

ZTT GROUP

Established in 1992, ZTT started from optical fiber communications and was listed on Shanghai Stock Exchange (SSE) in 2002 (Stock Code in SSE: 600522). ZTT has pictured a diversified industrial portfolio for marine equipment, renewable energy, new materials, smart grid, optical communications and other diversified industrial products. ZTT Group is now hosting 80 subsidiary companies and over 16,000 employee, operating 5 overseas plants located in India, Brazil, Indonesia, Morocco and Turkey. ZTT owns more than 2500 patents with independent intellectual property rights, presided over or participated in more than 500 international and national industry standards. The products of ZTT are exported to 160 countries and regions. The company has ranked among the top 500 Chinese enterprises for consecutive years and broke through \$13.4 billion in sales revenue in 2022. ZTT follows the new economic model of fostering cleaner production and accelerating green and low-carbon development, works hard to serve as the pioneer of persistent endeavor to achieve national goal involving carbon dioxide emissions peaking by 2030 and carbon neutrality by 2060, emerging as a green manufacturing technology group assuming regional economy.



Alloy Technology

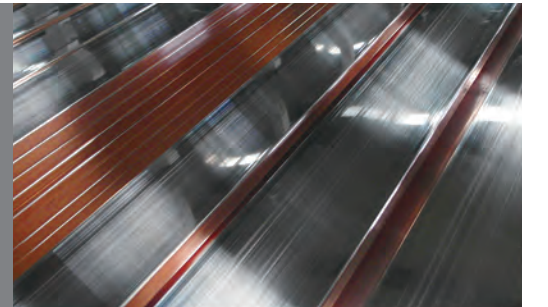
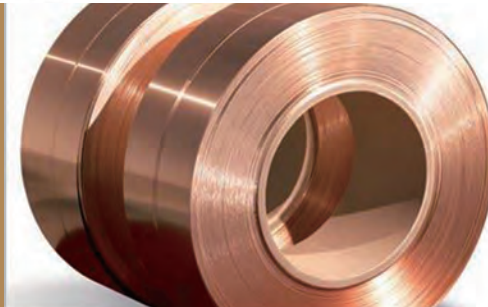


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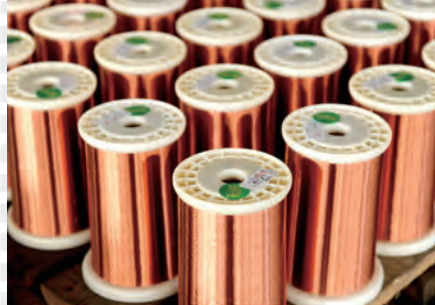
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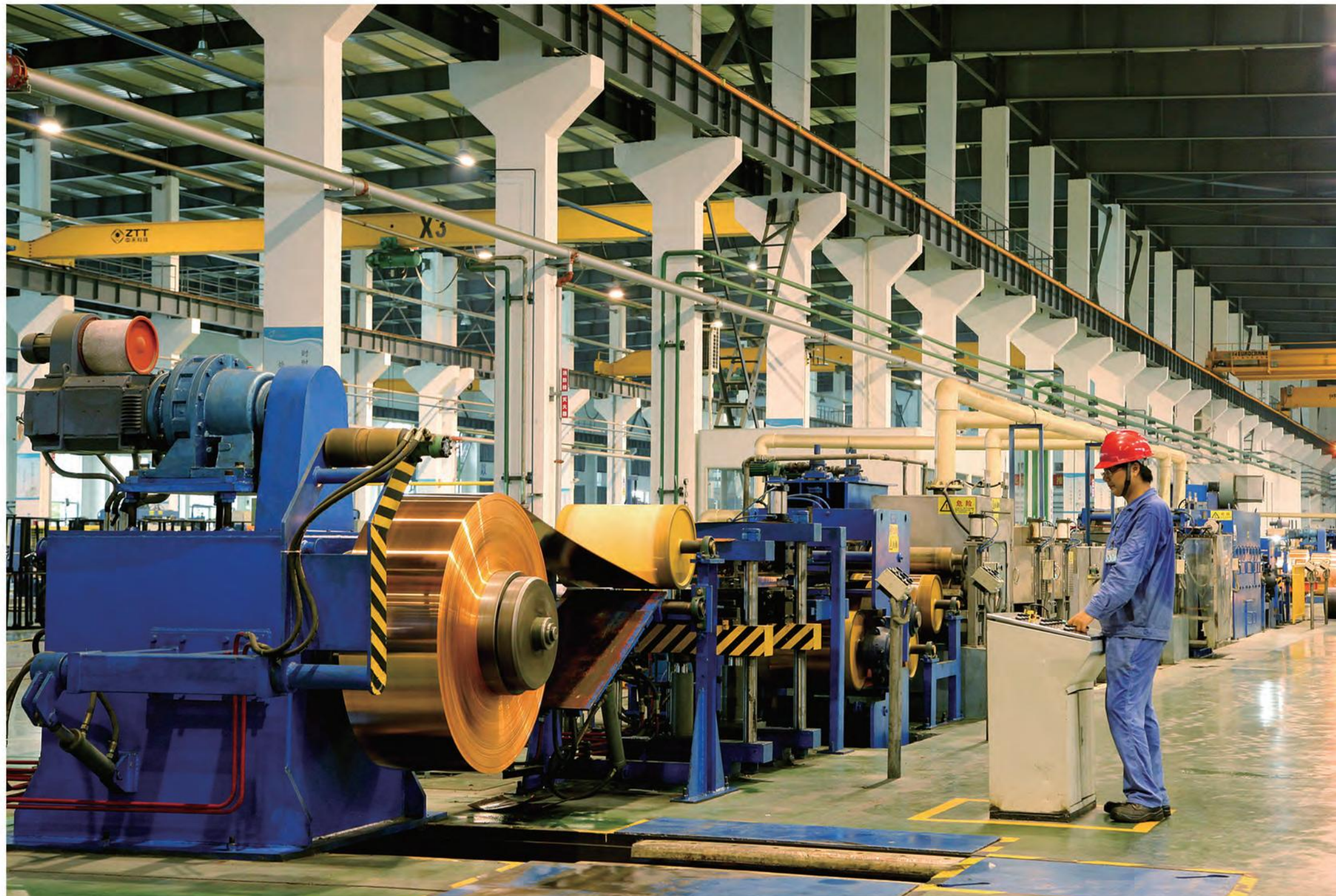
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01 COMPANY PROFILES



