PRODUCT DATASHEET / 2026

COPPER–NICKEL RESISTANCE ALLOY · 铜镍低电阻电热合金

CuNi1-CuNi44

NC003–NC050 · 0.03–0.50 μΩ·m · Ø0.05–9.0 mm

Eleven copper–nickel grades between 0.03 and 0.50 μΩ·m: low resistance with a tightening temperature coefficient, salt-spray corrosion resistance and easy soft soldering.

十一个铜镍牌号，电阻率 0.03–0.50 μΩ·m——低电阻、低温度系数，耐盐雾腐蚀，易软钎焊。

Copper–nickel low-resistance alloys are binary Cu–Ni materials used wherever a conductor also has to be a stable resistor: current shunts, precision resistors, heating cables and terminals. Raising nickel from 1 % to 44 % moves the resistivity from 0.03 to 0.50 μΩ·m and tightens the temperature coefficient from below 100 × 10^{-6}/K to zero at CuNi34.

The copper matrix keeps ductility, drawability and soft-solderability, while nickel adds chemical stability in humid, oxidising, acidic and salt-spray environments. Manganese appears from CuNi19 upward at 0.5–1 %; the leaner grades stay simple binary alloys, which is what keeps them consistent in volume production.

SPECIFICATION 规格

ALLOY RANGE 牌号范围
11 grades · NC003–NC050

RESISTIVITY 电阻率
0.03–0.50 μΩ·m

WIRE 线材
Ø0.05–9.0 mm

FORMS 供货形态
Wire · rod · flat wire · strip

01 ALLOY RANGE 牌号与性能

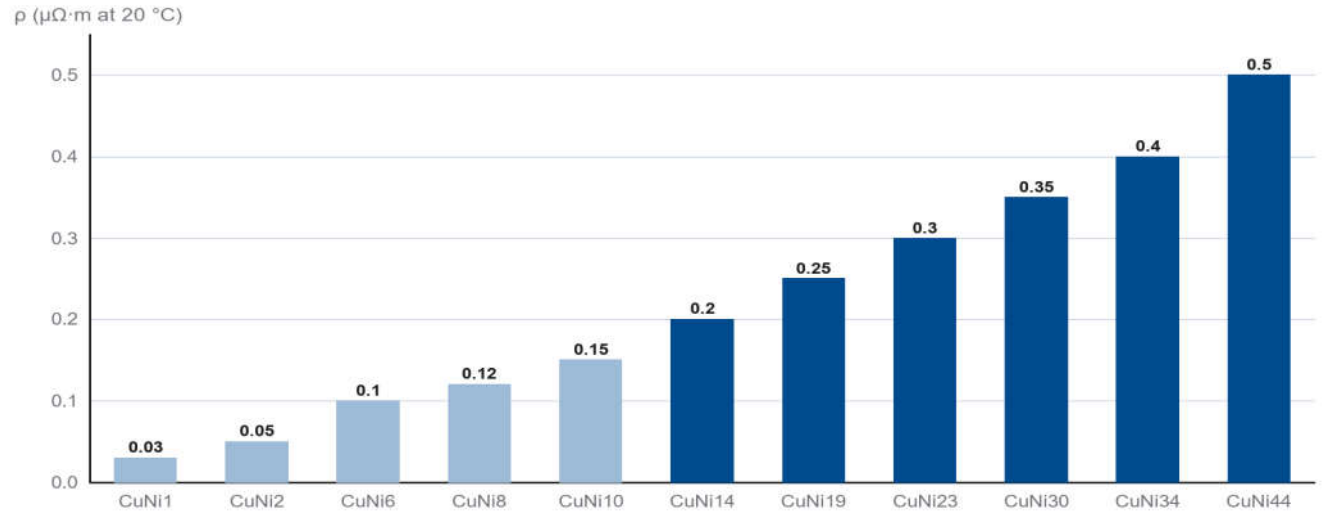
11 GRADES · NC003–NC050

Grade	Ni (%)	Mn (%)	Cu	Max. temp (°C)	Melting (°C)	Density (g/cm³)	ρ 20 °C (μΩ·m)	Rm (MPa)	EMF vs Cu (μV/K)	TCR (10^{-6}/K)	Elong. ≤1.0 mm (≥ %)	Elong. >1.0 mm (≥ %)
CuNi1 NC003	1	-	Bal.	200	1085	8.9	**0.03±10%**	≥210	-8	**<100**	18	25
CuNi2 NC005	2	-	Bal.	200	1090	8.9	**0.05±10%**	≥220	-12	**<120**	18	25
CuNi6 NC010	6	-	Bal.	220	1095	8.9	**0.1±10%**	≥250	-18	**<60**	18	25
CuNi8 NC012	8	-	Bal.	250	1097	8.9	**0.12±10%**	≥270	-22	**<38**	18	25
CuNi10 NC015	10	-	Bal.	250	1100	8.9	**0.15±10%**	≥290	-25	**<50**	20	25
CuNi14 NC020	14	-	Bal.	300	1115	8.9	**0.2±5%**	≥310	-28	**<30**	20	25
CuNi19 NC025	19	0.5	Bal.	300	1135	8.9	**0.25±5%**	≥340	-32	**<25**	20	25
CuNi23 NC030	23	0.5	Bal.	300	1150	8.9	**0.3±5%**	≥350	-34	**<16**	20	25
CuNi30 NC035	30	1	Bal.	350	1170	8.9	**0.35±5%**	≥400	-37	**<10**	20	25
CuNi34 NC040	34	0.5	Bal.	350	1180	8.9	**0.4±5%**	≥400	-39	**0**	20	25
CuNi44 NC050	44	1	Bal.	400	1280	8.9	**0.50±5%**	≥420	-43	**<-6**	20	25

Composition in weight %, balance copper. Ni, Mn and Cu as certified; resistivity and mechanical values are typical. TCR is quoted over 20–600 °C; a bound such as ≤10 means the coefficient never exceeds that value in the range.

02 RESISTIVITY ACROSS THE RANGE 电阻率分布

AT 20 °C



Dark bars: grades with ρ ≥ 0.20 μΩ·m, where the temperature coefficient has already fallen below 30 × 10^{-6}/K. Resistivity rises almost linearly with nickel; the return on that rise is the tightening TCR.

