



Accuracy●Reliability●Speciality



Catalogue of Bare Thermocouple Wire

About SICC

As the most trustful supplier working with more than 50 partners in 30 countries all over the world , SICC group has focused on bare thermocouple wires, mineral insulated cable, thermocouple and RTD probes since 1998 in China.

With 35000 square meters manufacturing base for 900 tons annual of nickel alloy wires, mainly bare thermocouple wires as well as resistance wires, Our advanced melting skills are combined with the chemical composition control to achieve the highest quality products from .O.D=0.01 to 8.0 mm or AWG/SWG 0-50 solid and stranded wires.

SICC has 10 production lines for 4 million meters annual of mineral insulated cable for thermocouple and RTD, constantly refined and improved the technology, including accuracy,powder grades, sheath materials, configurations, all our MI cable can meet IEC and ASTM standards with high purity sea powder MgO $\geq 99.6\%$, from.O.D=0.25 to 12.7mm or 0.01"to 0.5". The high quality MI cables can make in quantity wide range of thermocouple rods, RTD rods and MI heaters assemblies for varieties of industrial and commercial uses.

Our manufacturing plants are only 2-hour drive from Shanghai, the biggest metropolitan city with world-class convenient logistic network, which can make sure our products will be sent to you on time either by air or by ship.

We understand your needs and concerns, and we will provide further details regarding our products and services. Contact us now for the most competitive quote.

Thermocouple Alloy Wire

Thermocouple wire is a flexible, insulated wire used to link a thermocouple to a temperature control device. It may also be used to make the sensing point (or probe) of the thermocouple. The wire determines the component's temperature and relays the information to the device.



TYPE K THERMOCOUPLE WIRE

Type K is the most common thermocouple conductor($\geq 500^{\circ}\text{C}$), it has a good resistance against oxidation and can be recommended for oxidizing and inert atmospheres.



It can not be used in sulphurous and vacuum atmospheres directly at a high temperature, as this will have a significant impact on the EMF values. The composition of positive(KP) is Ni90Cr10, negative(KN) is Ni97Si3.

1.SPECIFICATIONS DETAILS

Specification	EMF(mv)			
	200 $^{\circ}\text{C}$	400 $^{\circ}\text{C}$	600 $^{\circ}\text{C}$	800 $^{\circ}\text{C}$
NiCr(KP)	5.949~ 6.007	12.729~ 12.821	19.532~ 19.676	26.064~ 26.246
	5.978	12.775	19.604	26.155
NiSi(KN)	2.145~ 2.175	3.600~ 3.644	5.271~ 5.331	7.080~ 7.160
	2.16	3.622	5.301	7.12
NiCr-NiSi	8.094~ 8.182	16.329~ 16.465	24.803~ 25.007	33.144~ 33.406
	8.138	16.397	24.905	33.275

2.PHYSICAL PARAMETERS

Specification	Density (g/cm ³)	MP($^{\circ}\text{C}$)	TS(mpa)	Extensibility(%)	Resistivity (20 $^{\circ}\text{C}$ $\mu\Omega\cdot\text{m}$)
NiCr(KP)	8.6	1427	≥ 490	≥ 10	0.71
NiSi(KN)	8.6	1360	≥ 390	≥ 15	0.3

TYPE J THERMOCOUPLE WIRE

Type J thermocouple alloys are suitable for using in vacuum, oxidizing and reducing atmospheres or inert gas atmospheres.



Because of high temperature oxidizing quickly for JP, the measuring temperature range is restricted. The composition of positive(JP) is Fe100, negative(JN) is Cu55Ni45.

1.SPECIFICATIONS DETAILS

EMF(mv)				
Specification	100℃	200℃	400℃	600℃
Fe-CuNi	5.209~ 5.329	10.718~ 10.840	21.760~ 21.936	32.961~ 33.243
	5.269	10.779	21.848	33.102

2.PHYSICAL PARAMETERS

Specification	Density(g/cm3)	MP (℃)	TS(mpa)	Extensibility	Resistivity (20℃μΩ.m)
Fe(JP)	7.8	1407	≥240	≥20	0.12
CuNi(JN)	8.8	1220	≥390	≥25	0.49

TYPE T THERMOCOUPLE WIRE

Type T thermocouple conductor is suitable for temperature below 0°C with an upper temperature limit of 350°C (ASTM E230:370°C).