Zhongtian Alloy Technology Co., Ltd, founded in 2010 and registered capital of 220 million RMB, is one subsidiary of Jiangsu Zhongtian Technology Co., Ltd (Stock Code: 600522). The company is the high-tech enterprise identified by Jiangsu Province science and technology department. The company owns imports and exports qualifications of self operating and being agent of various commodities and technologies. The company locates in economic and technical development zone industrial park of Nantong, a beautiful city which has a name of "Jianghai Portal", Nantong sits by the mountains and borders on the coastline and the Sutong Bridge connects Shanghai and Suzhou, which belongs to Shanghai one-hour economic circle.

The company covers an area of over 66,000 square meters, floor area over 40,000 square meters. It manages the production and marketing of high-precision and high-performance copper strips, copper bus bar, copper pipe, copper rod, railway through grounding wire, winding wire and other copper alloy products. The series of products are widely used in many fields like communications industry, cables and wires, shipping industry, transformer, electronic information industry, aviation and aerospace. It has an annual capacity of high-precision and high-performance copper strips 20,000 tons, winding wire 5000 tons, copper bus bar 10,000 tons, copper rod 40,000 tons, copper pipe 2,000tons, and railway through grounding wire 10,000 km, which can achieve product sales revenue of \$ 47million. The company is committed to build a first class domestic copper processing leading enterprise. In the next few years, based on the existing product development and technical upgrading, the company has already prepared from existing products to the high-tech, high value-added products. Further extended to 2025, the company is determined to become the "precision manufacturing" leader of China copper processing industry.

02 PRODUCT INTRODUCTION

COPPER STRIP

TECHNICAL PARAMETER

Product application: Copper strips for Radio frequency cable, copper strips for cable shielding, copper strips for photovoltaic solder strip, copper strip for transformer, copper strips for cylinder liner, electrical and electronic components, etc.



※ Standard

Standard	Standard	Specification
GB/T 11091-2014		Copper strip for cables
GB/T 18813-2014		Copper strip for transformer
GB/T 26015-2010		Copper strip for overbite

※ Trade Mark、State、Specification

Trade Mark	State	Specification (mm)	
		Thickness	Width
T1、TU1、T2、TU2	M、Y8、Y4、Y	0.05-2.0	10-500

※ Size and Tolerance

Thickness	Tolerance		Width	Tolerance	
	National	Internal Control Standards		National Standards	Internal Control Standards
0.05-0.2	±0.008	±0.003	10-500	±0.1	±0.05
> 0.2-0.7	±0.010	±0.005			
> 0.7-2.0	±0.015	±0.008			

※ Electrical and Mechanical Properties

Trade Mark	State	Tensile Strength (MPa)	Elongation (%)	Vickers Hardness (HV)	Electrical Conductivity (%IACS)	Electrical Resistivity (Ω mm ² /m)
T1、TU1 T2、TU2	M	200~270	≥ 35	50-60	≥ 100	0.017241
	Y8	220~280	≥ 30	50-65	≥ 99	0.017415
	Y4	240~300	≥ 25	55-70	≥ 98	0.017593
	Y	> 260	—	> 70	≥ 98	0.017593

COPPER PLATE PRODUCTION LINE



• Four-roll reversible roughing mill



• Horizontal continuous casting machine



• Thick tape slitting machine

The production line uses high-purity cathode copper as raw material. After horizontal continuous casting, double-sided milling, rough rolling, cutting edge of thick strip, intermediate annealing, degreasing cleaning of thick strip, finishing rolling, degreasing cleaning before annealing, the finished product annealing, thin strip degreasing cleaning, thin strip slitting and packaging processes, it can produce copper strip with specification range of $(0.05 \sim 1.0) * (15 \sim 420)$ mm. The copper strip has superior performance indexes like high surface quality, low oxygen content, etc. It is widely used in RF communication cable, photovoltaic, electrical appliance, automobile and other industries.



