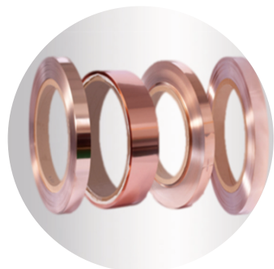


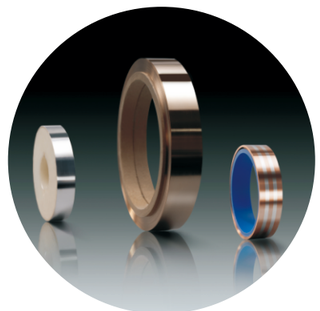
重庆川仪自动化股份有限公司金属功能材料分公司
Chongqing Chuanyi Metallic Functional Materials Branch

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国机集团 SINOMACH









重庆川仪自动化股份有限公司金属功能材料分公司

Chongqing Chuanyi Metallic Functional Materials Branch



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公司简介

重庆川仪自动化股份有限公司金属功能材料分公司始建于1966年，是由上海同仁合金厂一分为二，搬迁至重庆而创立。现有员工400多人，公司占地面积超10万平方米，建筑面积超3.8万平方米。上级公司是重庆川仪自动化股份有限公司，为主板上市公司，股票代码：603100。

本公司专业从事于金属功能材料的研究、生产和销售，拥有雄厚的技术力量和研发能力，已通过ISO 9001、ISO14001和ISO 45001体系认证。公司现拥有41项专利，其中发明专利31项。含Au多层复合材料、含稀土电接触材料和Ag/Cu贯穿复合材料完全为我司自主知识产权产品，并曾为我国运载火箭和通信卫星的成功发射做出过贡献。

本公司生产的微电子封装用材料、微马达换向器材料、金属电刷材料、熔断器材料、贴片电阻材料、分流器材料、温控器和各类开关用材料、电热合金材料、测温材料、电触头材料、电真空材料、贵金属材料、测温元件和电子元件等已广泛应用于电子电器、仪器仪表、新能源和医疗分析仪器等领域，并先后与陶瓷封装行业、微电机行业、熔断器行业、电阻电位器行业、开关保护器行业、电热管行业、测温行业、熔炼玻璃行业等领域的几十家国际国内知名企业建立了良好的合作关系。

本公司秉持“川仪在用户身边，用户在川仪心中”的宗旨，以“为社会创造效益，为用户创造价值”为理念，与顾客携手合作，共同发展，共同受益。

ABOUT US

关于我们

Chongqing Chuanyi Automation Co., Ltd. Metallic Functional Materials Branch was founded in 1966, which was divided into two parts by Shanghai Tongren Alloy factory and moved to Chongqing. Now the company has more than 400 employees. The company occupied area over 100 thousand square meters and the building area exceed 38 thousand square meters .The superior company is Chongqing Chuanyi Automation Co., Ltd., listed on the main board, stock code: 603100.

The company is specialized in the research, production and sales of metallic functional materials, with outstanding technology level and research and development capabilities. We have passed the system cerification about ISO 9001、ISO 14001 and ISO 45001. The company now has 41 patents, including 31 invention patents. The multi-layers Au contained clad metal, the Re contained electrical contact material and Ag clad Cu throughlay clad metal are completely for our independent intellectual property products, which have made a contribution to the successful launch of carrier rocket and communication satellite in China.

The microelectronics packaging materials, micro motor commutator materials, metal brush materials, fuses materials, chip resistance materials, shunt materials, temperature controller and all kinds of switch materials, resistance heating alloy materials, temperature measurement materials, electrical contact materials, electrical vacuum materials, precious metals, temperature test components, electronic components have been widely used in electronics & electrical appliances, instruments and apparatus, new energy and medical analysis instruments, etc. And having successively with the ceramic packaging industry, micro-motor industry, fuse industry, resistor potentiometer industry, switch protector industry, electric heating pipe industry, temperature test industry, melting glass industry and other fields of dozens of international and domestic well-known enterprises to establish a good cooperative relationship.

Our vision is “Chuanyi will always be there for our customer, our customer is always the core for Chuanyi”. Our business philosophy is “creating benefit for society and creating values for customers”. We will cooperate with our customers and benefit each other.

ISO 9001:2015

质量管理体系



QMS.

ISO 14001:2015

环境管理体系



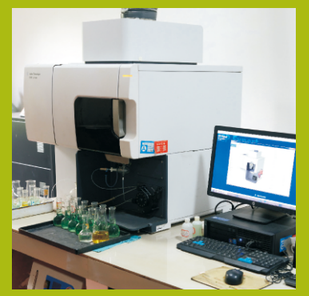
EMS.

ISO 45001:2015

职业健康安全管理体系

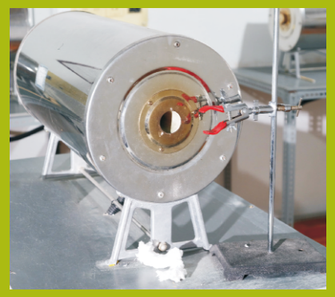


OHSMS.











历史变革
History

2021年

■ 2021年，销售收入突破6亿元。

2021 Sales revenue exceeded 600 million yuan.

2020年

■ 2020年，提升复合线产能，扩建产线至4条热复合和2条冷复合。

2020 Improving the production capacity of cladding line and accomplishing 4 heat-roll cladding line and 2 cold-roll clad line.

2018年

■ 2018年轧机改造升级，带材厚度最薄可轧制到0.015mm。

2018 Upgrading roll and rolling materials thickness min. 0.015mm.

2016年

■ 2016年，实施“镍铬电阻合金箔材”与“金银键合丝材”的国家重点研发课题。

2016 Implement the national key R&D projects of Nickel-chromium resistance alloy Foil and gold and silver bonding wire.

2015年

■ 2015年，推出贴片电阻用材料。

2015 Chip resistors materials.

2014年

■ 2014年，川仪股份上市，股票代码：603100。

2014 ChuanYi stock went public, stock code: 603100.

2010年

■ 2010年，推出含稀土的换向器材料，使马达寿命大幅度提升。

2010 Commutator materials containing rare earth elements.

2009年

■ 2009年，更名为重庆川仪自动化股份有限公司金属功能材料分公司。

2009 Name changed to Chongqing Chuanyi Automation Co., Ltd. Metallic Functional Materials Branch.

2008年

■ 2008年，研发推出微电子封装材料，主要用于晶振密封框。

2008 Microelectronic packaging materials.

2004年

■ 2004年，引进美国精轧机，冷复合轧机及德国分条机，使得产品升级。

2004 Purchased American finishing mill and cold-clad rolling mill and German slitting machine.

1999年

■ 1999年，更名为重庆川仪一厂。

1999 Name changed to Chongqing Chuanyi Factory No. 1.

1992年

■ 1992年，引进日本技术和设备建成贵金属复合材料生产线。

1992 Established precious metal clad materials line.

1975年

■ 1975年，更名为四川仪表一厂。

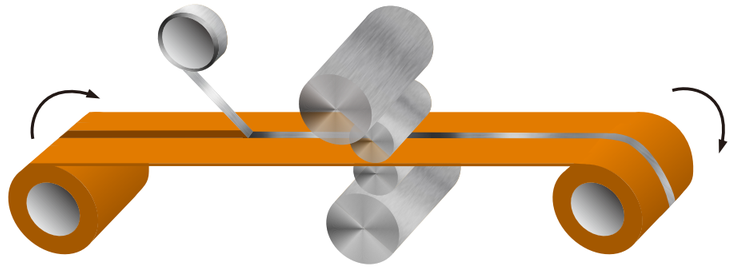
1975 Name changed to Sichuan Instrument Factory No. 1.