03 CHARACTERISTICS 特性

FIVE REASONS

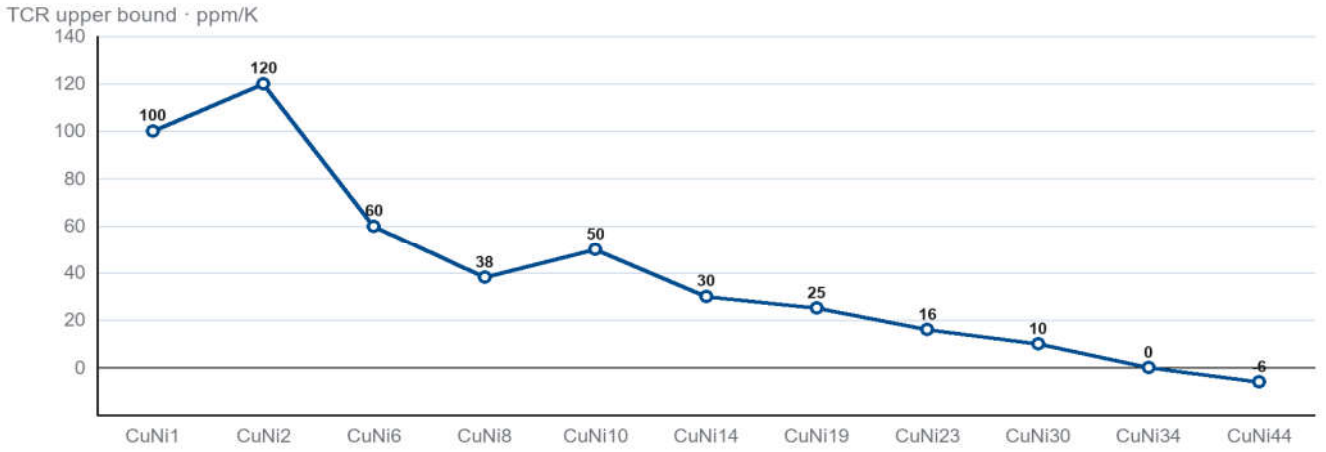
What copper–nickel buys you

Low resistivity, high stability Nickel raises stability far more than it raises resistance: the temperature coefficient tightens from below 100 × 10^{-6}/K at CuNi1 to below 10 × 10^{-6}/K by CuNi30 and zero at CuNi34.		**Corrosion resistance** Stable in humid, oxidising, acidic and salt-spray conditions — marine, chemical and outdoor equipment.
Machinability and soldering The copper matrix draws to fine wire, bends and takes soft solder without special flux — terminals, pins and formed parts.		**Stable when hot** Holds structure and resistance under heating, resists softening and oxidation — heating cables, brake resistors and high-temperature connectors.
Simple composition The lean grades carry no aluminium or other strengtheners, so composition and resistance stay consistent from lot to lot.		

04 TEMPERATURE COEFFICIENT 温度系数

UPPER BOUND · PPM/K

The coefficient is the return on resistivity: every step up in nickel buys a tighter TCR, and CuNi34 gives zero.



Upper bounds over 20–600 °C: the coefficient never exceeds the plotted figure, and turns negative at CuNi44.

