Nickel & Thermocouple Alloy

- Thermocouple Conductor
- Extension Conductor
- Compensating Conductor
- Nickel Conductor
- 80/20 Nichrome Wire

TEMPSENS

www.tempsens.com

ABOUT US

TEMPSENS Instruments (I) Pvt. Ltd is a part of Pyrotech group which was established by four technocrats in 1976 at Udaipur, with its first product as Thermocouples and RTDs.

Today Tempsens is one of the largest manufacturers of temperature sensors with world class manufacturing facilities in India, Germany and China.

Tempsens is an ISO 9001:2008 certified company with NABL Accredited Laboratory.

The company is involved into manufacturing of Thermocouples, RTDs, Thermowells, Cables, Non contact Pyrometers, Heaters and Calibration Equipments etc. with Covered Area of 2,70 ,000 Sq. Ft.

Tempsens is proud of its technical solution, quick delivery, high technical standards and outstanding quality which have been appreciated and highly valued by its customers worldwide.

Tempsens exports to more than 50 countries.

Tempsens success is driven by its people and their unrelenting focus on delivering results the right way - by operating responsibly, executing with excellence, applying innovative technologies and capturing new opportunities for profitable growth.

Tempsens is one of the largest players in the field of thermal and cable solutions. Tempsens has now used this vast knowledge in the domain of temperature measurement to be recognized as a superior vendor of thermocouple alloys which are now available in various configurations. Tempsens has a completely integrated alloy manufacturing capability right from melting, drawing, annealing, bunching and packing. Our growth in thermocouple alloys is attributable to our ability to provide stable material and to provide special limit requirements.

Processing Of Conductor Wire


Raw Material


Melting


Drawing


Annealing


Inspection &Packing

TESTING AND CALIBRATION

Thermocouple, extension and compensating grades are calibrated over the temperature range according to international specifications. All our grades are individually calibrated versus Pt 67. Each coil/spool is tested for EMF and value of deviation from the standard EMF at different temperatures is shown on the labels attached to each coil/spool. Alternatively, calibration can also be performed as per ASTM E220 comparison technique.

- Calibration Test
- Proof Stress Test
- Torsion Test
- Positive Material Identification(PMI) Test
- Bend Test
- Hardness Test
- Tensile Strength Test
- Elongation
- Electrical Resistivity (Loop Resistance)

THERMOCOUPLE

Many combinations of materials have been used to produce acceptable thermocouples, each with its own particular application spectrum. However, the value of interchangeability and the economics of mass production have led to standardization, with a few specific types now being easily available, and covering by far the majority of the temperature and environmental applications.

These thermocouples are made to conform to an e.m.f/ temperature relationship specified in the form of tabulated values of e.m.f's resolved normally to 1mV against temperature in 1C intervals, and vice versa. Internationally, these reference tables are published as IEC 584 1, 2 & 4, which is based on the International Temperature Scale ITS-90. It is worth noting here, however, that the standards do not address the construction or insulation of the cables themselves or other performance criteria. With the diversity to be found, manufacturers' own standards must be relied upon in this respect.

The standard covers the eight specified and most commonly used thermocouples, referring to their internationally recognized alpha character type designation & providing the full reference tables for each. These thermocouple types can be subdivided in 3 groups, base metal, and noble (rare) metal & Refractory metal thermocouple.

Base Metal Thermocouples

Base metal thermocouple types are composed of common, inexpensive metals such as nickel, iron and copper. The thermocouple types E, J, K, N and T are among this group and are the most commonly used type of thermocouple. Each leg of these different thermocouples is composed of a special alloy, which is usually referred to by their common names.

Type E – The type E thermocouple is composed of a positive leg of chromel (90%nickel/10%chromium) and a negative leg of constantan (45%nickel/55% copper). The temperature range for this thermocouple is -200 to 900°C (-330 to 16000F).