It can be used in oxidizing and reducing atmospheres or inert gas atmospheres. The composition of positive (TP) is Cu100, negative (TN) is Cu55Ni45.

1. SPECIFICATIONS DETAILS

Specification	EMF(mv)		
	100°C	200°C	300°C
Cu(TP)	0.761~ 0.785	1.825~ 1.849	3.137~ 3.161
	0.773	1.837	3.149
CuNi(TN)	3.493~ 3.517	7.420~ 7.482	11.655~ 11.771
	3.505	7.451	11.713
Cu-CuNi	4.255~ 4.303	9.245~ 9.331	14.792~ 14.932
	4.279	9.288	14.862

2. PHYSICAL PARAMETERS

Specification	Density(g/cm ³)	MP(°C)	TS (mpa)	Extensibility	Resistivity (20°C μΩ.m)
Cu(TP)	9	1084	≥190	≥20	0.018
CuNi(TN)	8.9	1220	≥390	≥25	0.5

TYPE E THERMOCOUPLE WIRE



Type E bare thermocouple wire develops the highest source voltage(EMF) per $^{\circ}\text{C}$ for measuring tiny temperature shift, it is suitable in oxidizing or inert gas atmospheres up to 900°C (ASTM E230: 870°C). The composition of positive(EP) is Ni90Cr10, negative(EN) is Cu55Ni45.

1.SPECIFICATIONS DETAILS

Specification	EMF(mv)				
	100 $^{\circ}\text{C}$	200 $^{\circ}\text{C}$	400 $^{\circ}\text{C}$	600 $^{\circ}\text{C}$	800 $^{\circ}\text{C}$
NiCr(EP)	2.784~ 2.844	5.938~ 6.002	12.709~ 12.819	19.537~ 19.699	26.102~ 26.308
	2.814	5.97	12.764	19.618	26.205
CuNi(EN)	3.467~ 3.543	7.410~ 7.492	16.109~ 16.255	25.362~ 25.588	34.664~ 34.960
	3.505	7.451	16.182	25.475	34.812
NiCr-CuNi	6.251~ 6.387	13.348~ 13.494	28.818~ 29.074	44.899~45.287	60.766~ 61.268
	6.319	13.421	28.946	45.093	61.017

2.PHYSICAL PARAMETERS

Specification	Density (g/cm ³)	MP($^{\circ}\text{C}$)	TS(mpa)	Extensibility	Resistivity (20 $^{\circ}\text{C}$ μΩ.m)
NiCr(EP)	8.5	1427	≥490	≥10	0.71
CuNi(EN)	8.5	1220	≥390	≥25	0.5

TYPE N THERMOCOUPLE WIRE



Type N thermocouple conductor is suitable in the similar atmospheres with type K and the operating temperature is -200-1300°C. Its advantage is thermoelectric stability. The composition of positive(NP) is approximately Ni84.4Cr14.2Si1.4, negative(NN) is Ni95.5Si4.4MgO.1.

1.SPECIFICATIONS DETAILS

Specification	EMF(mv)				
	100°C	200°C	400°C	600°C	800°C
NiCrSi(NP)	1.762~ 1.806	3.917~ 3.969	8.880~ 8.958	14.307~ 14.433	20.010~ 20.178
	1.784	3.943	8.919	14.37	20.094
NiCrMg(NN)	0.980~ 1.000	1.959~ 1.981	4.035~ 4.075	6.212~ 6.274	8.318~ 8.402
	0.99	1.97	4.055	6.243	8.36
NiCrSi- NiCrMg	2.741~ 2.807	5.877~ 5.949	12.915~ 13.033	20.519~ 20.707	28.330~28.580
	2.774	5.913	12.974	20.613	28.455

2.PHYSICAL PARAMETERS

Specification	Density (g/cm ³)	MP(°C)	TS (mpa)	Extensibility	Resistivity (20°C μΩ.m)
NiCrSi(NP)	8.5	1410	≥620	≥25	0.97
NiCrMg(NN)	8.6	1340	≥550	≥30	0.33

EXTENSION THERMOCOUPLE WIRE

SICC can supply Extension and Compensating bare thermocouple wire meet the standard IEC60584 and ASTM E230.