1966年

■ 1966年，从上海搬迁到重庆，成立花石仪表材料厂，主要生产电热合金、测温材料和贵金属制品加工。

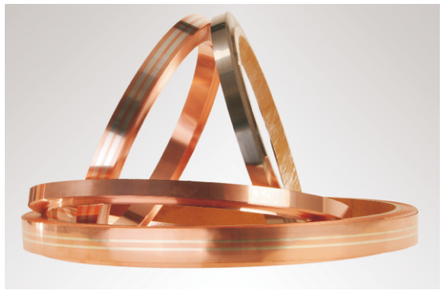
1966 Established Huashi Instrument Material Factory moved from ShangHai factory.

复合材料
Clad materials

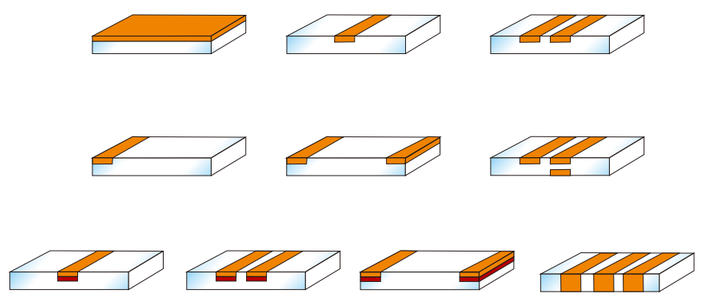


复合材料产品规格	Clad metal spec.
带材厚度/Strip thickness	0.015~1.5mm
带材宽度/Strip width	3~100mm
复层厚度/Cladding thickness	0.001~70% 带材厚度/strip thickness
复层宽度/Cladding width	1~100mm

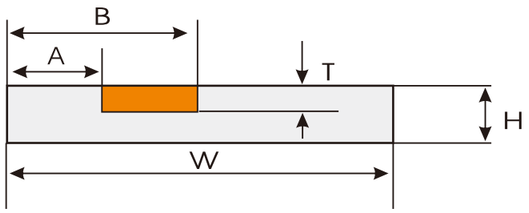




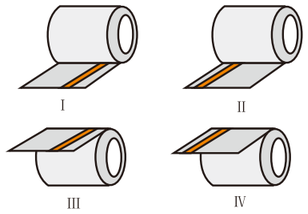
复合材料结构图
Clad metal Structure



复合定位
Bonding structure



卷曲方向
Packaging



复合材料厚度及允差（单位：mm）
Thickness and tolerance

带材厚度H Total thickness	带材厚度允差 Tolerance of total thickness	复层厚度及允差 Thickness and tolerance of clad layer	
	允差 Tolerance	复层厚度T Thickness of clad layer	允差 Tolerance
0.015≤H<0.040	±0.002	0.001≤T<70% H	+20%T - 10%T
0.040≤H<0.100	±0.003		
0.100≤H<0.300	±0.005		
0.300≤H<0.500	±0.010		
0.500≤H<0.800	±0.020		
0.800≤H<1.200	±0.035		
1.200≤H<1.500	±0.040		

注：其他规格可协商。
Note: For other specifications, please contact us for further details.

复合材料宽度及允差（单位：mm）
Width and tolerance

带材厚度 H Total thickness	带材宽度W Total width	带材宽度允差 Tolerance of width	复层宽度 Width of clad layer	复层宽度允差 Width tolerance of clad layer
0.015≤H<0.300	3≤W<100	±0.05	1.0~100.0	0~1.0
0.300≤H<0.500		±0.15		
0.500≤H<0.800	6≤W<100			
0.800≤H<1.500		±0.25		

注：其他规格可协商。
Note: For other specifications, please contact us for further details.

铁芯微马达用材料
Materials for core motors

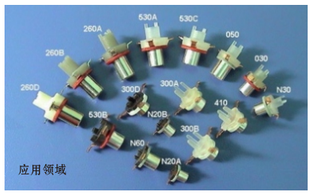
换向器用材料
贵金属部分的接触材质
AgCuNiRE、AgCuNi-2、AgCuNi-3、AuAg40/AgCuNiRE、WMD-06、WMD-07、WMD-01/WMD-06、WMD-03/WMD-07
基材：TU1, CuNi合金

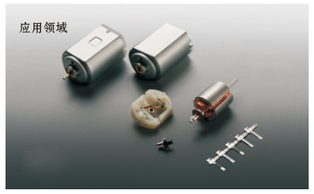
高温环境下运行稳定
优良的抗电弧烧蚀特性
优良的耐磨性
应用：各类直流微型铁芯微型马达换向器



Materials for commutator
Precious part materials: AgCuNiRE、AgCuNi-2、AgCuNi-3、AuAg40 clad AgCuNiRE、WMD-06、WMD-07、WMD-01 clad WMD-06、WMD-03 clad WMD-07
Base materials：C1020, CuNi alloy strip

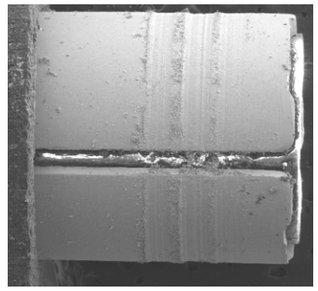
Stable operation under high temperature environment
Excellent resistance to arc ablation
Good wear resistance
Application: all kinds of micro-motors commutators.

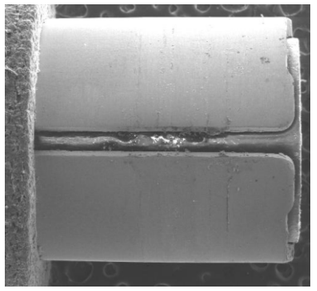




换向器磨损形貌（同样机种、同样运行条件下）
Wearing appearance of commutator (same motor type under the same working condition)

稀土系贵金属复合材料与同类型的复合材料相比，磨损更轻微，磨屑聚集短路死机的几率更低。
Re series precious clad metal have slighter wearing and lower short-circuit probability comparing with traditional clad metal.