Type J – Type J thermocouples have an iron positive leg and a constantan negative leg. Type J thermocouples have a useful temperature range of 0 to 750°C (32 to 1400 °F) and can be used in vacuum, oxidizing, reducing and inert atmospheres.

Type K – The type K thermocouple has a Chromel (90% nickel/10% copper) positive leg and an Alumel (95%nickel/ 5% manganese, aluminum and silicon) negative leg. The temperature range for type K alloys is -200 to 1250°C (-328 to 2282°F).

Type N – Type N thermocouples are made with a Nicrosil (74.1%nickel – 14.4% chromium – 1.4 % silicon.0.1%magnesium) positive leg and a Nisil (95.6% nickel to 4.4% silicon) negative leg. The temperature range for Type N is -270 to 1300°C (-450 to 2372°F).

Type T – Type T thermocouples are made with a copper positive leg and a constantan negative leg. The temperature range for type T is -200 to 350°C (-328 to 662°F).

Thermocouple Type	Material + & -	Temperature Range(°C)	Application
E	Chromel & Constantan (Ni-Cr & Cu-Ni)	-200 to 900°C	Inert media, Oxidizing media
J	Iron & Constantan (Fe & Cu-Ni)	0 to 750°C	Inert media, Oxidizing media, Reducing media Vacuum
K	Chromel & Alumel (Ni-Cr & Ni-Al)	-200 to 1250°C	Inert media, Oxidizing media
N	Nicrosil & Nisil (Ni-Cr & Ni-Si)	-270 to 1300°C	Inert media, Oxidizing media
T	Copper & Constantan (Cu & Cu-Ni)	-200 to 350°C	Inert media, Oxidizing media, Reducing media Vacuum

THERMOCOUPLE CONDUCTORS

All base metal thermocouples are offered according to ANSI/ASTM standards.

Type : K, T, J, N, E.

Dia : 0.16mm to 8 mm Dia

Standard : ANSI MC 96.1, ASTM E 230, other standard as per customer requirement.

THERMOCOUPLE CONDUCTORS

Type	Conductor (*) Chemical Composition %					Conductor (-) Chemical Composition %			Temp Range	American Standard ASTM E230/ANSI MC95.2			European Standard IEC 584		
	Ni	Cr	Fe	Cu	Others	Cu	Ni	Others		T/c Range	Class 1 (0.4%)	Class 2 (0.75%)	T/c Range	Class 1 (0.4%)	Class 2 (0.75%)
K	90	10	-	-	-	-	94	Mn+ Si+ Others	-200°C to +1260°C	0°C to 1260°C	±1.1°C	±2.2°C	0°C to 1260°C	±1.5°C	±2.5°C
N	84.4	14.2	-	-	Si 1.4	-	95.6	Si 4.4	-200°C to +1260°C	0°C to 1260°C	±1.1°C	±2.2°C	0°C to 1260°C	±1.5°C	±2.5°C
J	-	-	100	-	-	Bal	44	Mn+	-40°C to +760°C	0°C to 760°C	±1.1°C	±2.2°C	0°C to 760°C	±1.5°C	±2.5°C
T	-	-	-	100	-	Bal	44	Mn+	-200°C to +370°C	0°C to 370°C	±0.5°C	±1°C	0°C to 370°C	±0.5°C	±1°C
E	90	10	-	-	-	Bal	44	Mn+	-200°C to +870°C	0°C to 870°C	±1.1°C	±1.7°C	0°C to 870°C	±1.5°C	±2.5°C

- Available with high linearity, sensitivity, stability & homogeneity and with anti oxidizing properties.
- Available in bright and oxidized form.
- Special alloy and special curves can be provided for MI cable application.
- Stranded conductors also available.

EXTENSION/COMPENSATING CONDUCTOR ALLOY

Type : KX, TX, JX, NX, EX, KCA, KCB, RCB/SCB.

Dia : 0.16mm to 3.0 mm Dia

Standard : ANSI MC 96.1, other standard as per customer requirement.