The advanced melting skills combined controls the chemical composition to achieve the highest quality products , our produce base has the capacity of 900 tons annual that can meet your comprehensive requirements. Whatever the bright annealed or oxidized conditions, all thermocouple conductors are calibrated at our lab, this includes the testing of EMF, chemical composition, physical and thermoelectric properties before shipment.

1.SPECIFICATIONS DETAILS

Resistivity of nichrome (20°CμΩ.m)	CE (α×10 ⁻⁶ /°C)	MP(°C)	TCR(ppm/°C)	Max of T(°C)
1.09 ± 0.05	14	1400	85	1000
1.10±0.05	17	1390	140	950
1.05±0.05	19	1390	280	950

Specification	Resistance(20°CΩ/m) ≤				
	0.2mm ²	0.5mm ²	1.0mm ²	1.5mm ²	2.5mm ²
KX	5.5	2.2	1.1	0.73	0.44
KCA	3.5	1.4	0.7	0.47	0.28
KCB	2.6	1.04	0.52	0.35	0.21
NX	7.15	2.86	1.43	0.95	0.57
NC	3.75	1.5	0.75	0.5	0.3
EX	6.25	2.5	1.25	0.83	0.5
JX	3.25	1.3	0.65	0.43	0.26
TX	2.6	1.04	0.52	0.35	0.21
SC/RC	0.25	0.1	0.05	0.03	0.02

2. QUALITY GUARANTEE

SICC can supply all kinds of thermocouple wires meet the accuracy standard IEC60584 and ASTM E230. The advanced melting skills combined controls the chemical composition to achieve the highest quality products, our produce base has the capacity of 900 tons annual with 35000 square meters that can meet your comprehensive requirements. Whatever the bright annealed or oxidized conditions,all thermocouple conductors are calibrated at our lab, this includes the testing of EMF, chemical composition, physical and thermoelectric properties before shipment.

SICC provides calibration results for all bare thermocouple wires with each shipment, including EMF values, accuracy, batch number, raw materials chemistry, lab environment condition, etc. Each order has only one job no for tracking, Calibration capability is available up to 1000C on suitable thermocouple types.

Our lab routinely calibrates at the following fixed points: 100C, 200C, 400C, 600C, 800C, 1000C for thermocouple materials, we work continuously to reduce the measurement uncertainty at each calibration temperature and new estimates are made every six months to ten months, ensuring any deviations are identified early so that results generated by the lab remain consistent and accurate.

We supply the top quality bare thermocouple wires 100% through QA program supervised by the Chief Quality Officer. Continuously doing the job of raw materials purchase management, manufacturing processes optimization, staff training, etc. Our sales prices can always keep competitive all over the world.

Pls contact us for a completed quote and we will be waiting here at 7*24.

NICKEL CHROME WIRE



Nickel chrome wire is a kind of non-magnetic alloy of nickel and chromium, it is widely used in heating elements.

The maximum operation temperature of the heating elements is related to the wire diameter, it is better to choose thicker wires, the corrosive atmospheres also have a considerable relationship with the maximum operation temperature.

The surface temperature is about 100C higher than the inner normally, when the operation temperature exceeds the limit, the oxidation of heating elements itself is accelerated, the heat resistance will be reduced, which is easily deformed, collapsed and even appeared to be broken, thereby shortening the service life.

SPECIFICATIONS DETAILS

Nickel chromium wire and nickel chromium iron wire are the most widely used for high resistance wires, they have advantages as follow:

1. Nickel chrome wire is not easy to be deformed at high temperature and the layout of element is selective well;
2. Nichrome wire will not be brittle after cooling, therefore the relatively reliable to use and repair easily;
3. The emissivity of nickel chromium wire is higher than iron chromium aluminum with fully oxidized,so its temperature is lower when the surface load is the same;
4. The nickel chrome wire is not magnetic which is more suitable for some appliances at low temperature, the iron chromium aluminum is not magnetic above 600C.

The nichrome wire has better corrosion resistance (except for sulfur-containing atmospheres and certain controlled atmospheres.