AgCuNi/TU1材料


AgCuNiRE/TU1材料

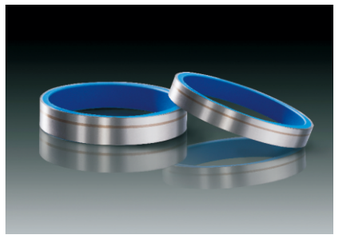
电刷/超薄电刷用材料　　Materials for Brush & Super thin brush

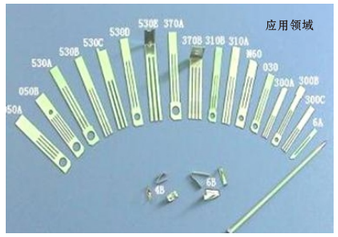
贵金属部分的接触材质/Precious part materials：
AgPd30、AgPd50、AP-2、AP-3、APZC、APNC
基材/Base materials: C7701、MX96、MX215
光带/Alloy strip：C7701（BZn18-26）、MX96、MX215

抗电弧烧损、耐磨性好	Arc burning resistance, good wear resistance
抑制火花的产生	Inhibit spark production
提高电机使用寿命	Improve the service life of the motor
超薄电刷厚度≤0.05mm	Thickness of super thin brushes strips≤0.05mm

应用：各类微型马达（如手机、航模、玩具用）电刷材料







空心杯马达用材料　　Coreless motor material

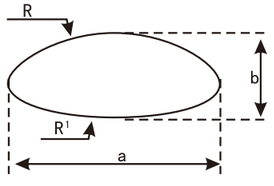
异形复合丝
异形贵金属丝
低的接触电阻，电接触稳定性好

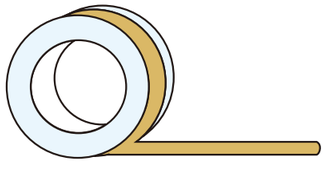
Profiled clad wire: **AgCuNiRE/TU1**
Profiled precious metal wire：**AgCuNi4、AgCuNiRE**
With low contact electric resistance and good contact stability

应用：各类微型马达换向器材料，如三极、五极换向器材料。

Application: all kinds of commutator materials used for micro-motors, such as three-pole or five-pole commutator materials.







微电子用材料
Materials for microelectronics

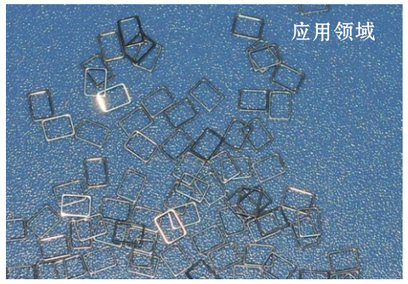
晶振密封框用复合带材

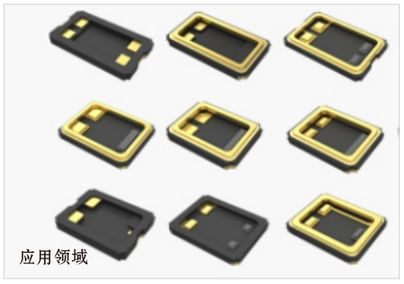
AgCu15/4J29　AgCu28/4J29
焊料层和可伐层
降低成本，提高自动化程度
应用：广泛应用于封装领域，如晶振器密封框



Clad metal for crystal oscillator seal frame

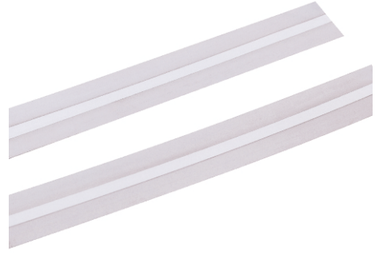
AgCu15 clad kovar　AgCu28 clad kovar
Solder layer and Kovar layer.
Reduce costs and increase automation.
Application: widely used in packaging field, such as seal frame of crystal oscillator.





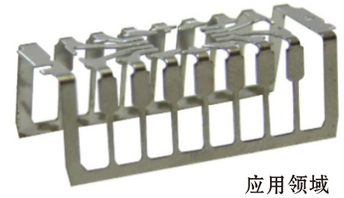
引线框架用材料

Al/4J42(4J29)　Al/C1020(C19400)
Cu/4J42(4J29)　AgCu/4J42(4J29)
可解决焊料片对位困难
满足自动化生产的需要
导电性、导热性好，耐热性、耐蚀性优异
应用：晶体管和集成电路用的引线框架



Materials for lead frame

Al clad 42 Alloy(Kovar)　Al cald C1020(KFC)
Cu clad 42 Alloy(Kovar)　AgCu alloy clad 42 Alloy(Kovar)
Can solve the solder sheet alignment difficulties.
Meet the needs of automatic production.
Good electrical and thermal conductivity, excellent heat resistance and corrosion resistance.
Application: lead frame materials for transistors and IC



应用领域

晶振盖板及壳体用复合材料

AgCu15(28)/Cu/Ni/4J29/Ni

AgCu15(28)/Ni/4J29/Ni

4J29/Tu1, Tu1/4J29, 4J29/Tu1/4J29

多层复合结构

设计有应力平衡层及缓冲层，保证封装气密性

适应于晶振微型化，扁平化的应用需求

应用：晶振盖板及外壳



应用领域

Clad metal for Crystal oscillator lids and Shell

AgCu15(28)/Cu/Ni/4J29/Ni AgCu15(28)/Ni/4J29/Ni

Kovar clad C1020, C1020 clad Kovar, Kovar clad C1020 clad Kovar

Multilayer clad structure

There are the stress balance layer and the buffer layer of the design to ensure the hermetic sealing.Suitable for miniaturization and flattening of crystal oscillator.

Application: crystal oscillator lids and shell



应用领域

高强度高导材料

铍铜、CuNi9Sn6、CuNi21Sn5、C7025

最薄可达0.015mm，尺寸精度高。

满足消费电子扁平化、微型化的设计要求及最为严苛的性能要求及工作条件。

应用：微马达电刷、音圈马达弹簧（VCM）、光学影像稳定器（OIS）、电磁屏蔽垫片等

High strength and high conductivity alloy strip

C1720、CuNi9Sn6、CuNi21Sn5、C7025

Min. thickness 0.015 mm, high dimensional accuracy

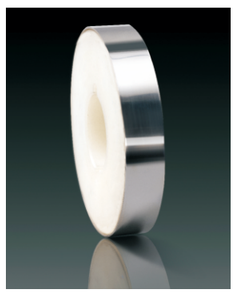
Meet the flat and miniaturized design requirements of consumer electronics

Meet the most stringent performance requirements and working conditions

Application: micro-motor brush, voice coil motor spring (VCM), optical image stabilizer (OIS), electromagnetic shielding gasket and other application scenarios.







焊接材料

◆镍基焊条芯材料: NiFe45、NiCu31、N6

◆高温镍基焊接材料: Inconel I 600 (NS312)、Inconel I 601 (NS313)、Inconel I 625 (NS336)、ENiCrMo-6

◆银基钎焊料: B-Ag72Cu、B-Ag94Al、B-Ag72CuLi、B- Ag72CuNiLi、B-Ag25CuZn、B-Ag60CuSn、B-Ag35CuZnCd、B-Ag34CuZnSn、B-Ag49CuZnMnNi、B-Ag40CuZnIn、B-Ag49CuZnMnNi/Cu/B-Ag49CuZnMnNi等

形状：丝材、带材、复合带材

应用：电子管、真空器件和电子元件的钎焊

Welding materials

◆Ni-base cored solder materials: NiFe45、NiCu31、Ni200

◆High temperature Ni-base welding materials: Inconel I 600 (NS312)、Inconel I 601 (NS313)、Inconel I 625 (NS336)、ENiCrMo-6

◆Ag-base brazing materials: Ag72Cu、B-Ag94Al、B-Ag72CuLi、B- Ag72CuNiLi、B-Ag25CuZn、B-Ag60CuSn、B-Ag35CuZnCd、B-Ag34CuZnSn、B-Ag49CuZnMnNi、B-Ag40CuZnIn、B-Ag49CuZnMnNi clad Cu clad B-Ag49CuZnMnNi

Shape: wire, strip, clad metal

Application: electronic tubes, vacuum devices and electronic components

IGBT 大功率模块引线框架用复合带材

Al/Cu、Cu/Al

可靠的复合界面及IMC，实现Cu-Al界面有效可靠接合

确保Bonding时铝线的打线牢度

引线框架设计更紧凑，简化总线

可实现更紧凑的模块设计

应用：新能源汽车、轨道交通、电力电子行业用绝缘栅双极晶体管（IGBT）模块封装

Clad metal for lead frame of IGBT high power module

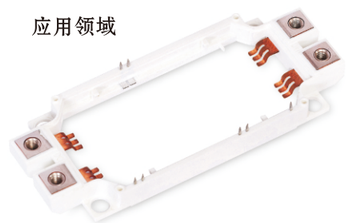
Al clad Cu、Cu clad Al

Getting reliable cladding interface and IMC, effective bond between Cu interface and Al interface. Accomplishing good wire bonding via aluminum wire.