• Milling machine

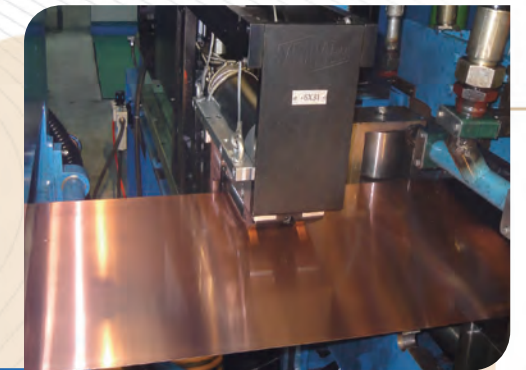
COPPER PLATE PRODUCTION LINE



• Bell type annealing furnace



• Degreasing cleaning line



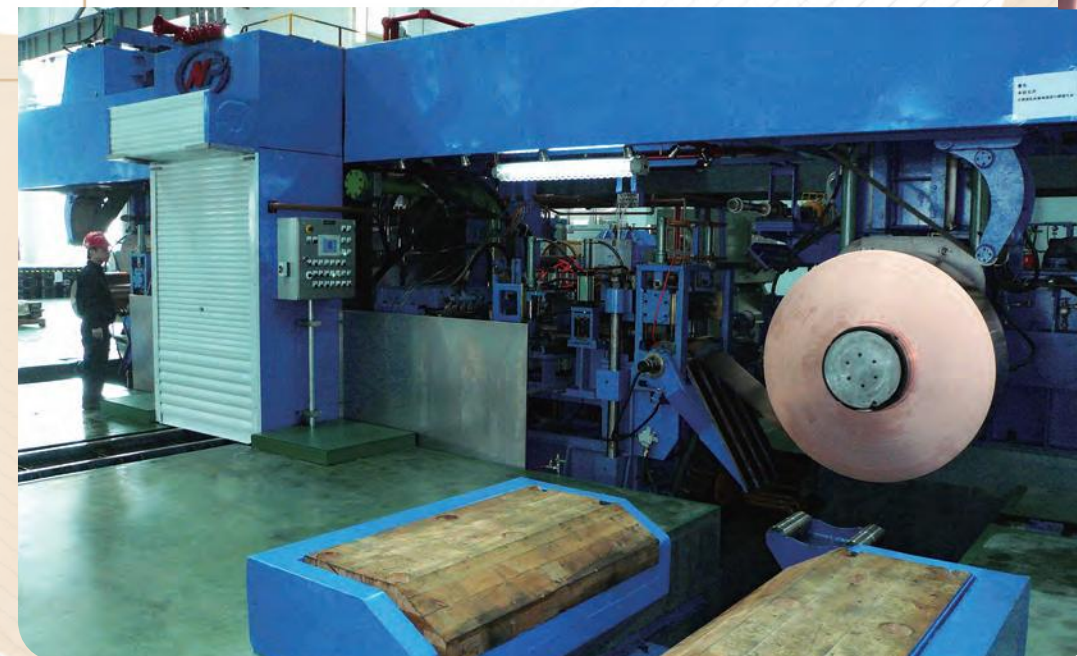
• Thickness tester



• Thin strip slitting machine

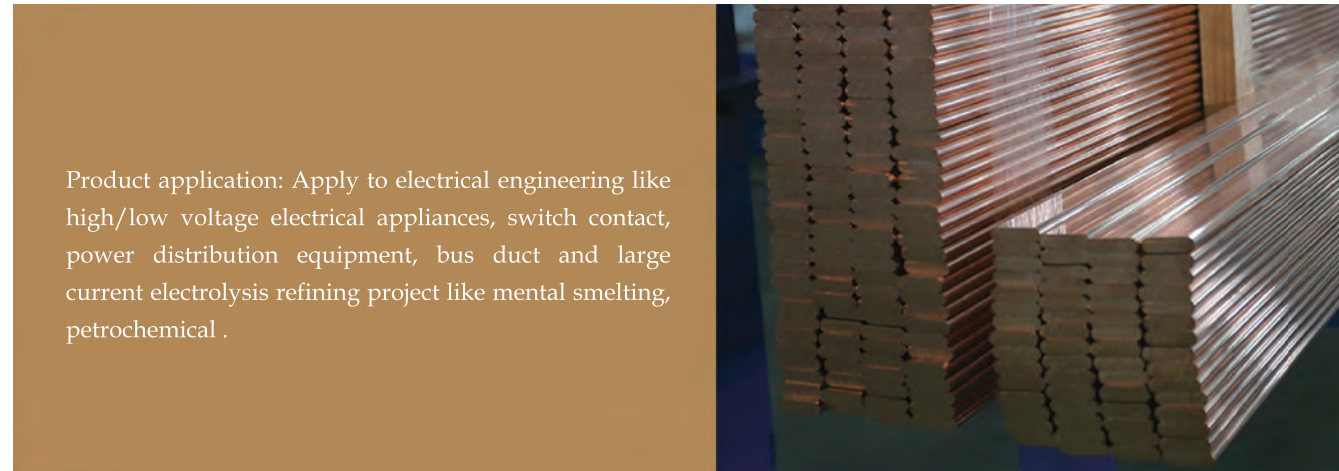


• Roll grinding machine



• Four-roll reversible finishing mill

COPPER BAR



Product application: Apply to electrical engineering like high/low voltage electrical appliances, switch contact, power distribution equipment, bus duct and large current electrolysis refining project like mental smelting, petrochemical.

TECHNICAL PARAMETER

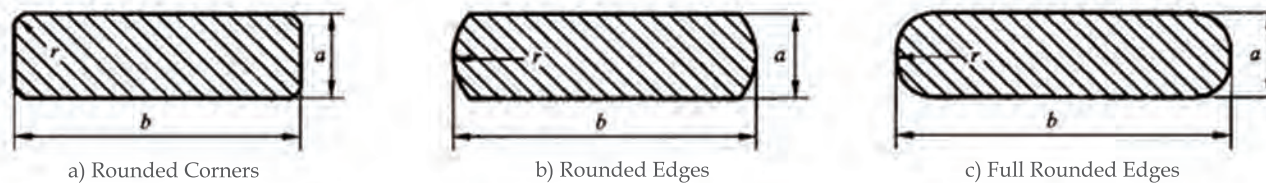
>> Operative Norm

GB/T 5585.1-2018 Electrical copper busbar

※ Type and Chemical composition

Type	Name	Specification (mm)		Chemical composition (Cu+Ag) %	
		Thickness	Width	National Standards	Internal Control Standards
TM	Copper busbar	2.24~50	16~400	99.90	99.95

※ Section shapes of copper busbar: circular bead, round edge, all round edge



※ a—Thickness is the narrow side dimension mm; b—Thickness is width dimension mm; r—Rounded Corner or Rounded edge radius mm.