PHYSICAL PARAMETERS OF NICKEL CHROME WIRE

Specification	Cr	Ni	Fe	Al	Si	C	P	S	Mn
Cr20Ni80	20.0-23.0	BAL.	≤1.0	≤0.50	0.75-1.60	≤0.08	≤0.02	≤0.015	≤0.60
Cr15Ni60	15.0- 18.0	55.0-61.0	BAL.	≤0.50	0.75- 1.60	≤0.08	≤0.02	≤0.015	≤0.60
Cr20Ni30	18.0- 21.0	30.0-34.0	BAL.	-----	1.00-2.00	≤0.08	≤0.02	≤0.015	≤1.00

NICHROME COMPOSITION

Resistivity of nichrome (20℃μΩ.m)	CE (α×10 ⁻⁶ /℃)	MP(℃)	TCR(ppm/℃)	Max of T(℃)
1.09 ± 0.05	14	1400	85	1000
1.10±0.05	17	1390	140	950
1.05±0.05	19	1390	280	950

QUALITY GUARANTEE

We supply the top quality nickel chrome wire 100% through QA program supervised by the Chief Quality Officer. Continuously doing the job of raw materials purchase management, manufacturing processes optimization, staff training,etc. Our sales prices can always keep competitive all over the world.

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PURE NICKEL WIRE

Pure nickel wire has good mechanical strength, corrosion resistance and high heat resistance.



It is suitable for making electrical vacuum devices, electronic instrument components, and corrosion resistant materials.

SPECIFICATIONS DETAILS

Specification	Ni	Fe	Si	C	Cu	Mn
N6	≥99.5	≤0.10	≤0.15	≤0.05	≤0.10	≤0.10
N8	≥98.5	≤0.50	≤0.35	≤0.10		≤0.50
NI200	≥99.6	≤0.40	≤0.35	≤0.15	≤0.25	≤0.35
NI212	≥97	≤0.25	≤0.1		≤0.25	1.5-2.5

QUALITY GUARANTEE

We supply the top quality pure nickel wire 100% through QA program supervised by the Chief Quality Officer. Continuously doing the job of raw materials purchase management, manufacturing processes optimization, staff training, etc. Our sales prices can always keep competitive all over the world.

COPPER NICKEL WIRE



Copper nickel wire has good mechanical strength, corrosion resistance and low resistance.

It is suitable to make thermal components in low-voltage electrical appliances such as thermal overload relays, low-voltage circuit breakers and household appliances. Copper nickel alloys are also the key materials for manufacturing geothermal cables.

SPECIFICATIONS DETAILS

Item No	Resistivity	Max of T(°C)	Thermal conductivity	EMF vs Cu(0-100C)	Chemical composition(%)			TS (N/mm2)
					Mn	Ni	Cu	
NC003	0.03	200	<100	-8	---	1	Bal	≥210
NC005	0.05	200	<120	-12	---	2	Bal	≥220
NC010	0.1	220	<60	-18	---	6	Bal	≥250
NC012	0.12	250	<57	-22	---	8	Bal	≥270
NC015	0.15	250	<50	-25	---	10	Bal	≥290
NC020	0.2	300	<38	-28	0.3	14.2	Bal	≥310
NC025	0.25	300	<25	-32	0.5	19	Bal	≥340
NC030	0.3	300	<16	-34	0.5	23	Bal	≥350
NC035	0.35	350	<10	-37	1	30	Bal	≥400
NC040	0.4	350	<0	-39	1	34	Bal	≥400
NC050	0.49	400	<-6	-43	1	44	Bal	≥420

QUALITY GUARANTEE

We supply the top quality copper nickel wire 100% through QA program supervised by the Chief Quality Officer. Continuously doing the job of raw materials purchase management, manufacturing processes optimization, staff training, etc. Our sales prices can always keep competitive all over the world.

SHIPPING DETAILS

SICC' produce bases are closed to Shanghai within 2 hours, as the most modern city that having a very convenient logistics network, this advantage can promise our mineral insulated cables are delivered to you by air and sea ship on time. Shipments are usually made in spools, for large shipments can be palletized.

All spools shipped are uniquely identified with SICC' shipping tag, it shows the customer's order number, specification, batch number, accuracy, length, date.

Pls contact us for a completed quote and we will be waiting here at 7*24.