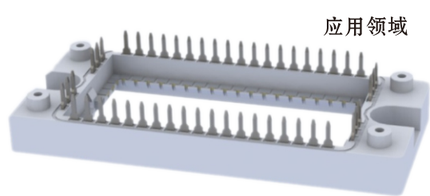
More compact lead frame design and more simplified bus.

More compact module design.

Application: new energy vehicles, rail transit, electric power and electronic industry used for IGBT module packaging.



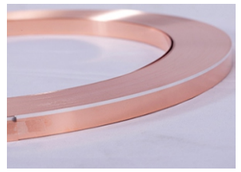
应用领域



应用领域

温控器和各类开关用材料
Thermostat and switch materials

种类多样性　Species diversity
环保型材料　Environment friendly materials
个性化定制　Customization
形状：带材/方形丝　Shape：clad strip/square wire

应用：工业、家用电机和电器设备中的热保护器元件
Application: mainly used for protector components in industrial, household devices and electrical equipments







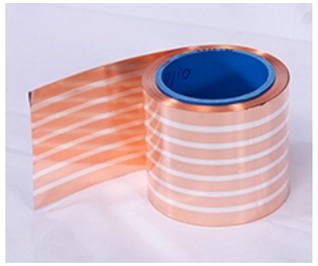
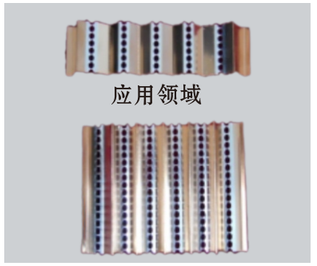
基带/Base strip ＼ 复层/Clad layer		Ag	细晶银 Fine-grain silver AgNi0.15	Au/Ag	$AgSnO_2$	AgNi10 AgNi10-T AgNi15	ASCM
铜系Copper series	TU1(C1020) TU2(C1011)	◉	◉	◉	◉	◉	◉
锡磷青铜系 Tin Phosphor bronze series	QSn6.5-0.1 (C5191) QSn8-0.3 (C5210)	◉	◉		◉	◉	◉
黄铜系 Bronze Series	H62(C2800)、H65(C2700)、H68(C2680)	◉	◉		◉	◉	◉
锌白铜系 White copper series	BZn15-20 (C7541) BZn18-26 (C7701)	◉				◉	◉
铁系 Ferrum series	Cu/Fe (Cu clad Fe)	◉	◉		◉	◉	
铜镍合金 Copper nickel series	CuNi20					◉	◉

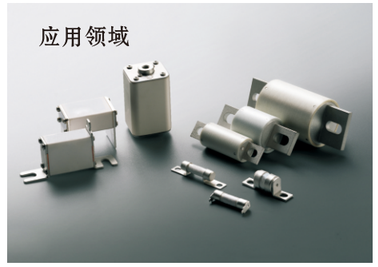
注：其他规格可协商。
Note: For other specifications, please contact us for further details.

熔断器用熔体材料
Melt materials for fuse

Ag/Cu、纯银带、纯铜带
Ag/Cu可最大限度地减少所需的贵金属数量，降低成本
充分发挥金属银与铜的导电性，具有良好的限流和分断作用
电阻率低而稳定，产品一致性好
应用：主要用于新能源汽车、新能源风光发电及储能、通信、轨道交通和电力等行业。

Ag clad Cu (throughlay), pure silver strip, pure copper strip
Minimising the amount of precious metal needed and reducing cost when compared with soild silver used in fuse industry.
Give full play to the silver and copper conductivity, with good current limiting and breaking effect.
Low resistivity and stability, good product consistency.
Application: mainly used for new energy automotive, new energy power generation and energy storage, communications, rail transit, electric power and other industries.



材质/Material ＼ 性能/Property	结构 Structure	20℃电阻率 (μΩ·m) Resistivity	状态 State	硬度（HV） Vickers hardness	带材厚度及允差(mm) Thickness and tolerance		带材宽度及允差(mm) Width and tolerance	
					厚度 Thickness	允差 Tolerance	宽度 Width	允差 Tolerance
Ag	光带Pure Silver strip	16.2	Y2	50-75	0.07~0.3	±0.005	1~100	±0.05~±0.1
			Y	80-100	0.02~0.3			
Cu	光带Pure Copper strip	17.2	Y2	70-90	0.07~0.3	±0.005	1~100	±0.05~±0.1
			Y	100-120	0.02~0.3			
Ag/Cu	贯穿复 Throughlay	—	Y2	Ag:50-75 Cu:70-90	0.07~0.3	±0.005	20~100	±0.05~±0.1
Ag/Cu	贯穿复 Throughlay	—	Y	Ag:80-100 Cu:100-120	0.04~0.3	±0.005	20~100	±0.05~±0.1

电池用材料
Materials for batteries



极耳材料

Al/Cu, Cu/Al 侧面复、镶嵌复、面复

可靠的复合界面，连接强度高，疲劳性能好。

实现Cu-Al界面最低的电阻，从而降低PACK内阻及发热量。

可简化总线设计，Pack模块设计更紧凑，可实现更紧凑的模块设计及整车的轻量化。

应用：汽车行业，如锂电池极耳材料、电池包铜铝复合连接片、汽车电子组件等。

Electrode lug material

Al clad Cu, Cu clad Al Edgelay,Inlay,Onlay

Reliable cladding interface, high connection intensity, good fatigue resistance.

The lowest resistance at the Cu-Al interface can reduce the internal resistance and heat in the battery PACK.

More simplified bus design and more compact PACK module design can realize lightweight vehicle.

Application: Automobile industry, such as electrode lug material of lithium battery, Cu to Al clad connector for battery pack, and automotive electronic components.

PTC热敏电阻

NiFe系列正温度系数合金带材

灵敏度高，电阻温度系数大

工作温度范围宽

稳定性好、过载能力强

PTC thermistor

Positive temperature coefficient (NiFe series)

Great sensitivity and high TCR

Wide operating temperature range

Good stability and overload capacity

软连接



◆导电连接材料：超纯银箔、4J29箔材及其多层复合箔材

尺寸精度高、物理性能均匀稳定、耐原子氧侵蚀。

应用：LEO空间环境应用

◆电连接带材：Ag/Cu、Al/Cu

连接可靠，长期稳定性好。

应用：输配电、新能源、轨道交通、通讯、军工等行业



Flexible connection

◆Conductive bonding materials:
pure silver foil, kovar foil and their multilayer clad foil

High accuracy, uniform and stable physical properties, atomic oxygen corrosion resistance.