※ Thickness deviation

(Thickness) a	(Width) b			
	$b \leq 50.00$	$50.00 < b \leq 100.00$	$50.00 < b \leq 200.00$	$200.00 < b$
$a \leq 2.80$	± 0.03	—	—	—
$2.80 < a \leq 4.75$	± 0.05	± 0.08	—	—
$4.75 < a \leq 12.50$	± 0.07	± 0.09	± 0.12	± 0.30
$12.50 < a \leq 25.00$	± 0.10	± 0.11	± 0.13	± 0.30
$25.00 < a$	± 0.15	± 0.15	± 0.15	—

※ Width deviation

(Width) b	Deviation
$b \leq 25.00$	± 0.13
$25.00 < b \leq 35.50$	± 0.15
$35.50 < b \leq 100.00$	± 0.30
$100.00 < b$	$\pm 0.3\%b$

※ Physical property

Trade Mark	Tensile Strength (MPa)	Elongation (%)	Electrical Resistivity (Ω mm ² /m)	Electrical Conductivity (%IACS)
TMY	≥ 206	≥ 35	≤ 0.017241	≥ 100

COPPER PLATOON PRODUCTION LINE

The $\phi 20.0\text{mm}$ copper rod produced by up-draw process produces copper platoon through continuous extruding machine. The maximum width of copper platoon product can reach 170mm. This production line can produce 10,000 tons of copper platoon annually. Hydraulic automatic drawing machine draws the copper platoon after extrusion to improve the size precision of the copper platoon, the surface finish, hardness, etc. so as to machining into all kinds of products according to customer's requirement in the following days.



Hydraulic automatic drawing machine

Extruding machine



COPPER ROD



TECHNICAL PARAMETER

Product application: Mainly are the raw materials of wire and cable production, productive copper flat wire, current copper wire of wire drawing, enameled wire etc.

ELECTRICAL COPPER ROD

>> Operative Norm

GB/T 3952-2016 Electrical copper rod

※ Trade Mark、 State、 Specification

Trade Mark	State	d /mm
T1、 T2	R	6.0~35.0
TU1、 TU2	R	
		Y

※ Chemical composition

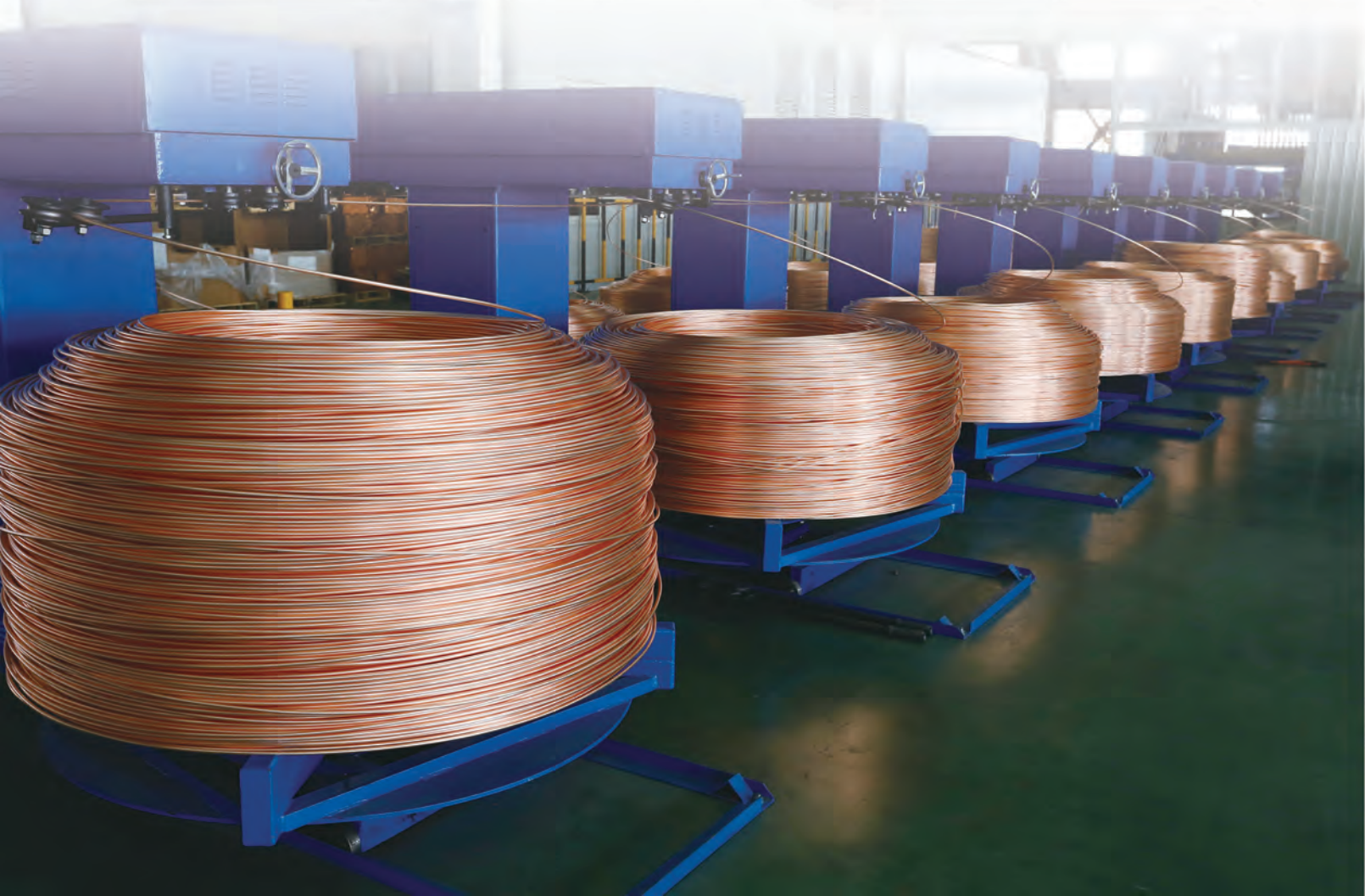
Trade Mark	Cu+Ag	P	Bi	Sb	As	Fe	Ni	Pb	Sn	S	Zn
T1、 TU1	≥ 99.99	/	0.0002	0.0004	0.0005	0.001	/	0.0005	/	0.0015	/
T2、 TU2	≥ 99.95	0.001	0.0006	0.0015	0.0015	0.0025	0.002	0.002	0.001	0.0025	0.002