Type	Conductor (*) Chemical Composition %					Conductor (-) Chemical Composition %			American Standard ASTM E230/ANSI MC95.2			European Standard IEC 584		
	Ni	Cr	Fe	Cu	Others	Cu	Ni	Others	T/c Range	Class 1	Class 2	T/c Range	Class 1	Class 2
KX	90	10	-	-	Si+	-	94	Si+ Mn+ Others	0°C to 200°C	±1.1°C	±2.2°C	-25°C to 200°C	±1.5°C	±2.5°C
KCA (WX)	-	-	100	-	-	Bal	43	Mn 2 - Fe 2	-	-	-	0°C to 150°C	-	±2.5°C
KCB (VX)	-	-	-	100	-	Bal	44	-	-	-	-	0°C to 100°C	-	±2.5°C
NX	84.4	14.2	-	-	Si 1.4	-	95.6	Si 4.4	0°C to 200°C	±1.1°C	±2.2°C	-25°C to 200°C	±1.5°C	±2.5°C
JX	-	-	100	-	-	Bal	44	Mn+	0°C to 200°C	±1.1°C	±2.2°C	-25°C to 200°C	±1.5°C	±2.5°C
TX	-	-	-	100	-	Bal	44	Mn+	0°C to 100°C	±0.5°C	±1°C	-25°C to 100°C	±0.5°C	±1°C
EX	90	10	-	-	-	Bal	44	Mn+	0°C to 200°C	±1°C	±1.7°C	-25°C to 200°C	±1.5°C	±2.5°C
RCB/SCB	-	100	-	-	-	2	95	Mn+	0°C to 100°C	-	-	-25°C to 200°C	-	±2.5°C

PURE NICKEL CONDUCTOR ALLOY

Nickel as a material has very high corrosion resistivity & high conductivity as well as high melting point. It has proper resistance, good radiation coefficient and provides great heat transfer coefficient.

Dia : 0.16 to 3.0 mm

80/20 Ni Cr RESISTANCE WIRE

80/20 Ni Cr Resistance Wire is used at operating temperatures up to 1200°C (2200°F). Its chemical composition gives good oxidation resistance especially under conditions of frequent switching or wide temperature fluctuations. 80/20 Ni Cr is known for their high mechanical strength and their high creep strength.

Dia : 0.16 mm to 25 mm

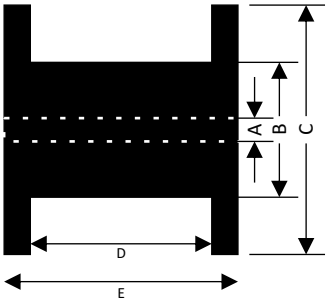
PACKAGING AND SHIPPING

Wire in coils, spools and cut lengths / bars

We offer a wide variety of packaging in the form of coils, spools and cut lengths. All items are clearly labelled with customer's order number, alloy, dimensions and weight. There is also the option to supply neutral labels or labels with the customer's branding on them. Special packaging to individual requirements may also be available on request.

We deliver globally and all products are securely packed suitable for transporting by road, air courier or sea depending on shipment size and delivery location.

SPOOLS SIZES



Spool Type	A	B	C	D	E	Wire Diameter Range	Max. Weight
 DIN 80	16mm	50mm	80mm	64mm	80mm	upto 0.25mm	0.800 kg
 DIN100	16mm	64mm	100mm	80mm	100mm	0.19 - 0.4mm	1.500kg
 DIN125	16mm	80mm	125mm	100mm	125mm	0.19 - 0.55mm	3kg
 DIN160	22mm	100mm	160mm	128mm	160mm	0.25 - 0.71mm	5 kg
 DIN200	36mm	125mm	200mm	160mm	200mm	0.4 - 0.81mm	10kg
 DIN250	36mm	160mm	250mm	160mm	200mm	0.4 - 1.5mm	20kg
 DIN355	36mm	225mm	355mm	162mm	200mm	1.0 - 3.0mm	40KG
 DIN500	36mm	316mm	500mm	180mm	250mm	1.2 - 3.0mm	75kg