05 WIRE PARAMETERS 线材参数TABLE 1 / 2

Ohms, metres and grams per metre

Dia. (mm)	Weight (g/m)	Length per kg (m/kg)	Ohm per metre at 20 °C (Ω/m)					
			CuNi1	CuNi2	CuNi6	CuNi8	CuNi10	CuNi14
0.05	0.01748	57224.30	15.279	25.465	50.930	61.116	76.394	101.859
0.06	0.02516	39739.10	10.610	17.684	35.368	42.441	53.052	70.736
0.07	0.03425	29196.07	7.795	12.992	25.985	31.181	38.977	51.969
0.08	0.04474	22353.24	5.968	9.947	19.894	23.873	29.842	39.789
0.09	0.05662	17661.82	4.716	7.860	15.719	18.863	23.579	31.438
0.1	0.06990	14306.07	3.820	6.366	12.732	15.279	19.099	25.465
0.11	0.08458	11823.20	3.157	5.261	10.523	12.627	15.784	21.045
0.12	0.10066	9934.77	2.653	4.421	8.842	10.610	13.263	17.684
0.13	0.11813	8465.13	2.260	3.767	7.534	9.041	11.301	15.068
0.15	0.15728	6358.26	1.698	2.829	5.659	6.791	8.488	11.318
0.17	0.20201	4950.20	1.322	2.203	4.406	5.287	6.609	8.811
0.19	0.25234	3962.90	1.058	1.763	3.527	4.232	5.290	7.054
0.21	0.30826	3244.01	0.866	1.444	2.887	3.465	4.331	5.774
0.25	0.43688	2288.97	0.611	1.019	2.037	2.445	3.056	4.074
0.27	0.50957	1962.42	0.524	0.873	1.747	2.096	2.620	3.493
0.29	0.58786	1701.08	0.454	0.757	1.514	1.817	2.271	3.028
0.31	0.67174	1488.67	0.397	0.662	1.325	1.590	1.987	2.650
0.35	0.85628	1167.84	0.312	0.520	1.039	1.247	1.559	2.079
0.40	1.11841	894.13	0.239	0.398	0.796	0.955	1.194	1.592
0.45	1.41548	706.47	0.189	0.314	0.629	0.755	0.943	1.258
0.50	1.74751	572.24	0.153	0.255	0.509	0.611	0.764	1.019
0.55	2.11449	472.93	0.126	0.210	0.421	0.505	0.631	0.842
0.60	2.51641	397.39	0.106	0.177	0.354	0.424	0.531	0.707
0.65	2.95329	338.61	0.090	0.151	0.301	0.362	0.452	0.603
0.70	3.42512	291.96	0.078	0.130	0.260	0.312	0.390	0.520
0.80	4.47362	223.53	0.060	0.099	0.199	0.239	0.298	0.398
0.85	5.05030	198.01	0.053	0.088	0.176	0.211	0.264	0.352
0.90	5.66193	176.62	0.047	0.079	0.157	0.189	0.236	0.314
0.95	6.30851	158.52	0.042	0.071	0.141	0.169	0.212	0.282
1.00	6.99004	143.06	0.038	0.064	0.127	0.153	0.191	0.255
1.1	8.45795	118.23	0.0316	0.0526	0.1052	0.1263	0.1578	0.2105