※ Size and Tolerance

Nominal diameter	6.0~6.35	> 6.35~12.0	> 12.0~19.0	> 19.0~25.0	> 25.0~35.0
The allowable deviation	- 0.25, + 0.5	±0.4	±0.5	±0.6	±0.8

※ Mechanical properties

Trade Mark	State	Diameter	Tensile Strength (MPa)	Elongation (%) ≥	Electrical Conductivity (%IACS)	Electrical Resistivity (Ω mm ² /m)
T1、TU1 T2、TU2	M	6.0~35	—	≥ 40	≥ 100	0.017241
			—	≥ 37		
			—	≥ 35		
	Y	6.0~7.0	370	≥ 2.0	≥ 98.5	0.017500
		> 7.0~8.0	345	≥ 2.2		
		> 8.0~9.0	335	≥ 2.4		
		> 9.0~10.0	325	≥ 2.8		
		> 10.0~11.0	315	≥ 3.2		
		> 11.0~12.0	290	≥ 3.6		



ELECTRICAL COPPER ROD

>> Operative Norm

GB/T 3953-2016 Electrical copper line

※ Size and Tolerance

Type	Specification (mm)	Deviation
TR、TY	0.20~0.025	±0.002
	0.026~0.125	±0.003
	0.126~0.400	±0.004
	0.401~14.00	±0.1% _d

※ Mechanical Properties

Nominal diameter (mm)	TR	TY	
	Elongation %	Tensile Strength (N/mm ²)	Elongation %
0.020~0.100	10	421	—
0.200~0.380	15	419~420	—
0.380~0.60	20	416~418	—
0.600~3.00	25	389~415	0.5~0.9
3.00~8.00	30	335~388	1.0~2.2
8.00~14.00	35	271~330	2.3~3.6

※ Electrical properties

Type	Electrical Resistivity (Ω mm ² /m)	
	< 2.00mm	≥ 2.00mm
TR	0.017241	0.017241
TY	0.017960	0.017770

OXYGEN FREE COPPER ROD PRODUCTION LINE

Oxygen free copper rod uses high purity cathode copper as raw material, and uses the up-draw process to pull the copper rod billet. The standard sizes include $\phi 20.0\text{mm}$, $\phi 17.0\text{mm}$, $\phi 12.5\text{mm}$, $\phi 8.0\text{mm}$. Copper rod. Copper rod can produce $\phi 8.0\text{mm}$ hard copper rod after pressing, and can produce $\phi 2.0\text{-}3.5\text{mm}$ soft copper wire or hard copper wire after drawing. This production line has an annual output of 40000 tons of oxygen free copper rod and copper wire.



• Oxygen free copper rod production line



• Rod rolling machine



• Wire drawing machine



• End product

• Copper rod up drawn



COPPER TUBE

TECHNICAL PARAMETER

Product application: Inner conductor of radio-frequency cable, tap water pipe, heating and cooling pipe, copper tube etc.

>> Operative Norm

GB/T 19849-2014 Seamless copper tube for cable

※ Trade Mark, State, Specification



Trade Mark	State	Specification (mm)	
		Outside diameter	Wall thickness
TU1、TU2、T2	M	4~22	0.25~1.5

※ Size and Tolerance

Outside diameter	Tolerance	Wall thickness			
		0.25~0.40	0.40~0.60	0.60~0.80	0.80~1.50
4~15	± 0.05	0.03	0.05	0.06	0.08
> 15~20	± 0.06	0.03	0.05	0.06	0.09
> 20~22	± 0.08	0.04	0.06	0.08	0.09

※ Electrical and mechanical properties

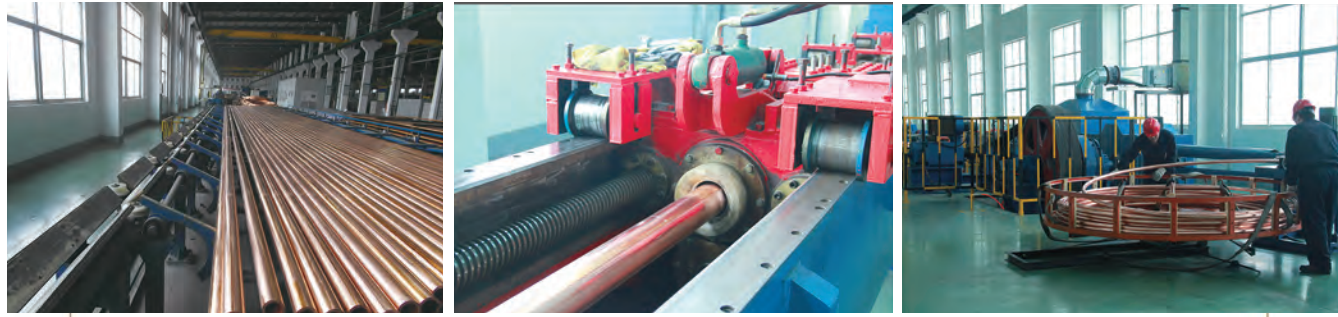
Trade Mark	State	Tensile Strength (MPa)	Elongation (%)	Electrical Conductivity (%IACS)
TU1、TU2、T2	M	205~280	≥ 40	≥ 100