TEMPSENS TECHNICAL DATASHEET FOR (KP) & (KPX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens KP is used as positive leg for the thermocouple type-K (KP) as well as the positive leg for extension type-K (KPX)

Leg	Chromel
Chemical Composition	(Ni + 10% Cr)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.73

Melting Point	
C	C-1427
F	F-2600

Magnetic Attraction
NO

Electrical Resistivity in µΩ x cm at +20°C
70.6

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	610	28	130
Hard	970	2	>310

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**400**	**600**	**800**	**1000**	**1200**
2	**E.M.F. (mV) (KP)**	2.814	5.97	12.764	19.618	26.205	32.499	38.508
3	**E.M.F. (mV) (KPX)**	2.814	5.97					

Tempsens KP & KPX is supplied in the form of bare wire with dimension from 8.00 mm to 0.20mm.
Tempsens KP & KPX can also be supplied in the form of stranding wire and rods.

SWG

SWG	Diam. (mm)	Length (m/kg)	Weight (g/m)
8	4.064	8.84	113.1
9	3.658	10.91	91.64
10	3.251	13.82	72.38
12	2.642	20.92	47.8
14	2.032	35.36	28.28
16	1.626	55.23	18.11
18	1.219	98.26	10.19
19	1.016	141	7.07
20	0.914	175	5.72
21	0.813	221	4.53
22	0.711	289	3.46
24	0.559	467	2.14
26	0.457	699	1.43
30	0.315	1472	0.68
34	0.234	2667	0.38
36	0.193	3920	0.26

B & S (AWG)

B & S or AWG	Diam. (mm)	Length (m/kg)	Weight (g/m)
6	4.115	8.62	116
7	3.658	10.91	91.64
8	3.251	13.82	72.38
10	2.591	21.75	45.98
12	2.057	34.51	28.98
14	1.626	55.23	18.11
16	1.295	87.07	11.49
18	1.016	141	7.07
20	0.813	221	4.53
22	0.643	353	2.83
24	0.511	559	1.79
25	0.455	705	1.418
26	0.404	895	1.12
28	0.32	1426	0.7
32	0.203	3543	0.28

METRIC

Diam. (mm)	Length (m/kg)	Weight (g/m)	Diam. (mm)	Length (m/kg)	Weight (g/m)
8.00	2.28	438.3	1.20	101	9.86
7.00	2.98	335.6	1.15	110	9.06
6.00	4.06	246.6	1.13	114	8.75
4.70	6.61	151.3	1.00	146	6.85
4.00	9.13	109.6	0.81	223	4.49
3.90	9.60	104.2	0.64	356	2.81
3.26	13.74	72.8	0.63	368	2.72
3.20	14.26	70.1	0.60	406	2.47
3.00	16.22	61.6	0.51	561	1.78
2.50	23.36	42.8	0.50	584	1.71
2.30	27.60	36.2	0.45	721	1.39
2.05	34.74	28.8	0.40	913	1.10
2.00	36.50	27.4	0.32	1426	0.70
1.63	54.96	18.2	0.30	1622	0.62
1.50	64.89	15.4	0.25	2336	0.43
1.40	74.50	13.14	0.20	3650	0.27
1.29	87.74	11.41			

TEMPSENS TECHNICAL DATA SHEET FOR (KN) & (KNX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens KN is used as negative leg for the thermocouple type-K (KN) as well as the negative leg for extension type-K (KNX)

Leg	Alumel
Chemical Composition	(Ni 95% + Si + Mn)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.6

Melting Point	
C	C-1399
F	F-2550

Magnetic Attraction
Yes

Electrical Resistivity in µΩ x cm at +20°C
29.4

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)	
Soft	600
Hard	>1.050

Elongation
35
<2

Hardness (HV10)
100
>300

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**400**	**600**	**800**	**1000**	**1200**
2	**E.m.f (mV) (KN)**	1.283	2.168	3.633	5.287	7.07	8.777	10.33
3	**E.m.f (mV) (KNX)**	1.283	2.168					