1.2	10.06565	99.35	0.0265	0.0442	0.0884	0.1061	0.1326	0.1768
1.3	11.81316	84.65	0.0226	0.0377	0.0753	0.0904	0.1130	0.1507
1.4	13.70047	72.99	0.0195	0.0325	0.0650	0.0780	0.0974	0.1299
1.5	15.72758	63.58	0.0170	0.0283	0.0566	0.0679	0.0849	0.1132
1.6	17.89450	55.88	0.0149	0.0249	0.0497	0.0597	0.0746	0.0995
1.7	20.20121	49.50	0.0132	0.0220	0.0441	0.0529	0.0661	0.0881
1.8	22.64772	44.15	0.0118	0.0196	0.0393	0.0472	0.0589	0.0786
1.9	25.23404	39.63	0.0106	0.0176	0.0353	0.0423	0.0529	0.0705
2.0	27.96015	35.77	0.0095	0.0159	0.0318	0.0382	0.0477	0.0637
2.2	33.83178	29.56	0.0079	0.0132	0.0263	0.0316	0.0395	0.0526
2.4	40.26262	24.84	0.0066	0.0111	0.0221	0.0265	0.0332	0.0442
2.6	47.25266	21.16	0.0057	0.0094	0.0188	0.0226	0.0283	0.0377
2.8	54.80190	18.25	0.0049	0.0081	0.0162	0.0195	0.0244	0.0325
3.0	62.91034	15.90	0.0042	0.0071	0.0141	0.0170	0.0212	0.0283
3.2	71.57799	13.97	0.0037	0.0062	0.0124	0.0149	0.0187	0.0249
3.4	80.80484	12.38	0.00330	0.00551	0.01101	0.01322	0.01652	0.02203
3.6	90.59089	11.04	0.00295	0.00491	0.00982	0.01179	0.01474	0.01965
3.8	100.93615	9.91	0.00265	0.00441	0.00882	0.01058	0.01323	0.01763
4.0	111.84060	8.94	0.00239	0.00398	0.00796	0.00955	0.01194	0.01592
4.5	141.54826	7.06	0.00189	0.00314	0.00629	0.00755	0.00943	0.01258
5.0	174.75094	5.72	0.00153	0.00255	0.00509	0.00611	0.00764	0.01019
5.5	211.44864	4.73	0.00126	0.00210	0.00421	0.00505	0.00631	0.00842
6.0	251.64136	3.97	0.00106	0.00177	0.00354	0.00424	0.00531	0.00707
6.5	295.32909	3.39	0.00090	0.00151	0.00301	0.00362	0.00452	0.00603
7.0	342.51185	2.92	0.00078	0.00130	0.00260	0.00312	0.00390	0.00520
7.5	393.18962	2.54	0.00068	0.00113	0.00226	0.00272	0.00340	0.00453
8.0	447.36242	2.24	0.00060	0.00099	0.00199	0.00239	0.00298	0.00398
8.5	505.03023	1.98	0.00053	0.00088	0.00176	0.00211	0.00264	0.00352
9.0	566.19306	1.77	0.00047	0.00079	0.00157	0.00189	0.00236	0.00314

Calculated at a density of 8.9 g/cm³ and the nominal resistivity of each grade; resistance tolerance ±10 % (CuNi1–CuNi8) and ±5 % (CuNi14–CuNi44).