COPPER TUBE PRODUCTION LINE

Seamless copper tube uses high purity cathode copper as raw material, by using upward casting process to lead the tube billet. Copper tube billet coming from casting workshop is rolled by two hole ring rolling mill, pulled by multi-channel times plate pull machine, levelly cleaned and compound wound, annealed of finished product in the pit type furnace, line winded in Longmen, finished product storage after inspection. The annual output of the seamless copper tube is 2000 ton.



● Copper Tube Up Drawn ●



• Tube mill •



• Levelly compound wound •



Well type annealing furnace

◀ Wire wrap

• Plate drawing machine •



ENVIRONMENTALLY-FRIENDLY COPPER ALLOY SHEATH RAILWAY THROUGH GROUNDING WIRE

Environmentally-friendly copper alloy sheath railway through grounding wire is a kind of whole line unified grounding cable used for railway signal system. It can make each ground potential of a wide range of railway electrical system keep consistent basically, can eliminate the potential unbalance current caused by the potential difference between different equipment, can make the equipment grounding of the system safe and reliable, and realize the effective and reliable protection to personnel and equipment. It is suitable for railway passenger dedicated line integrated grounding system and suitable for the through grounding wire of ZPW-2000-A or UM71 automatic block system.



PRODUCT FEATURES

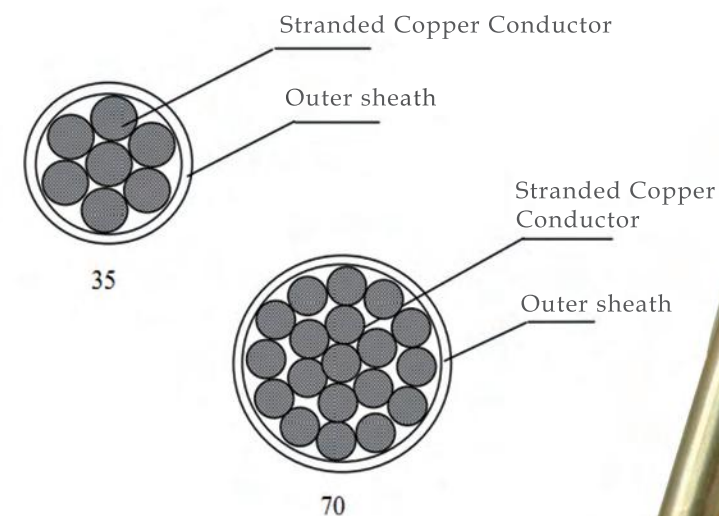
- ※ Good soil corrosion resistant performance.
- ※ More than 50 years service life.
- ※ The environmental performance is in accordance with the EU ROHS directive rules, and will not cause pollution to soil, water, and accord with environmental protection requirement.
- ※ The sheath is of high conductivity, strong discharge capacity, and good grounding reliability, effectively guaranteeing the safety of train operation and equipment personnel.



Production line of railway through grounding wire

PRODUCT SPECIFICATIONS AND TYPES

The product specifications are distinguished by the nominal section of copper conductor (mm²), including 35, 70 and other specifications. The corresponding product types are: DH35, DH70; D means the product type is railway through ground wire, H means the outer sheath of through ground wire is anti-corrosion copper alloy sheath.



USE REQUIREMENT

Minimum bending radius of the anticorrosion copper alloy sheath railway through grounding wire DH should be no less than 20 times of the product diameter. The system short circuit instantaneous (5s) conductor operating temperature should be no more than 400°C.

PRODUCT PERFORMANCE

※ Electrical properties

20°C DC resistance of copper conductor

Item	Type	Unit	Standard value	Typical value
DC Resistance of conductor 20°C	35mm ²	Ω /km	≤0.590	0.565
	70mm ²		≤0.270	0.260

※ Environmental performance

Harmful substances measured values of through grounding wire (mg/kg)