Application: LEO space environment

◆Electrical connection strip: Ag clad Cu、Al clad Cu

Reliable connection and good stability.

Application: power industry, new energy, rail transit, communications industry and military industry.

其他复合材料
Other clad metals

继电器用材料

QSn/DT4E、Cu/Fe

复层厚度可控

Cu层和QSn层可充当去剩磁气隙

产品一致性好，可满足自动化生产的需要

应用：信号继电器领域

Clad metal for Relay

C5191 clad DT4E、Cu clad Fe

Controllable thickness of clad layer

Cu layer and QSn layer could act as the deremanent magnetic air gap.

Good consistency, meeting the needs of automatic production.

Application: signal relay fields.





应用领域

电路板、手机中板和支撑架用复合材料
Clad metal for circuit board, mobile phone middle board and bracket

316L/Cu，Cu/316L，316L/Cu/316L，Cu/Fe/Cu

良好的散热性和支撑强度　　Good heat dissipation and support strength

复层厚度与比例可定制化　　Customization for cladding thickness and thickness radio

应用：电路板蚀刻，手机中板，断路器和开关的电器支撑架等产品

Applications: circuit board etching, mobile phone middle board, electrical bracket used for circuit breaker and switch , etc

微型电池及电池内引线用复合材料
Clad metal for mini cell and batteries internal lead

Cu/OCr18Ni9、Ni/OCr18Ni9、Ni/Cu、Ni/Cu/Ni

镍或铜层可满足耐蚀性、导电性、强度和深冲引伸性的要求

Ni or Cu layer can possess the feature of corrosion, conductivity, strength and deep stamp possibility.

应用：小型电子装置、照相机、电子计算器和相关电子产品的微型电池外壳以及电池内引线。

Application: used for the shell of mini cell installed in mini electronic devices, camera, electron calculators,and internal lead for batteries.

电子封装及热沉材料
Electronic packaging and heat sink materials

Cu/FeNi36/Cu　　Cu/4J36/Cu

拥有良好的热传导性和低膨胀系数，可替代金属钼和钨

Having good thermal conductivity and low expansion coefficient, replacing metal Mo and W.

应用：大规模集成电路和大功率微波器件等行业。

Application: mainly used for Large-scale IC, high power microwave devices and other industries.

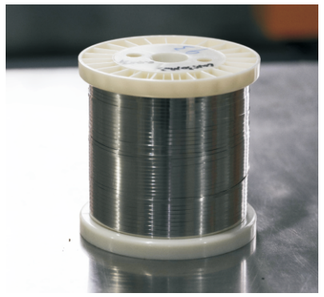
精密合金带材、扁线（带）、丝材
Precision alloy materials



带材
Strip

厚度/Thickness:
0.015～3.0mm

宽度/Width:
10～200mm



扁线（带）
Ribbon

厚度/Thickness:
0.10～3.0mm

宽度/Width:
1.27～10mm



丝材
Wire

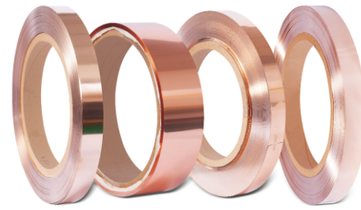
直径/Diameter:
≥Φ0.03mm

厚度H（mm） Thickness	厚度允许偏差（mm） Tolerance of thickness	同卷厚度一致性（mm） CPK of thickness	宽度W允许偏差（mm） Tolerance of width		
			5.00≤W≤30.00	30.00＜W≤100.00	100.00＜W
0.020≤H＜0.100	±0.008	±0.004	±0.20	±0.30	±0.50
0.100≤H＜0.200	±0.015	±0.006			
0.200≤H＜0.500	±0.020	±0.010			
0.500≤H＜0.900	±0.020	±0.010			
0.900≤H＜1.300	±0.020	±0.010	±0.20	±0.30	±0.50
1.300≤H＜1.800	±0.025	±0.012			
1.800≤H＜2.500	±0.030	±0.015			
2.500≤H＜4.000	±0.040	±0.020			

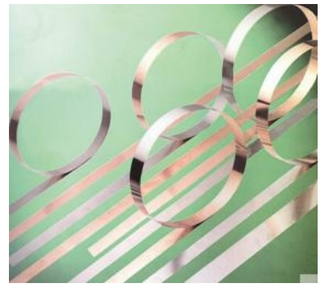
注：其他规格可协商。
Note: For other specifications, please contact us for further details.

精密电阻合金材料
Precision resistance alloy materials

电阻率范围：0.13μΩ•m~1.35μΩ•m
拥有多种电阻率、平均电阻温度系数及其组合，可选择范围广。
◆锰铜系精密电阻合金：电阻温度系数低，对铜热电动势率小。
◆镍基精密电阻合金：可达1.3μΩ• m的高电阻率；
电阻温度系数小，呈线性分布；
耐热性能，耐腐蚀性能好。
◆应用：适用于制作各种标准电阻器、分流器，固定片式电阻器。
精密电阻合金材料选型表见附件1。



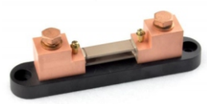
Resistivity ranges from 0.13μΩ•m~ 1.35μΩ•m.
Owning a variety of resistivity, average TCR and their combination.
Having a wide range and combination.
◆Manganin precision resistance alloys have the characteristics of low TCR and low average thermal EMF vs copper.
◆Nickel-based precision resistance alloys possess high resistivity up to 1.3μΩ•m.
Small and linear TCR.
Good heat resistance and corrosion resistance.
◆Application: Suitable for making all kinds of standard resistors, shunt and fixed chip resistors.
The data sheet of precision resistance alloy materials see table 1.

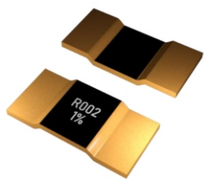






应用领域





精密电阻合金材料选型表 The data sheet of precision resistance alloy materials

名称 Name	牌号 Grade	电阻率 Resistivity μΩ·m	适用温度 Temperature range ℃	测试温度 Test temperature ℃	平均电阻温度系数 Average TCR a×10-6/℃	特殊要求 Special requirements a×10-6/℃	对铜平均热电动势率 Average thermal EMF versus copper（≤） μv/℃	近似熔点 Approximate Melting point ℃	密度 Density g/cm³
铜锰3	CuMn3	0.13±0.03	0~120	20、120	260~400	—	1	1050	8.9
铜锰锡合金	CuMn7Sn	0.29±0.03	10~70	20、60	-10~+10	-5~+5	1	1000	8.5
F1锰铜合金	6J8	0.37±0.04	0~120	20、60	-20~+20	-10~+10	2	970	8.5
F2锰铜合金 Manganese copper alloy	6J13(M)	0.44±0.04	0~120	20、60	-20~+20	-20~+20	2	960	8.4
	MT	0.44±0.04	0~120	20、120	-20~+20	-20~+20	2	960	8.4
	MN	0.44±0.04	0~120	20、120	-30~-70	-30~-60	2	960	8.4
	MF	0.5±0.04	0~120	20、120	-50~-100	-60~-100	2	960	8.4
锰铜合金/Manganin	6J12	0.47±0.03	10~60	10、50	-20~+20	-10~+10	1	960	8.4
康铜合金/Constantan	6J40	0.48±0.03	0~120	20、120	-40~+40	-20~+20	45	1280	8.9
铜镍44合金	CuNi44	0.49±0.04	0~120	20、120	-80~0	—	40	1290	8.9
铜锰镍合金 Cu-Mn-Ni Alloy	MH	0.90±0.05	0~60	20、50	-20~+20	—	0.5	940	8
卡玛/Kamar	6J22	1.35±0.05	0~300	20、120	-20~+20	-5~+5	1	1400	8.07
伊文/Evanohm	6J23	1.33±0.05	0~300	20、120	-20~+20	-5~+5	1	1400	8.07
—	6J24	1.33±0.05	0~300	20、120	-20~+20	-5~+5	1	1400	8.07

注：其他需求可协商定制。
Note: Other requirements can be negotiated and customized.