05 WIRE PARAMETERS 线材参数 TABLE 2 / 2

Ohms, metres and grams per metre

Dia. (mm)	Weight (g/m)	Length per kg (m/kg)	Ohm per metre at 20 °C (Ω/m)				
			CuNi19	CuNi23	CuNi30	CuNi34	CuNi44
0.05	0.01748	57224.30	127.324	152.789	178.254	203.718	254.648
0.06	0.02516	39739.10	88.419	106.103	123.787	141.471	176.839
0.07	0.03425	29196.07	64.961	77.954	90.946	103.938	129.923
0.08	0.04474	22353.24	49.736	59.683	69.630	79.578	99.472
0.09	0.05662	17661.82	39.298	47.157	55.017	62.876	78.595
0.1	0.06990	14306.07	31.831	38.197	44.563	50.930	63.662
0.11	0.08458	11823.20	26.307	31.568	36.829	42.091	52.613
0.12	0.10066	9934.77	22.105	26.526	30.947	35.368	44.210
0.13	0.11813	8465.13	18.835	22.602	26.369	30.136	37.670
0.15	0.15728	6358.26	14.147	16.977	19.806	22.635	28.294
0.17	0.20201	4950.20	11.014	13.217	15.420	17.623	22.028
0.19	0.25234	3962.90	8.817	10.581	12.344	14.108	17.635
0.21	0.30826	3244.01	7.218	8.662	10.105	11.549	14.436
0.25	0.43688	2288.97	5.093	6.112	7.130	8.149	10.186
0.27	0.50957	1962.42	4.366	5.240	6.113	6.986	8.733
0.29	0.58786	1701.08	3.785	4.542	5.299	6.056	7.570
0.31	0.67174	1488.67	3.312	3.975	4.637	5.300	6.625
0.35	0.85628	1167.84	2.598	3.118	3.638	4.158	5.197
0.40	1.11841	894.13	1.989	2.387	2.785	3.183	3.979
0.45	1.41548	706.47	1.572	1.886	2.201	2.515	3.144
0.50	1.74751	572.24	1.273	1.528	1.783	2.037	2.546
0.55	2.11449	472.93	1.052	1.263	1.473	1.684	2.105
0.60	2.51641	397.39	0.884	1.061	1.238	1.415	1.768
0.65	2.95329	338.61	0.753	0.904	1.055	1.205	1.507
0.70	3.42512	291.96	0.650	0.780	0.909	1.039	1.299
0.80	4.47362	223.53	0.497	0.597	0.696	0.796	0.995
0.85	5.05030	198.01	0.441	0.529	0.617	0.705	0.881
0.90	5.66193	176.62	0.393	0.472	0.550	0.629	0.786
0.95	6.30851	158.52	0.353	0.423	0.494	0.564	0.705
1.00	6.99004	143.06	0.318	0.382	0.446	0.509	0.637
1.1	8.45795	118.23	0.2631	0.3157	0.3683	0.4209	0.5261
1.2	10.06565	99.35	0.2210	0.2653	0.3095	0.3537	0.4421
1.3	11.81316	84.65	0.1883	0.2260	0.2637	0.3014	0.3767
1.4	13.70047	72.99	0.1624	0.1949	0.2274	0.2598	0.3248
1.5	15.72758	63.58	0.1415	0.1698	0.1981	0.2264	0.2829
1.6	17.89450	55.88	0.1243	0.1492	0.1741	0.1989	0.2487
1.7	20.20121	49.50	0.1101	0.1322	0.1542	0.1762	0.2203
1.8	22.64772	44.15	0.0982	0.1179	0.1375	0.1572	0.1965
1.9	25.23404	39.63	0.0882	0.1058	0.1234	0.1411	0.1763
2.0	27.96015	35.77	0.0796	0.0955	0.1114	0.1273	0.1592
2.2	33.83178	29.56	0.0658	0.0789	0.0921	0.1052	0.1315
2.4	40.26262	24.84	0.0553	0.0663	0.0774	0.0884	0.1105
2.6	47.25266	21.16	0.0471	0.0565	0.0659	0.0753	0.0942
2.8	54.80190	18.25	0.0406	0.0487	0.0568	0.0650	0.0812
3.0	62.91034	15.90	0.0354	0.0424	0.0495	0.0566	0.0707
3.2	71.57799	13.97	0.0311	0.0373	0.0435	0.0497	0.0622
3.4	80.80484	12.38	0.02754	0.03304	0.03855	0.04406	0.05507
3.6	90.59089	11.04	0.02456	0.02947	0.03439	0.03930	0.04912
3.8	100.93615	9.91	0.02204	0.02645	0.03086	0.03527	0.04409
4.0	111.84060	8.94	0.01989	0.02387	0.02785	0.03183	0.03979
4.5	141.54826	7.06	0.01572	0.01886	0.02201	0.02515	0.03144
5.0	174.75094	5.72	0.01273	0.01528	0.01783	0.02037	0.02546
5.5	211.44864	4.73	0.01052	0.01263	0.01473	0.01684	0.02105
6.0	251.64136	3.97	0.00884	0.01061	0.01238	0.01415	0.01768
6.5	295.32909	3.39	0.00753	0.00904	0.01055	0.01205	0.01507
7.0	342.51185	2.92	0.00650	0.00780	0.00909	0.01039	0.01299
7.5	393.18962	2.54	0.00566	0.00679	0.00792	0.00905	0.01132
8.0	447.36242	2.24	0.00497	0.00597	0.00696	0.00796	0.00995
8.5	505.03023	1.98	0.00441	0.00529	0.00617	0.00705	0.00881
9.0	566.19306	1.77	0.00393	0.00472	0.00550	0.00629	0.00786

