10773 : 1995. CM/L - 7100054187

PRINTING ON EVERY ONE MTR. LENGTH & BOTH END CAPS AND COVERED WITH PRINTED BAG

THE HI-M. SOLUTEK INDIA ADVANTAGE

- **Brand Trust**

Marketed by Hi-M.Solutek India, an LG Electronics Service and Maintenance Company.
Committed to delivering on the Brand Promise.

- **Quality Standards**

High Quality Copper Tubes following National and International Standards.
Passing Stringent tests for Chemical Composition, Mechanical properties, Non-Destructive and Dimensional inspection.
Manufactured under Make in India Initiative by ISO 9001:2015 Certified Manufacturer.

- **Purity**

99.9% Copper and 0.015~0.040 Phosphorus as per ASTM/BS-EN/IS/JIS or likewise standards.
RoHS compliant and Ecofriendly Copper Tubes.

- **Availability**

Customization offered.
Door Step delivery and streamlined operations.

ANNEXURE

DIMENSIONS & PRESSURE RATING

VRV/VRF INSTALLATIONS - SOFT / ANNEALED (STANDARD) STANDARD COIL LENGTH: 50FT

JIS H 3300:1997							
OD		No of Coils	THK	WT/COIL	Bursting Pressure at room Temperature		
Inch	mm	Cartoon	MM	KG	Temper	psi	Mpa
1/4"	6.40	15.00	0.762	1.84	Soft	2381	16.42
3/8"	9.52	10.00	0.813	3.02	Soft	1708	11.77
1/2"	12.70	7.00	0.813	4.14	Soft	1280	8.83
5/8"	15.88	5.00	0.80/1.00	5.71	Soft	10.50/1326	7.24/9.14
3/4"	19.05	4.00	1.00	6.91/8.24	Soft	1096	7.56
7/8"	22.22	3.00	0.88	8.00	Soft		

Safety Factor = 3

ASTM B 280 - 03							
OD		No of Coils	THK	WT/COIL	Bursting Pressure at room Temperature		
Inch	mm	Cartoon	MM	KG	Temper	psi	Mpa
1/4"	6.40	15.00	0.762	1.84	Soft	2381	16.42
3/8"	9.52	10.00	0.813	3.02	Soft	1708	11.77
1/2"	12.70	7.00	0.813	4.14	Soft	1280	8.83
5/8"	15.88	5.00	0.889	5.71	Soft	1120	7.72
3/4"	19.05	4.00	0.889/1.07	6.91/8.24	Soft	933/1123	6.43/7.74
7/8"	22.22	3.00	1.14	10.29	Soft		

Safety Factor = 3

NON-VRV/VRF INSTALLATIONS - SOFT / ANNEALED (LIGHT WEIGHT / ECONOMY)

STANDARD COIL LENGTH : 50 FT (SINGLE LAYERED / DOUBLE LAYERED)

ASTM B 68							
OD		No of Coils	THK	WT/COIL	Bursting Pressure at room Temperature		
Inch	mm	Cartoon	MM	KG	Temper	psi	Mpa
1/4"	6.40	15.00	0.61	1.50	Soft	1906	13.14
3/8"	9.52	10.00	0.66	2.50	Soft	1387	9.56
1/2"	12.70	7.00	0.68	3.50	Soft	1071	7.38
5/8"	15.88	5.00	0.69	4.50	Soft	873	6.02
3/4"	19.05	4.00	0.713/0.8	5.60/6.30	Soft	767/850	5.29/5.86

Safety Factor = 3

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ASTM B 280 - 03						
OD		THK	WT/MTR	Bursting Pressure At Room Temperature		
INCH	MM	MM	KG	TEMPER	psi	Mpa
1/4"	6.35		-	-	-	-
3/8"	9.52	0.76	0.19	HARD	3592	24.77
1/2"	12.70	0.89	0.30	HARD	3154	21.74
5/8"	15.90	1.02	0.43	HARD	2887	19.9
3/4"	19.10	1.07	0.54	HARD	2521	17.38
7/8"	22.30	1.14	0.68	HARD	2300	15.86
1 1/8"	28.60	1.27	0.98	HARD	1998	13.78
1 3/8"	34.90	1.40	1.32	HARD	1805	12.44
1 5/8"	41.30	1.52	1.70	HARD	1656	11.42
2 1/8"	54.00	2.03	2.96	HARD	1483	10.23
2 5/8"	66.70	2.03	3.69	HARD	1370	9.44
3 1/8"	79.40	2.29	4.96	HARD	1298	8.95
3 5/8"	92.10	2.54	6.39	HARD	1241	8.56
4 1/8"	104.78	2.79	8.00	HARD	1196	8.24
Bursting Pressure = 2* UTS*THK/ (OD-0.8*THK) Safety Factor=2						

JIS H 3300-2018									
OD		THICKNESS	WT/MTR	Bursting Pressure at room					
INCH	MM	MM	KG	TEMPER	Mpa	Psi	TEMPER	Mpa	Psi
1/4"	6.35	0.80	0.125	HARD	44.13	6399	Half Hard	34.33	4977
3/8"	9.52	0.80	0.196		28.38	4115		22.07	3200
1/2"	12.7	0.80	0.268		20.90	3030		16.25	2357
5/8"	15.88	0.80/1.00	0.339/0.418		16.54/20.89	2398/3029		12.86/16.25	1865/2356
3/4"	19.05	0.80/1.00	0.410/0.507		13.70/17.30	1985/2503		10.60/13.40	1544/1947
7/8"	22.23	0.80/1.00	0.482/0.597		11.70/14.70	1692/2131		9.10/11.40	1316/1658
1"	25.4	0.80/1.00	0.606/0.686		11.20/12.80	1628/1857		8.70/10.00	1266/1444
1 1/8"	28.6	1.00	0.776		11.33	1643		8.81	1278
1 1/4"	31.75	1.10	0.947		11.22	1628		8.73	1266
1 3/8"	34.9	1.21	1.145		11.23	1629		8.74	1267
1 1/2"	38.1	1.32	1.364		11.22	1628		8.73	1266
1 5/8"	41.3	1.43	1.43		11.22	1627		8.72	1265

Safety Factor = 2

LG Electronics HVAC Service & Maintenance

Hi-M.Solutek

LG Electronics HVAC Service & Maintenance

Hi-M.Solutek

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“T&C” APPLY

Marketed in India by Hi-M. Solutek India Private Limited
Manufactured in India under Make in India Initiative
“T&C” APPLY