Tempsens KN & KNX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens KN & KNX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	8.961	111.6
9	3.658	1.061	90.38
10	3.251	4.012	71.39
12	2.642	1.213	47.15
14	2.032	5.865	27.89
16	1.626	6.009	17.86
18	1.219	9.63	10.04
19	1.016	143	6.97
20	0.914	177	5.64
21	0.813	224	4.46
22	0.711	293	3.41
24	0.559	474	2.11
26	0.457	709	1.41
30	0.315	1492	0.67
34	0.234	2704	0.37
36	0.193	3975	0.25

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.7	114.4
7	3.658	11.1	90.38
8	3.251	14.0	71.39
10	2.591	22.1	45.34
12	2.057	35.0	28.58
14	1.626	56.0	17.86
16	1.295	88.3	11.33
18	1.016	143.0	6.97
20	0.813	224.0	4.46
22	0.643	353.0	2.79
24	0.511	567.0	1.76
25	0.455	715.0	1.36
26	0.404	907.0	1.10
28	0.320	1446.0	0.69
32	0.203	3593.0	0.28

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.31	432.3	1.20	103	9.73
7.00	3.02	331	1.15	112	8.93
6.00	4.11	243.2	1.13	116	8.62
4.70	6.7	149.2	1.00	148	6.75
4.00	9.25	108.1	0.81	226	4.43
3.90	9.73	102.7	0.64	361	2.77
3.26	13.93	71.78	0.63	373	2.68
3.20	14.46	69.17	0.60	411	2.43
3.00	16.45	60.79	0.51	569	1.76
2.50	23.69	42.22	0.50	592	1.69
2.30	27.99	35.73	0.45	731	1.37
2.05	35.23	28.39	0.40	925	1.08
2.00	37.01	27.02	0.32	1446	0.69
1.63	55.72	17.95	0.30	1645	0.61
1.50	65.8	15.2	0.25	2369	0.42
1.40	75.54	13.24	0.20	3701	0.27

TEMPSENS TECHNICAL DATA SHEET FOR (KNCB)/(VNX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens KNCB/VNX is used as Negative leg for the Compensating grade Type K.

Leg	CONSTANTAN
Chemical Composition	(44% Ni-balance Cu)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.6

Melting Point	
C	C- 1280
F	F- 2156

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
49

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	420	30	95
Hard	> 740	2	>230

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**
2	**E.m.f (mV) (KNCB)**	3.323

Tempsens KNCB/VNX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens KNCB/VNX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	8.66	115.4
9	3.658	10.69	93.53
10	3.251	13.54	73.88
12	2.642	20.5	48.79
14	2.032	34.65	28.86
16	1.626	54.11	18.48
18	1.219	96.27	10.39
19	1.016	138.6	7.22
20	0.914	171.2	5.84
21	0.813	216.4	4.62
22	0.711	283	3.53
24	0.559	457.8	2.18
26	0.457	685	1.46
30	0.315	1442	0.69
34	0.234	2613	0.38
36	0.193	3841	0.26

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.4	118.4
7	3.658	10.7	93.53
8	3.251	13.5	73.88
10	2.591	21.3	46.93
12	2.057	33.8	29.58
14	1.626	54.1	18.48
16	1.295	85.3	11.72
18	1.016	139.0	7.22
20	0.813	216.0	4.62
22	0.643	346.0	2.89
24	0.511	548.0	1.83
25	0.455	691.0	1.45
26	0.404	877.0	1.14
28	0.320	1397.0	0.72
32	0.203	3472.0	0.29