ACCURACIES

Operating limits and accuracies of thermocouples (IEC 60584, ASTM E230)

The following table contains permissible tolerance values of IEC 60584-2 incl. the tolerance values of ASTM E230 standard which is common in North America:

Tolerance values of the thermocouples per IEC 60584-2 / ASTM E230 (Reference temperature 0 °C)

Model	Thermocouple	Tolerance value per	Class	Temperature range	Tolerance value
K N	NiCr-NiAl (NiCr-Ni)	IEC 60584 part 2	1	-40 ... +1000 °C	$\pm 1.5^{\circ}\text{C}$ or $0.0040 \cdot t $ ^{1) 2)}
			2	-40 ... +1200 °C	$\pm 2.5^{\circ}\text{C}$ or $0.0075 \cdot t $
	NiCrSi-NiSi	ASTM E230	Special	0 ... +1260 °C	$\pm 1.1^{\circ}\text{C}$ or $\pm 0.4\%$
			Standard	0 ... +1260 °C	$\pm 2.2^{\circ}\text{C}$ or $\pm 0.75\%$
J	Fe-CuNi	IEC 60584 part 2	1	-40 ... +750 °C	$\pm 1.5^{\circ}\text{C}$ or $0.0040 \cdot t $
			2	-40 ... +750 °C	$\pm 2.5^{\circ}\text{C}$ or $0.0075 \cdot t $
		ASTM E230	Special	0 ... +760 °C	$\pm 1.1^{\circ}\text{C}$ or $\pm 0.4\%$
			Standard	0 ... +760 °C	$\pm 2.2^{\circ}\text{C}$ or $\pm 0.75\%$
E	NiCr-CuNi	IEC 60584 part 2	1	-40 ... +800 °C	$\pm 1.5^{\circ}\text{C}$ or $0.0040 \cdot t $
			2	-40 ... +900 °C	$\pm 2.5^{\circ}\text{C}$ or $0.0075 \cdot t $
		ASTM E230	Special	0 ... +870 °C	$\pm 1.0^{\circ}\text{C}$ or $\pm 0.4\%$
			Standard	0 ... +870 °C	$\pm 1.7^{\circ}\text{C}$ or $\pm 0.5\%$
T	Cu-CuNi	IEC 60584 part 2	1	-40 ... +350 °C	$\pm 0.5^{\circ}\text{C}$ or $0.0040 \cdot t $
			2	-40 ... +350 °C	$\pm 1.0^{\circ}\text{C}$ or $0.0075 \cdot t $
			3	-200 ... +40 °C	$\pm 1.0^{\circ}\text{C}$ or $0.015 \cdot t $
		ASTM E230	Special	0 ... +370 °C	$\pm 0.5^{\circ}\text{C}$ or $\pm 0.4\%$
			Standard	-200 ... 0 °C	$\pm 1.0^{\circ}\text{C}$ or $\pm 1.5\%$
			Standard	0 ... +370 °C	$\pm 1.0^{\circ}\text{C}$ or $\pm 0.75\%$
R S	Pt13%Rh-Pt	IEC 60584 part 2	1	0 ... +1600 °C	$\pm 1.0^{\circ}\text{C}$ or $\pm [1 + 0.003 (t - 1100)]^{\circ}\text{C}$
			2	0 ... +1600 °C	$\pm 1.5^{\circ}\text{C}$ or $\pm 0.0025 \cdot t $
	Pt10%Rh-Pt	ASTM E230	Special	0 ... +1480 °C	$\pm 0.6^{\circ}\text{C}$ or $\pm 0.1\%$
			Standard	0 ... +1480 °C	$\pm 1.5^{\circ}\text{C}$ or $\pm 0.25\%$
B	Pt30%Rh-Pt6%Rh	IEC 60584 part 2	2	+600 ... +1700 °C	$\pm 0.0025 \cdot t $
			3	+600 ... +1700 °C	$\pm 4.0^{\circ}\text{C}$ or $\pm 0.005 \cdot t $
		ASTM E230	Special Standard	- +870 ... +1700 °C	- $\pm 0.5\%$

1) |t| is the value of the temperature in °C without consideration of the sign
2) The greater value applies