Calculated at a density of 8.9 g/cm³ and the nominal resistivity of each grade; resistance tolerance ±10 % (CuNi1–CuNi8) and ±5 % (CuNi14–CuNi44).

06 APPLICATIONS 应用领域

TYPICAL DUTY

Low-resistance resistors
precise current control in power and signal circuits

Resistance wire and heaters
stable resistance under load

Terminals and connectors
conductivity, strength, easy soldering

Instruments and sensors
low TCR and long-term stability

SELECTING A GRADE 选型提示

CuNi34 is the zero-TCR grade; CuNi44 goes negative (below −6 × 10^{-6}/K). For a shunt, start low (CuNi1–CuNi6) and move up only as far as the temperature coefficient requires — every step adds resistivity and cost.

07 CHOOSING BY REQUIREMENT 按需选型

FOUR STARTING POINTS

If you need	Choose	Because
Lowest resistance	**CuNi1 · CuNi2**	0.03–0.05 μΩ·m at 20 °C
Shunts and current sensing	**CuNi6 – CuNi10**	0.10–0.15 μΩ·m, still soft and easy to solder
Zero temperature coefficient	**CuNi34**	TCR 0 over 20–600 °C
Negative TCR (compensation)	**CuNi44**	below −6 × 10^{-6}/K

08 SUPPLY 供货

FORMS AND SIZES

Wire, rod, flat wire and wide strip

WIRE
0.03–10.0 mm
bright, soft annealed

ROD
6.0–80.0 mm
drawn

FLAT WIRE
0.2–6.0 × 0.08–1.0 mm
width × thickness

WIDE STRIP
5.0–100 × 0.05–4.0 mm
width × thickness

ABOUT THE NUMBERS 关于数据

The density of copper–nickel resistance wire is about 8.9 g/cm³; every weight and length in this brochure is calculated on that basis. Resistivity is quoted at 20 °C and the temperature coefficient over 20–600 °C.

ALSO FROM HEYI 同厂其他材料

Ni–Cr WIRE
Cr20Ni80 … Cr20Ni35
heating, 0.025–12.0 mm

Fe–Cr–Al WIRE
0Cr25Al5 … 1Cr13Al4
heating, to 1400 °C

FLAT WIRE / STRIP
same alloys, rectangular
0.2–6.0 / 5.0–300 mm

ELEMENTS
to drawing
coil, tubular, ribbon

WHEN ORDERING state the grade (e.g. CuNi44), form (wire, rod, flat wire or strip), size · coil, spool or cut length, and the resistance tolerance you need.

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Founded 1990 · formerly Danyang Resistance Wire Factory · ISO 9001:2015 · 1,500 t per year · about half exported