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.24	447.4	1.20	99	10.07
7.00	2.92	342.5	1.15	108	9.24
6.00	3.97	251.6	1.13	112	8.93
4.70	6.48	154.4	1.00	143	6.99
4.00	8.94	111.8	0.81	218	4.59
3.90	9.41	106.3	0.64	349	2.86
3.26	13.46	74.29	0.63	360	2.77
3.20	13.97	71.58	0.60	397	2.52
3.00	15.9	62.91	0.51	550	1.82
2.50	22.89	43.69	0.50	572	1.75
2.30	27.04	36.98	0.45	707	1.42
2.05	34.04	29.38	0.40	894	1.12
2.00	35.77	27.96	0.32	1397	0.72
1.63	53.84	18.57	0.30	1590	0.63
1.50	63.58	15.73	0.25	2289	0.44
1.40	72.99	13.7	0.20	3577	0.28
1.29	85.97	11.63			

TEMPSENS TECHNICAL DATA SHEET FOR (JP) & (JPX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens JP is used as positive leg for the thermocouple type-J (JP) as well as the positive leg for extension type-J (JPX)

Leg	IRON
Chemical Composition	(Fe 100%)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	7.86

Melting Point	
C	C- 1490
F	F- 2715

Magnetic Attraction
YES

Electrical Resistivity in µΩ x cm at +20°C
12

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)	
Soft	370
Hard	>600

Elongation
28
0-1

Hardness (HV10)
90
200

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**400**	**600**	**700**
2	**E.m.f (mV) (JP)**	1.78	3.38	5.74	7.73	9.08
3	**E.m.f (mV) (JPX)**	1.78	3.38			

Tempsens JP & JPX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM.
Tempsens JP & JPX can also be supplied in the form of stranding wire and rods.

SWG

SWG	Diam. (mm)	Length (m/kg)	Weight (g/m)
8	4.064	9.8	102.0
9	3.658	12.1	82.6
10	3.251	15.3	65.24
12	2.642	23.2	43.09
14	2.032	39.2	25.49
16	1.626	61.3	16.32
18	1.219	109	9.17
19	1.016	157	6.37
20	0.914	194	5.16
21	0.813	245	4.08
22	0.711	320	3.12
24	0.559	518	1.93
26	0.457	776	1.29
30	0.315	1633	0.61
34	0.234	2958	0.34
36	0.193	4349	0.23

B & S (AWG)

B & S or AWG	Diam. (mm)	Length (m/kg)	Weight (g/m)
6	4.115	9.57	104.51
7	3.658	12.11	82.60
8	3.251	15.33	65.24
10	2.591	24.13	41.44
12	2.057	38.28	26.12
14	1.626	61.27	16.32
16	1.295	96.59	10.35
18	1.016	157	6.37
20	0.813	245	4.08
22	0.643	392	2.55
24	0.511	620	1.61
25	0.455	783	1.28
26	0.404	992	1.01
28	0.32	1582	0.63
32	0.203	3931	0.25

METRIC

Diam. (mm)	Length (m/kg)	Weight (g/m)	Diam. (mm)	Length (m/kg)	Weight (g/m)
8.00	2.53	395.1	1.20	112	8.89
7.00	3.31	302.5	1.15	122	8.16
6.00	4.5	222.2	1.13	127	7.88
4.70	7.33	136.4	1.00	162	6.17
4.00	10.12	98.77	0.81	247	4.05
3.90	10.65	93.89	0.64	395	2.53
3.26	15.24	65.61	0.63	408	2.45
3.20	15.82	63.21	0.60	450	2.22
3.00	18	55.56	0.51	623	1.61
2.50	25.92	38.58	0.50	648	1.54
2.30	30.62	32.66	0.45	800	1.25
2.05	38.55	25.94	0.40	1012	0.99
2.00	40.50	24.69	0.32	1582	0.63
1.63	60.97	16.4	0.30	1800	0.56
1.50	72	13.89	0.25	2592	0.39
1.40	82.65	12.1	0.20	4050	0.25
1.29	97.34	10.27			

TEMPSENS TECHNICAL DATA SHEET FOR (JN) & (JNX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens JN is used as negative leg for the thermocouple type-J (JN) as well as the negative leg for extension type-J (JNX).