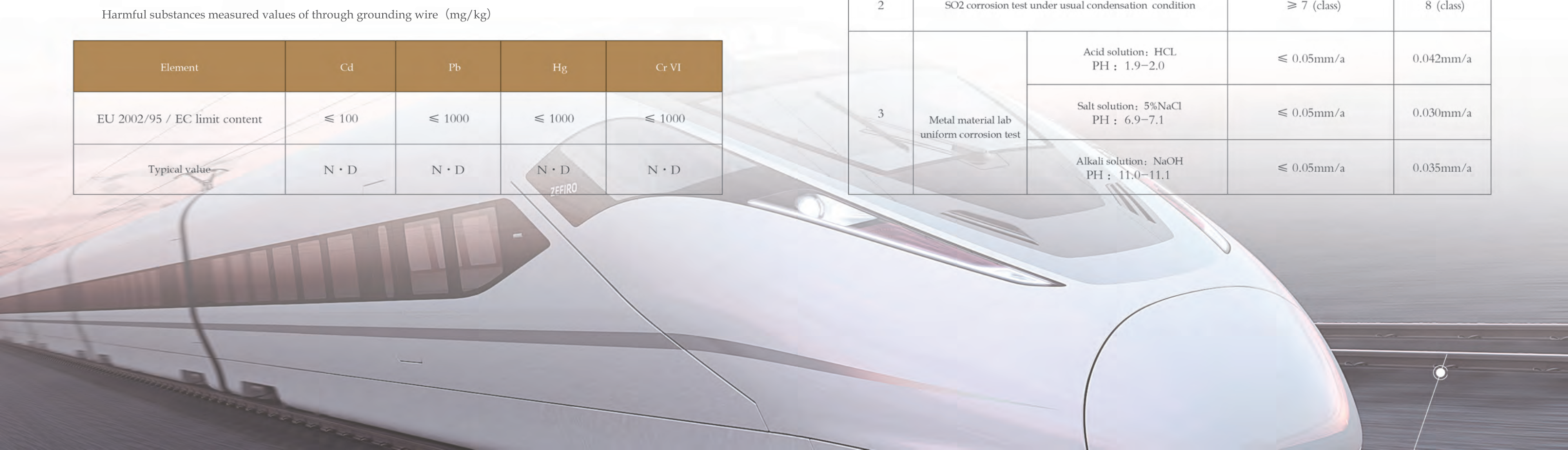
Element	Cd	Pb	Hg	Cr VI
EU 2002/95 / EC limit content	≤ 100	≤ 1000	≤ 1000	≤ 1000
Typical value	N · D	N · D	N · D	N · D

※ Material properties of anti-corrosion copper alloy sheath

Number	Item	Type	Unit	Standard value	Typical value
1	Tensile breaking force	35mm ²	KN	≥12.0	14.0
		70mm ²		≥25.0	26.0
2	Elongation at break	35mm ²	-	≥35%	40%
		70mm ²			

※ Corrosion resistance of the outer sheath of through grounding wire

Number	Item	Performance requirement	Typical value	
1	Artificial atmosphere corrosion test,salt spray test	≥ 7 (class)	8 (class)	
2	SO2 corrosion test under usual condensation condition	≥ 7 (class)	8 (class)	
3	Metal material lab uniform corrosion test	Acid solution: HCL PH : 1.9-2.0	≤ 0.05mm/a	0.042mm/a
		Salt solution: 5%NaCl PH : 6.9-7.1	≤ 0.05mm/a	0.030mm/a
		Alkali solution: NaOH PH : 11.0-11.1	≤ 0.05mm/a	0.035mm/a



ATTACHMENT OF THE THROUGH GROUNDING WIRE

The internal grounding copper of environment-friendly copper alloy sheath railway through grounding wire is stranded conductor, outer sheath is anticorrosion copper alloy sheath. Cable connection uses special pressure welding tools, moulds and fittings. It's safe, reliable, and easy.

CONNECTION TOOLS(MANUAL HYDRAULIC PLIERS, STAMPER)