锰铜合金

CuMn3、CuMn7Sn、6J8、6J13、MT、MN、MF、6J12、MH

从低到高的电阻率，电阻率范围：0.13~0.9μΩ.m

可定制的电阻温度系数

可选择的测量温度范围：-55 ~ 150℃

长期负载稳定性好

Manganin alloy

CuMn3、CuMn7Sn、6J8、6J13、MT、MN、MF、6J12、MH

Resistivity ranges from low to high: 0.13~0.9 μΩ.m

Tailored TCR

Optional test temperature range：-55℃ ~ 150℃

Good long-term load stability

镍铬系合金

6J20、6J22、6J23、6J24

高电阻率

可定制的电阻温度系数

电阻温度系数精度最高为±5ppm/℃

耐高温环境

长期负载稳定性好

NiCr series alloy

Cr80Ni20、Kamar、Evanohm、6J24

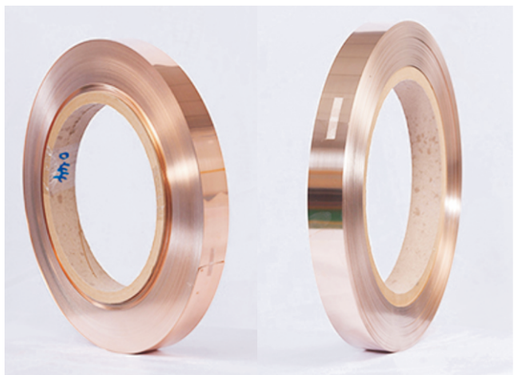
High resistivity

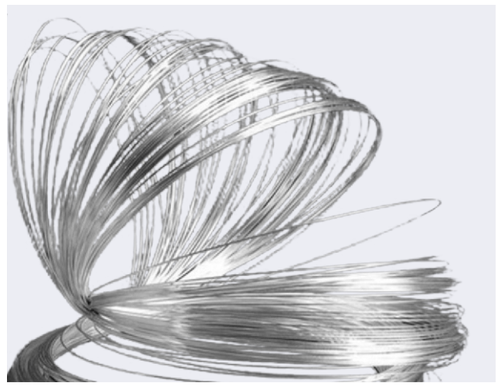
Tailored TCR

Highest accuracy of TCR: ±5ppm/℃

Good stability in high temperature environment

Good long-term load stability





电热合金材料
Resistance heating alloy materials

良好的耐高温抗氧化性能
良好的抗介质腐蚀性能
电导率、电阻温度系数和电阻率稳定
产品加工成形性良好，使用寿命长
电热合金材料选型表见附件2。

Good high temperature resistance and oxidation resistance
Good corrosion resistance of medium
Stable conductivity, TCR and resistivity
Good formability and long life
The data sheet see table 2.

◆Ni-Cu型低电阻发热合金：
镍含量从1%～44%。这类合金适用于中低温发热，无磁性。
应用：主要用于家用或汽车型等中低温发热。

◆Ni-Cu type low resistance heating alloy:
Ni element content ranges from 1% to 44%.
Suitable for medium and low temperature heating and no magnetism.
Application: mainly used for medium and low temperature heating, such as household or automobile type.

◆Ni-Cr-（Fe）型电热合金：
这类合金以镍或铁为基体，一般含Cr15～31%，含Ni29～80%。
良好的高温抗氧化性能和抗介质腐蚀性能，稳定的电阻率和电阻温度系数。
应用：适用于各种高温加热环境，如家用电器、工业炉窑等。

◆Ni-Cr-(Fe) type resistance heating alloy:
Useing Ni or Fe as the matrix, generally containing Cr15 ~ 31%, containing Ni29 ~ 80%.
Good high temperature oxidation resistance and corrosion resistance of medium, stable resistivity and TCR.
Application: mainly used for high temperature heating, such as household appliances and industrial furnaces.





镍铬合金
Cr20Ni80、Cr30Ni70
使用温度高，高温强度好
高温抗氧化性能好
抗介质腐蚀性能好

NiCr alloy
Cr20Ni80、Cr30Ni70
High temperature and strength
Good oxidation resistance under high temperature
Good corrosion resistance

镍铬铁合金
Cr15Ni60、Cr20Ni30、Cr20Ni35
稳定的电阻率和电阻温度系数
高温抗氧化性能好
抗介质腐蚀性能好

NiCrFe alloy
Cr15Ni60、Cr20Ni30、Cr20Ni35
Stable resistivity and TCR
Good oxidation resistance under high temperature
Good corrosion resistance

铜镍合金（NC合金）
CuNi1、CuNi2、CuNi6、CuNi10、CuNi14、CuNi23、CuNi44
使用温度低，无磁性
适用于低温发热元件

CuNi alloy
CuNi1、CuNi2、CuNi6、CuNi10、CuNi14、CuNi23、CuNi44
Low application temperature, non-magnetic
Suitable for low temperature heating element

应用领域







测温材料
Thermocouple materials

热电势稳定性好，产品精度高
温度范围覆盖-50℃~ +1700℃
符合正常国标一级标准，亦可定制
测温材料选型表见附件3。

Stable thermoelectric potential and high accuracy
-50 ~ +1700℃
Standards:Chinese National standard (I class). Customization.
The data sheet of thermocouple materials see table 3.

高温测温材料（贵金属）
High temperature thermocouple material (precious metal)

常用工业贵金属热电偶是铂铑偶丝热电偶，热电偶型号有B型（PtRh6-PtRh30）、S型（Pt-PtRh10）、R型（Pt-PtRh13）。

铂铑丝在热电偶系列中具有准确度最高，稳定性最好，测温温区宽，使用寿命长，测温上限高等优点。适用于氧化性和惰性气氛中，也可短期用于真空中，但不适用于还原性气氛或含有金属或非金属蒸气气氛中。

铂铑丝加工性能良好，0.1mm以下丝材用作快速测温热电偶，广泛用于金属熔炼厂。



Platinum rhodium thermocouple wire is a popular materials in industrial fields, which iniclude thermocouple type B(PtRh6-PtRh30),type S(Pt-PtRh10), type R(Pt-PtRh13).

Platinum rhodium wire has the highest accuracy, stability, wide temperature range, long relibality life, Max. temperature high in thermocouple series. Suitable for oxidizing and inert atmospheres.

Platinum rhodium wire has good processing performance. Diameter under 0.1mm is used for fast measure temperature in steel factory.