Leg	CONSTANTAN
Chemical Composition	(Ni 44% + Cu 56%)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.92

Melting Point	
C	C- 1220
F	F-2228

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
49

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	420	30	95
Hard	> 740	2	> 230

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**400**	**600**	**700**
2	**E.m.f (mV) (JN)**	3.49	7.404	16.105	25.368	30.053
3	**E.m.f (mV) (JNX)**	3.49	7.404			

Tempsens JN & JNX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens JN & JNX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	8.66	115.4
9	3.658	10.69	93.53
10	3.251	13.54	73.88
12	2.642	20.5	48.79
14	2.032	34.65	28.86
16	1.626	54.11	18.48
18	1.219	96.27	10.39
19	1.016	138.6	7.22
20	0.914	171.2	5.84
21	0.813	216.4	4.62
22	0.711	283	3.53
24	0.559	457.8	2.18
26	0.457	685	1.46
30	0.315	1442	0.69
34	0.234	2613	0.38
36	0.193	3841	0.26

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.4	118.4
7	3.658	10.7	93.53
8	3.251	13.5	73.88
10	2.591	21.3	46.93
12	2.057	33.8	29.58
14	1.626	54.1	18.48
16	1.295	85.3	11.72
18	1.016	139	7.22
20	0.813	216	4.62
22	0.643	346	2.89
24	0.511	548	1.83
25	0.455	691	1.45
26	0.404	877	1.14
28	0.32	1397	0.72
32	0.203	3472	0.29

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.24	447.4	1.20	99	10.07
7.00	2.92	342.5	1.15	108	9.24
6.00	3.97	251.6	1.13	112	8.93
4.70	6.48	154.4	1.00	143	6.99
4.00	8.94	111.8	0.81	218	4.59
3.90	9.41	106.3	0.64	349	2.86
3.26	13.46	74.29	0.63	360	2.77
3.20	13.97	71.58	0.60	397	2.52
3.00	15.9	62.91	0.51	550	1.82
2.50	22.89	43.69	0.50	572	1.75
2.30	27.04	36.98	0.45	707	1.42
2.05	34.04	29.38	0.40	894	1.12
2.00	35.77	27.96	0.32	1397	0.72
1.63	53.84	18.57	0.30	1590	0.63
1.50	63.58	15.73	0.25	2289	0.44
1.40	72.99	13.7	0.20	3577	0.28
1.29	85.97	11.63			

TEMPSENS TECHNICAL DATA SHEET FOR (EP) & (EPX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens EP is used as Positive leg for the thermocouple type-E (EP) as well as the Positive leg for extension type-E (EPX).

Leg	CHROMEL
Chemical Composition	(Ni+ 10 % Cr)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.73

Melting Point	
C	C- 1427
F	F-2600

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
70.6

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	610	28	130
Hard	970	2	> 130

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**300**	**400**	**600**	**700**	**800**
2	**E.m.f (mV) (EP)**	2.814	5.97	9.323	12.764	19.618	22.951	26.205
3	**E.m.f (mV) (EPX)**	2.814	5.97					

Tempsens EP & EPX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens EP & EPX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	8.84	113.1
9	3.658	10.91	91.64
10	3.251	13.82	72.38
12	2.642	20.92	47.8
14	2.032	35.36	28.28
16	1.626	55.23	18.11
18	1.219	98.26	10.18
19	1.016	141	7.07
20	0.914	175	5.72
21	0.813	221	4.53
22	0.711	289	3.46
24	0.559	467	2.14
26	0.457	699	1.43
30	0.315	1472	0.68
34	0.234	2667	0.38
36	0.193	3920	0.26