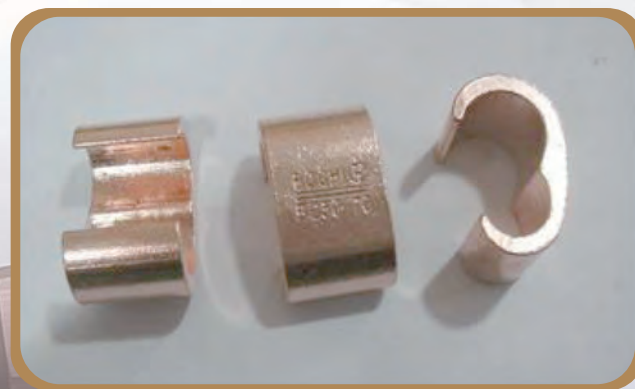


Manual hydraulic clamp

GROUNDING AND CONNECTION ATTACHMENT

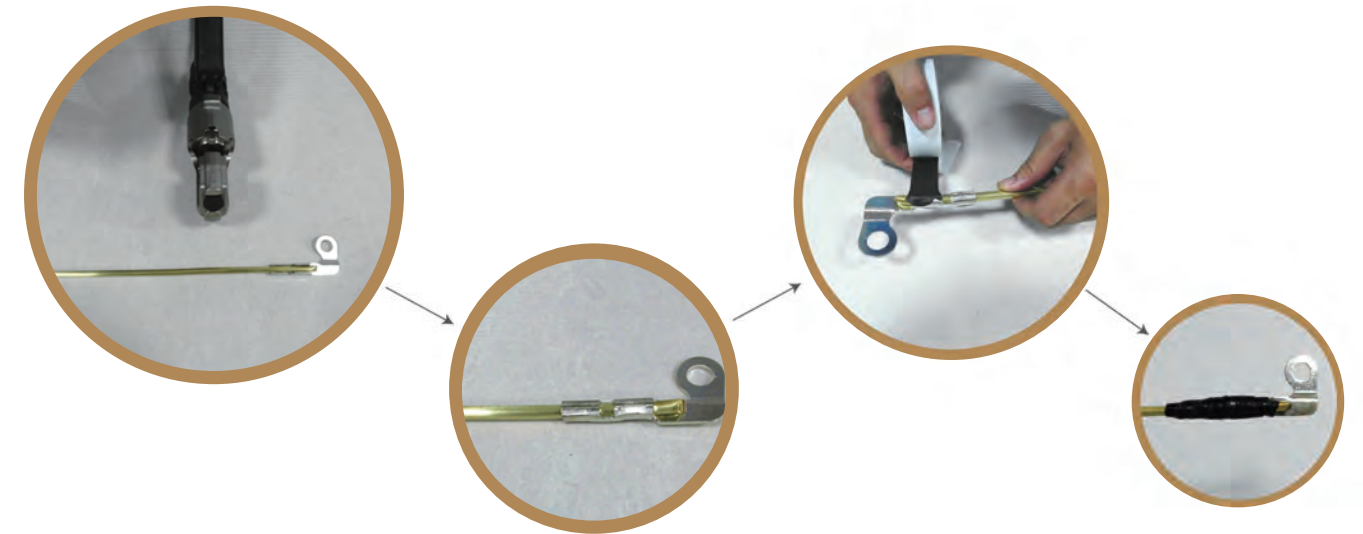


Tin plated L type copper pressure fittings



C type copper pressure fittings

CONNECTION METHOD OF L TYPE FITTINGS

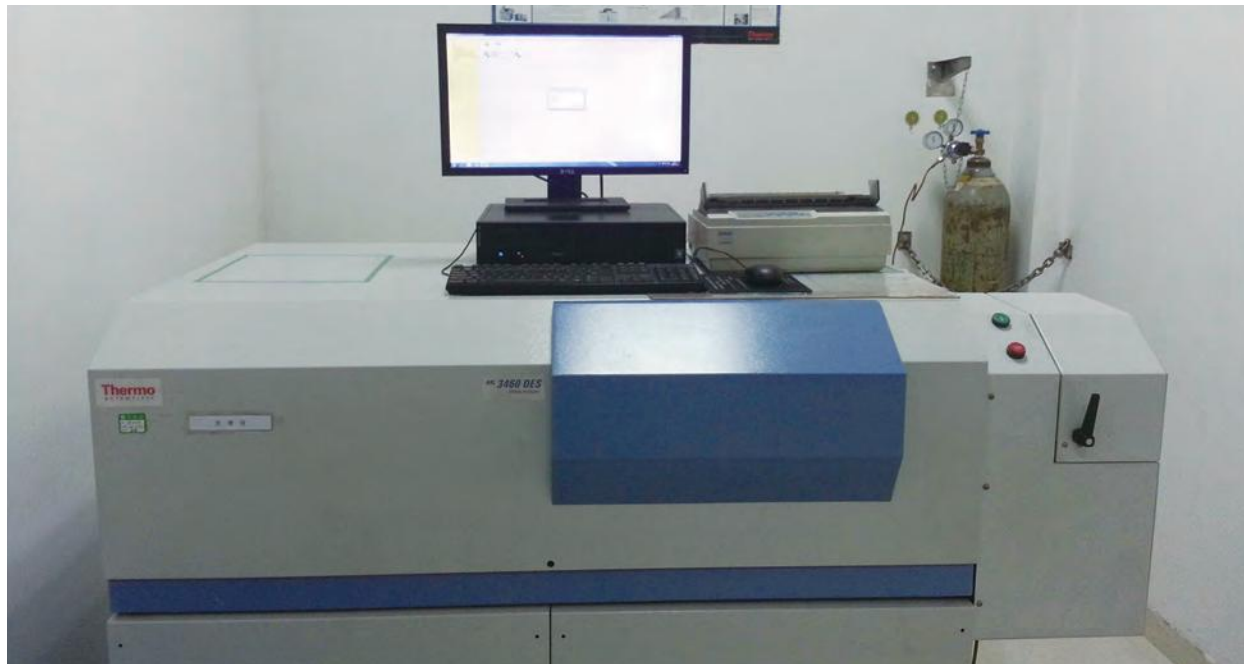


CONNECTION METHOD OF C TYPE FITTINGS



03 TEST EQUIPMENT

METAL COMPOSITION ANALYSIS



ARL Direct-reading spectrograph

MECHANICS PERFORMANCE TEST



MTS Tensile testing machine(5t)

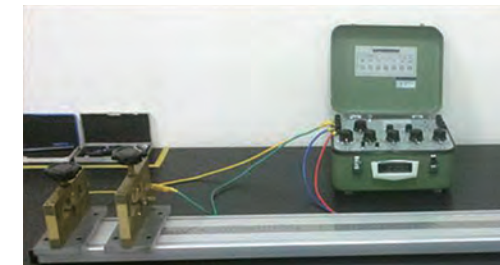


REGER Tensile testing machine (2t)

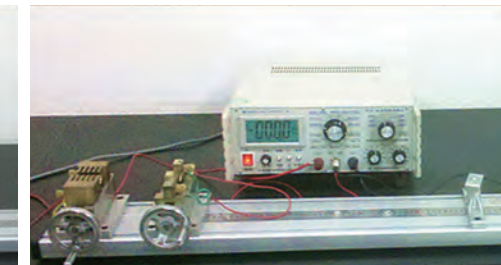


Vivtorinox hardness tester

ELECTRIC PERFORMANCE TEST



DC resistance tester

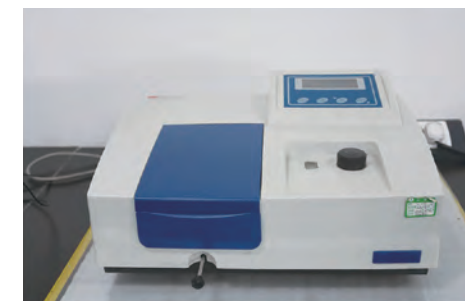


PC36 DC resistance tester



Eddy current conductivity meter

CHEMICAL ANALYSIS LABORATORY



UV-VIS Spectro Photometer



Sulfur dioxide test box



Salt fog test box



Chemical analysis of test bench

04 TEST REPORT

RAILWAY THROUGH GROUNDING WIRE



COPPER BAR



COPPER TUBE



COPPER STRIP



COPPER ROD



COPPER MONOFILAMENT