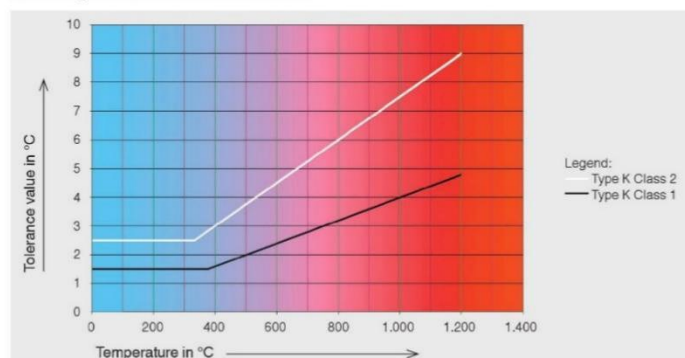
There are different notations of type K thermocouples in Europe and North America:

Europe: NiCr-NiAl or NiCr-Ni

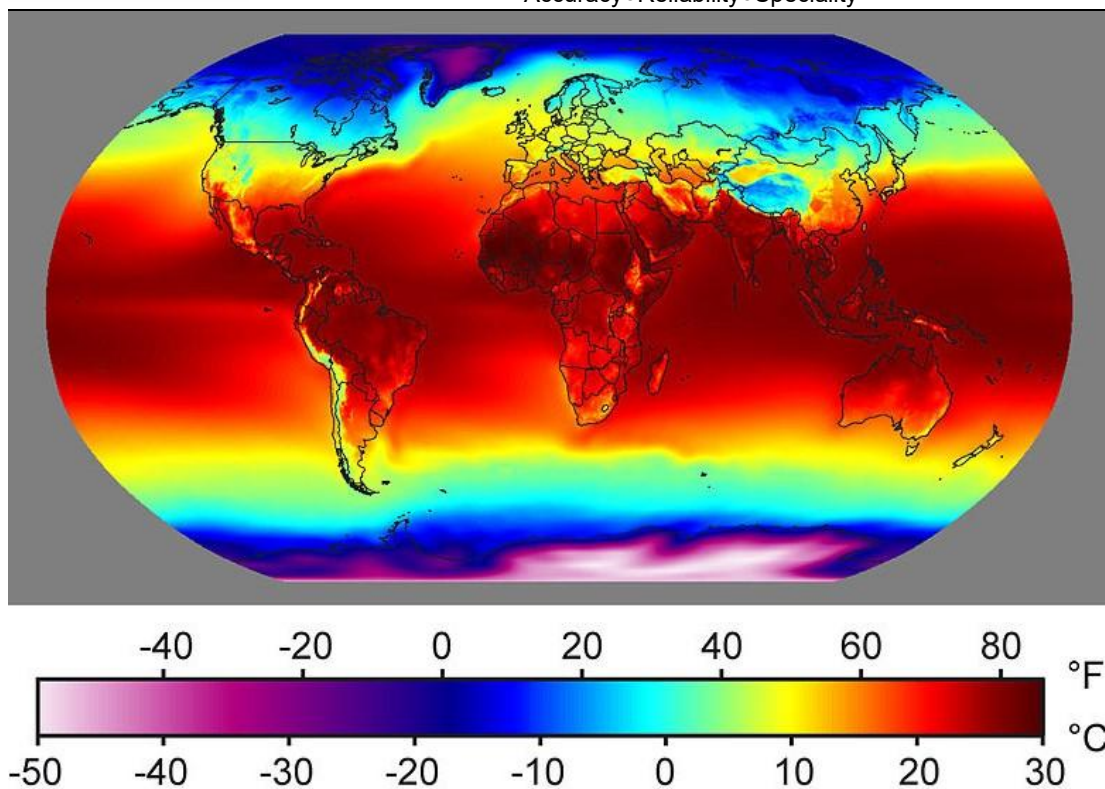
North America: Ni-Cr / Ni-Al

There is no physical difference, it is just the naming caused by historical reasons.

For the tolerance value of thermocouples, a cold junction temperature of 0 °C has been taken as the basis. When using a compensating cable or thermocouple cable, an additional measuring deviation must be considered.



Example:
Tolerance value of the
accuracy classes 1 and 2 of
thermocouple type K



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