应用领域

附件2 / Table 2

电热合金材料选型表

The data sheet of resistance heating alloy materials

名称 Name	合金牌号 Grade	熔点 Melting Point (approximate) ℃	最高使用温度 Maximum Service Temperature ℃	密度 Density g/cm³	电阻率 Resistivity μΩ·m	比热容 Specific Heat Capacity J/(g·k)	导热系数 Thermal Conductivity W/(m·k)	平均线膨胀系数 Average Coefficient Of Linear Expansion 10^{-6}/K	抗拉强度 Tensile Strength Mpa	延伸率 Ductility %
铜镍1	NC003/CuNi1	1085	200	8.9	0.03	0.38	145	17.5	210	18
铜镍2	NC005/CuNi2	1090	200	8.9	0.05	0.38	130	17.5	220	18
铜镍6	NC010/CuNi6	1095	220	8.9	0.1	0.38	92	17.5	250	18
铜镍8	NC012/CuNi8	1097	250	8.9	0.12	0.38	75	17.5	270	18
铜镍10	NC015/CuNi10	1100	250	8.9	0.15	0.38	59	17.5	290	20
铜镍14.2	NC020/CuNi14.2	1115	300	8.9	0.2	0.38	48	17.5	310	20
铜镍20	NC025/CuNi20	1135	300	8.9	0.25	0.38	38	17.5	340	20
铜镍23	NC030/CuNi23	1150	300	8.9	0.3	0.38	33	17.5	350	20
铜镍30	NC035/CuNi30	1170	350	8.9	0.35	0.39	27	17	400	20
铜镍35	NC040/CuNi35	1180	350	8.9	0.4	0.4	25	16	400	20
铜镍44	NC050/CuNi44	1280	400	8.9	0.5	0.41	23	15	420	20
镍铬8020	Cr20Ni80	1400	1200	8.4	1.09	0.46	15	18	650	25
镍铬7030	Cr30Ni70	1380	1250	8.1	1.18	0.46	14	17	650	25
镍铬6015	Cr15Ni60	1390	1150	8.2	1.12	0.46	13	17	600	25
镍铬3520	Cr20Ni35	1390	1100	7.9	1.04	0.5	13	19	600	25
镍铬3020	Cr20Ni30	1390	1100	7.9	1.04	0.5	13	19	600	25

注：其他需求可协商定制。
Note: Other requirements can be negotiated and customized.

测温材料选型表 Thermocouple materials data sheet

热电偶型号 Thermocouple Type	分度号 Graduation	等级 Class	温度上限 Upper Temp. Limit		温度范围 Temp. Range	常规国标要求允差 Tolerance Of Conventional National Standards Require				备注 Notes
			长期使用 Long-term service	短期使用 Short-term service		400℃	600℃	800℃	1000℃	
镍铬—镍硅/镍铝 NiCr—NiSi/NiAl	K	Ⅰ	700~1200 ℃	800~1300 ℃	-50~1100	±1.6℃	±2.4℃	±3.2℃	±4.0℃	特殊要求：-50—1000℃可达到±1.1℃ Special requirements（-50-1000℃ ）can reach ±1.1℃
		Ⅱ			-50~1300	±3.0℃	±4.5℃	±6.0℃	±7.5℃	
镍铬硅—镍硅镁 NiCrSi—NiSiMg	N	Ⅰ	700~1200 ℃	800~1300 ℃	-50~1100	±1.6℃	±2.4℃	±3.2℃	±4.0℃	具有良好的热电势准确性及寿命 Good thermoelectric accuracy and application life.
		Ⅱ			-50~1300	±3.0℃	±4.5℃	±6.0℃	±7.5℃	
铂铑 10-铂 RtRh10-Pt	S	Ⅰ	1400℃	1600℃	0~1100	±0.6℃	±0.6℃	±0.8℃	±1.0℃	标准偶丝直径：0.5mm Standard thermocouple wire diameter: 0.5mm
					1100~1600	±1.2℃	±1.3℃	±1.5℃	±1.6℃	
		Ⅱ			0~600	±1.5℃	±1.5℃	±2.0℃	±2.5℃	
					600~1600	±3.0℃	±3.5℃	±3.7℃	±4.0℃	
铂铑 13-铂 RtRh13-Pt	R	Ⅰ	1400℃	1600℃	0~1100	±0.6℃	±0.6℃	±0.8℃	±1.0℃	
					1100~1600	±1.3℃	±1.4℃	±1.5℃	±1.6℃	
		Ⅱ			0~600	±1.5℃	±1.5℃	±2.0℃	±2.5℃	
					600~1600	±3.0℃	±3.5℃	±3.8℃	±4.0℃	
铂铑 30-铂铑 6 RtRh30-RtRh6	B	Ⅱ	1600℃	1700℃	600~1700	±2.5℃	±3.2℃	±3.7℃	±4.3℃	
		Ⅲ			600~800	——	±4.0℃	±4.1℃	±5.0℃	
					800~1700	±5.5℃	±6.5℃	±7.5℃	±8.5℃	

注/Note：1、不同直径的偶丝有不同的使用温度上限。 Thermocouple wires with different diameters have different upper limits of operating temperature.
2、其他需求可协商定制。 Other requirements can be negotiated and customized.

中低温测温材料（廉金属）
Medium and low temperature measuring materials (inexpensive metal)

K型偶丝可有效的调控线性，各温度点控制在±1.1℃，满足航空航天用标准。N型偶丝经过多年经验累积，其寿命超过市面上大部分偶丝，在兼顾了热电势准确性、精度的同时，也保证了使用寿命。

川仪生产高温快速偶丝，即定碳杯使用偶丝，主要使用温度为1100~1200℃。

应用于钢铁熔炼和铸造行业；φ0.5mm及以上可定制。具有良好的准确性及数据一致性。



Type K thermocouple wire can effectively control the linear and the temperature point is controlled in 1.1℃, which can meet the aerospace standard.

Type N thermocouple wire have great life. Not only are the accuracy and precision of thermoelectric potential taken into account, but also the life of Type N thermocouple wire is guaranteed.

Type K thermocouple wire for quick-carbon: high accuracy and data consistency

Main use temperature: 1100~1200℃. Accept customization: ≥ φ0.5mm

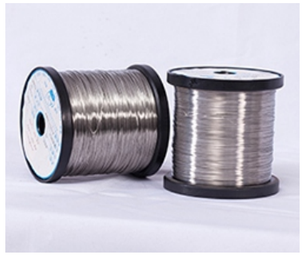
Application: steel smelting and foundry industry.





应用领域

其他合金材料
Other alloy materials





电光源用材料

纯镍、镍锰2、镍锰5、镍铁
优良的导电性、可焊性、可电镀性
合适的线膨胀系数
加工性能好，抗腐蚀能力强
应用：阳极、隔片、电极支架、灯丝引线和保险丝等

Materials for electric light

N4(Ni200)、N6(Ni201)、NiMn2、NiMn5、NiFe alloy
Excellent electrical conductivity, weldability, electroplating
Appropriate linear expansion coefficient
Good processability and corrosion resistance
Application: anode, spacer, electrode support, heater lead, fuse wire, etc

磁温度补偿合金

1J30、1J31、1J32、1J38、CBNi37Cr13
居里点温度：在60℃~120℃；工作温度范围：-60℃~+170℃；
应用：磁分路补偿，如行波管、磁控管、风速表、电度表和里程速度表等

Magnetic temperature compensation alloy

1J30、1J31、1J32、1J38、CBNi37Cr13
Curie temperature ranging from 60℃ to 120℃;
Operation temperature ranging from -60℃ to +170 ℃;
Application: magnetic shunt compensation, such as traveling wave, magnetron, anemometer, kilowatthourmeter, odometer and so on.



