

Ceramic Coated High Temperature Magnet Wire

600-1000° C Operating Temperature

High Temperature

Small Diameters

Lead – Free

Multiple Conductors

Our wires offers the perfect solution in coil windings under ultra-high temperatures and highly radioactive conditions in Plasma physics and nuclear research, as well as production coils for industry, military and aerospace applications.



- Maximum long-term use temperature can reach 1800° F (1000° C).
- The thin ceramic insulation layer allows for a small bending radius (7 x wire diameter) if winding is done at our factory. If client would like to wind, the bending radius is roughly 30 x wire diameter.
- Wide ranges of diameters and sizes from 44 AWG - 18 AWG.
- Lead-free ceramic formula.
- Wide range of conductors, including nickel plated copper wire, pure nickel, copper, silver, and other alloys, allowing for a wider range of applications.

Ceramic Coated High Temperature Magnet Wire

General Specifications

Conductor Diameter: 0.05mm - 1.024mm

Insulator Thickness: 7 – 30 μ m

No outgassing in a vacuum environment

Lifetime

Nickel Plated: 2500 hours at +573° C

Pure Nickel has a higher lifetime

Nickel Migration

Due to the high temperature migration characteristics of nickel-plated copper, it is recommended to use pure nickel wire for small diameter wires at high temperatures for longer operating periods.

Insulating Material

Proprietary ceramic coating with different properties: bending radius, voltage withstand, operating lifetime.

Chemical Characteristics

Ordinary Solvents, oils, and water will not damage the insulating layer

Molten NaOH will corrode the insulation layer

Thermal Characteristics

Operating Temperature

Ni Plated Cu Wire = -267° - 600° C

Short term use up to 10000°C

Pure Nickel Wire = -267 - 1000° C

Temperature Shock

No cracking from -267°C to ambient temperature and ambient temperature to maximum operating temperature

Flammability

Wire will not burn, at temperatures in excess of 1093° C, the insulation layer may start to melt but will not burn

Radiation Resistance

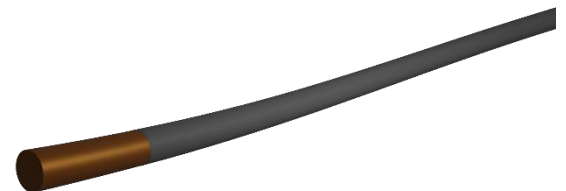
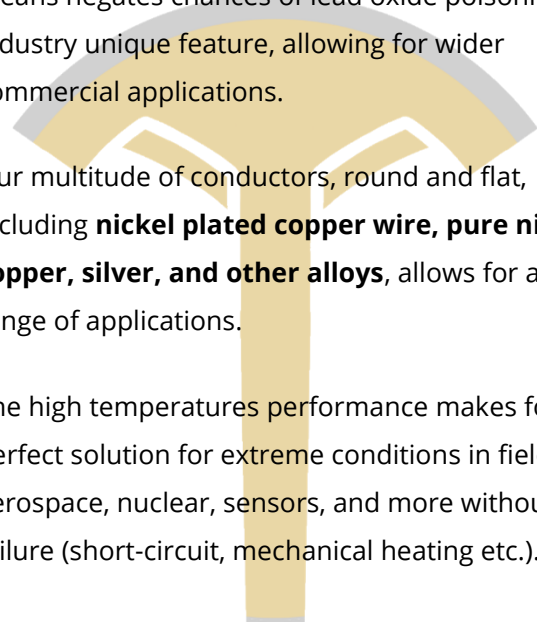
Able to withstand prolonged exposure to neutrons and gamma rays without affecting the properties of the insulating material

T-Axel's magnet wires provides windings with greater reliability at high temperatures, Peak 1000°C in high performance applications. The lead-free formula means negates chances of lead oxide poisoning, an industry unique feature, allowing for wider commercial applications.

Our multitude of conductors, round and flat, including **nickel plated copper wire, pure nickel, copper, silver, and other alloys**, allows for a wider range of applications.

The high temperatures performance makes for the perfect solution for extreme conditions in fields like aerospace, nuclear, sensors, and more without failure (short-circuit, mechanical heating etc.).

The wide range of conductors we offer guarantees that our magnet wires will be a perfect fit for your project.