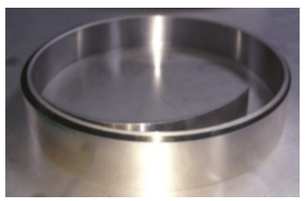


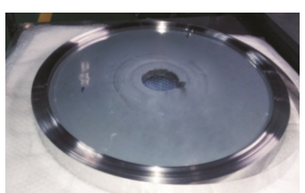
铁镍软磁合金

NiFe50、1J79、1J77、1J85、1J86
高的初始磁导率和低的矫顽力
应用：在弱磁场中工作的各种变压器、互感器、磁放大器、扼流圈铁芯及磁屏蔽产品

Fe-Ni soft magnetic alloy

NiFe50、1J79、1J77、1J85、1J86
High initial permeability and low coercive force
Application: are used in all kinds of transformers, mutual inductors, magnetic amplifiers, iron-core coil and magnetic shielding devices which working in low-intensity magnetic field.





膨胀合金材料

4J28、4J29、4J42、4J45、4J49、4J50、NiFe50、4J52、4J54
在一定温度范围内，与玻璃或陶瓷等材料的膨胀系数相近
应用：适用于电器元件与硬玻璃、软玻璃和陶瓷匹配的封接

Expansion alloy

4J28(Alloy 27)、4J29(Kovar、K94610)、4J42(Alloy 42、K94100)、4J45(Niromet 46)、4J49(FeNi46Cr5)、4J50(FeNi50)、NiFe50、4J52(FeNi52)、4J54(FeNi54、N54)
Within certain temperature range, having similar expansion coefficient with the glass or ceramic materials.
Application: used for the sealing between the electric components and the hard glass, soft glass and ceramic.

耐蚀合金材料

Monel 400、Monel R-405、Monel K-500、Monel-502、NCu28-2.5-1.5等
优良的耐蚀性和良好的切削性能
应用：阀杆、泵轴和叶轮、输送器刮刀、油井钻环、弹性部件、阀垫等

Corrosion resistant alloy

Monel 400、Monel R-405、Monel K-500、Monel-502、NCu28-2.5-1.5 and so on
Excellent corrosion resistance and good cutting performance
Application: valve stem, pump shaft and impeller, conveyor scraper, oil drilling ring, elastic parts, valve pad, etc.

弹性材料

QSn6.5-0.1、BZn18-26、BZn15-20
弹性模量不高，低负载下能产生较大的弹性变形
应用：载流弹性元件，继电器用导电弹簧，各类接插件、膜片、膜盒和接触弹簧等

Elastic materials

C5191、C7701、C7541
Having low elastic modulus, generating big elastic deformation under low load.
Application: current-carrying elastic components, conduction springs for the relay, all kinds of connector assembly, diaphram, bellow and contact spring.

高温合金

K423(C1023)，K4130(C130)，K4242(C242)，K4163(C263)，K213，K232，K418，K640，GH605，GH536，GH1035，GH2132等
优异的高温强度，良好的疲劳性能和断裂韧性
良好的抗氧化和抗热腐蚀性能
应用：主要用于制造航空、舰艇和工业用的高温部件，如涡轮叶片、导向叶片、涡轮盘等

High temperature alloy

C1023、C130、C242、C263、K213、K232、K418、K640、GH605、GH536、GH1035、GH2132
Excellent high temperature strength, good fatigue performance and fracture toughness
Good oxidation resistance and thermal corrosion resistance
Application: mainly used to manufacture high temperature components for aviation, naval vessels and industry, such as turbine blades, guide blades, turbine disks and so on.

其他产品
Other products

贵金属制品、回收与提纯

纯铂、铂铑合金、大型铂坩埚、强化铂坩埚、连熔坩埚、铂搅拌器、铂包钼搅拌器、炉头埚、料碗、强化铂、铑漏板、银散热片、铂异形舟等

拥有先进的贵金属分离与提纯工艺技术，接受来料加工

能回收各种贵金属及合金废料，回收率高，产品纯度高

应用：温度计量、特种玻璃熔制、化工触媒、燃气净化、电子电路、电接触元件等领域

Precious metal products, recycling and refinement

Pure Pt、Pt-Rh alloy、large-size Pt crucible、Strengthened Pt crucible、Crucible with connecting-tube、Pt agitator、Platium-coated Mo agitator、Furnace end crucible、Stuff bowl、Strengthened Pt-Rh nozzle plate、Ag radiator、Pt heterotype boat and so on



Possessing advanced technology for the detachment and purification of the precious metals, processing on giving materials.

Recovering the scrap materials of various precious metals and alloy materials, having high recovery rate and high purity of products.

Application: used for temperature measurement, special glass founding, catalyst of chemical engineering,pruification of the fuel gas, electric circuit and electric contact components.

银合金材料

银铜合金/AgCu alloy：AgCu6.5, AgCu8.4, AgCu15, AgCu28, AgCu50 等

银镍合金/AgNi alloy: AgNi0.15, AgNi10, AgNi15 等

形状：丝材/带材/板材　　Shape: Wire/Strip/Sheet

良好的导电、导热能力　　Good electricand thermal conductivity

应用：接触器、继电器、起动器、电压控制器、汽车电器等中低压电器

Application: widely applied in low and medium voltage electrical appliances, such as Contactor, Relay, Starter, Voltage Controller and Automobile etc.

接触器用触点材料

AgCuO、AgCuO/Cu、AgMgNi

复合材料、片材、带材

电流等级≥20A

应用：开关、保护器、断路器、继电器、控制器等元器件触点

Contact material for the contactor

AgCuO、AgCuO/Cu、AgMgNi

Clad materials、contact component、strip

Current class:≥ 20A

Application: switch, protector, circuit breaker, relay, controller and other components contact



应用领域

元件

医疗用纯铂电极片

玻璃行业铂铑保护管

分析用铂金坩埚、料碗

中低压电器用加热元件

中低压开关、断路器、双电源用电触头接点材料

各类元件按用户图纸设计要求加工

Element

Pure Pt electrode sheet used for medical industry

Pt-Rh protected tubes for the glass industry

Platinum crucible and stuff bowl for analysis

Heating elements for medium and low voltage electrical appliances

Medium and low voltage switch, circuit breaker, double power supply contact material.

All kinds of components are processed according to customer's drawing design requirements.

客户
Main customers

CCTC 三环集团 SINCE 1970

KYOCERA

JOHNSON ELECTRIC HOLDINGS LIMITED

中熔电气 SINOFUSE

COOPER

FERRAZ SHAWMUT IS NOW MERSEN

HONGFA

Changsheng Electric Appliance Jiangsu Changsheng Electric Appliance Co.,Ltd.

Sensata Technologies

Schneider Electric

ABB

Zoppas Industries

Zoppas Industries Hangzhou Ltd

AVIC

SAMSUNG

EMERSON