Electrical Characteristics

Voltage = 150-200 V

Wire gauges can be customized to withstand higher voltages (1000-2000 V)

Relative Conductivity

Pure Nickel Wire (Nickel 205) : 18.2% IACS at 20° C with copper being at 100.0% IACS

27% Nickel-plated copper wire: 70.0% IACS at 20° C

Wire Gauge Characteristics

AWG	Conductor Diameter	Minimum Bend Radius	Resistance <u>27% Nickel Plated Cu 20 C (Ω/m)</u>	Resistance <u>Pure Nickel 20 C (Ω/m)</u>	Resistance <u>Pure Copper 20 C (Ω/m)</u>	Resistance <u>Pure Silver 20 C (Ω/m)</u>
44	0.051 mm	0.50	11.7358	48.097	8.762	8.06
41	0.071 mm	0.50	5.8586	23.856	4.353	4.004
40	0.079 mm	0.56	4.6438	18.907	3.44	3.164
39	0.089 mm	0.60	3.684	14.999	2.728	2.509
38	0.102 mm	0.70	2.9216	11.895	2.163	1.99
37	0.114 mm	0.80	2.3164	9.4309	1.715	1.578
36	0.127 mm	0.90	1.8373	7.4803	1.36	1.251
35	0.142 mm	1.00	1.4568	5.9314	1.091	1.004
34	0.160 mm	1.10	1.1554	4.7042	0.856	0.787
33	0.180 mm	1.20	0.9163	3.7307	0.679	0.625
32	0.203 mm	1.40	0.7267	2.9589	0.538	0.452
31	0.226 mm	1.50	0.5762	2.3461	0.427	0.393
30	0.254 mm	1.70	0.457	1.8608	0.338	0.311
29	0.287 mm	2.00	0.3624	1.4755	0.268	0.247
28	0.320 mm	2.20	0.2874	1.1703	0.213	0.196
27	0.361 mm	2.50	0.2279	0.928	0.169	0.155
26	0.404 mm	2.80	0.1808	0.7359	0.114	0.105
25	0.455 mm	3.10	0.1434	0.5837	0.106	0.098
24	0.511 mm	3.50	0.1137	0.4628	0.084	0.077
23	0.574 mm	4.00	0.0902	0.367	0.067	0.062
22	0.645 mm	4.50	0.0715	0.2911	0.053	0.049
21	0.724 mm	5.00	0.0567	0.2309	0.041	0.039
20	0.813 mm	5.60	0.045	0.1831	0.033	0.03
19	0.912 mm	6.30	0.0357	0.1452	0.025	0.024
18	1.024 mm	7.00	0.0283	0.1151	0.021	0.019

Temperature Resistance – Pure Nickel

Temperature	DC Resistivity <u>Ω/cir. mil ft</u>	DC <u>Resistivity Ω/m</u>
68° F (20.00 °C)	57.0	9.50 x 10-8
500° F (260.00 °C)	138.0	23.00 x 10-8
1000° F (537.78 °C)	228.0	38.00 x 10-8

***Minimum Bend Radius is the smallest radius we can wound the wire without the ceramic cracking**

***Resistances listed are nominal data in standard conditions**

Note - Minimum Bend Radius listed is for when T-Axel winds the wires. If ceramic-coated wire is used as lead wire/ wound by client, bending radius is 30X Wire Diameter

Temperature Resistance – 27% Ni Plated Cu Wire

Temperature	DC Resistivity <u>Ω/cir. mil ft</u>	DC Resistivity <u>Ω/m</u>
68° F (20.00 °C)	14.0	2.30 x 10-8
100° F (37.78 °C)	15.0	2.46 x 10-8
200° F (93.33 °C)	18.2	2.99 x 10-8
300° F (148.89 °C)	21.0	3.45 x 10-8
400° F (204.44 °C)	23.8	3.91 x 10-8
500° F (260.00 °C)	26.9	4.42 x 10-8
600° F (315.56 °C)	29.8	4.89 x 10-8
700° F (371.11 °C)	32.5	5.34 x 10-8
800° F (426.67 °C)	36.9	5.89 x 10-8
900° F (482.22 °C)	39.0	6.41 x 10-8
1000° F (537.78 °C)	42.3	6.95 x 10-8
1100° F (593.33 °C)	45.8	7.52 x 10-8
1200° F (648.89 °C)	49.3	8.10 x 10-8
1300° F (704.44 °C)	53.0	8.71 x 10-8
1400° F (760.00 °C)	57.5	9.45 x 10-8

Above instructions are suggestions. T-Axel Inc makes no warranties either express or implied as to the suitability of ceramic-coated high-temperature magnet wire for a particular application or use. Buyer and use must determine the suitability for his intended use and assume all risk and liability in connection therewith. Each application must be judged for suitability and performance by the user.