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.62	116
7	3.658	10.91	91.64
8	3.251	13.82	72.38
10	2.591	21.75	45.98
12	2.057	34.51	28.98
14	1.626	55.23	18.11
16	1.295	87.07	11.49
18	1.016	141	7.07
20	0.813	221	4.53
22	0.643	353	2.83
24	0.511	559	1.79
25	0.455	705	1.418
26	0.404	895	1.12
28	0.32	1426	0.70
32	0.203	3543	0.28

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.28	438.3	1.20	101	9.86
7.00	2.98	335.6	1.15	110	9.06
6.00	4.06	246.6	1.13	114	8.75
4.70	6.61	151.3	1.00	146	6.85
4.00	9.13	109.6	0.81	223	4.49
3.90	9.60	104.2	0.64	356	2.81
3.26	13.74	72.8	0.63	368	2.72
3.20	14.26	70.1	0.60	406	2.47
3.00	16.22	61.6	0.51	561	1.78
2.50	23.36	42.8	0.50	584	1.71
2.30	27.60	36.2	0.45	721	1.39
2.05	34.74	28.8	0.40	913	1.10
2.00	36.50	27.4	0.32	1426	0.70
1.63	54.96	18.2	0.30	1622	0.62
1.50	64.89	15.4	0.25	2336	0.43
1.40	74.50	13.41	0.20	3650	0.27
1.29	87.74	11.41			

TEMPSENS TECHNICAL DATA SHEET FOR (EN) & (ENX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens EN is used as negative leg for the thermocouple type-E (EN) as well as the negative leg for extension type-E (ENX).

Leg	CONSTANTAN
Chemical Composition	(Ni 44% + Cu 56%)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.92

Melting Point	
C	C- 1220
F	F-2228

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
49

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	420	30	95
Hard	> 740	2	> 230

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**300**	**400**	**600**	**700**	**800**
2	**E.m.f (mV) (EN)**	3.505	7.457	11.71	16.18	25.48	30.16	34.81
3	**E.m.f (mV) (ENX)**	3.505	7.457					

Tempsens EN & ENX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens EN & ENX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	8.66	115.4
9	3.658	10.69	93.53
10	3.251	13.54	73.88
12	2.642	20.5	48.79
14	2.032	34.65	28.86
16	1.626	54.11	18.48
18	1.219	96.27	10.39
19	1.016	138.6	7.22
20	0.914	171.2	5.84
21	0.813	216.4	4.62
22	0.711	283	3.53
24	0.559	457.8	2.18
26	0.457	685	1.46
30	0.315	1442	0.69
34	0.234	2613	0.38
36	0.193	3841	0.26

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.4	118.4
7	3.658	10.7	93.53
8	3.251	13.5	73.88
10	2.591	21.3	46.93
12	2.057	33.8	29.58
14	1.626	54.1	18.48
16	1.295	85.3	11.72
18	1.016	139	7.22
20	0.813	216	4.62
22	0.643	346	2.89
24	0.511	548	1.83
25	0.455	691	1.45
26	0.404	877	1.14
28	0.32	1397	0.72
32	0.203	3472	0.29

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.24	447.4	1.20	99	10.07
7.00	2.92	342.5	1.15	108	9.24
6.00	3.97	251.6	1.13	112	8.93
4.70	6.48	154.4	1.00	143	6.99
4.00	8.94	111.8	0.81	218	4.59
3.90	9.41	106.3	0.64	349	2.86
3.26	13.46	74.29	0.63	360	2.77
3.20	13.97	71.58	0.60	397	2.52
3.00	15.9	62.91	0.51	550	1.82
2.50	22.89	43.69	0.50	572	1.75
2.30	27.04	36.98	0.45	707	1.42
2.05	34.04	29.38	0.40	894	1.12
2.00	35.77	27.96	0.32	1397	0.72
1.63	53.84	18.57	0.30	1590	0.63
1.50	63.58	15.73	0.25	2289	0.44
1.40	72.99	13.7	0.20	3577	0.28
1.29	85.97	11.63			

TEMPSENS TECHNICAL DATA SHEET FOR (NP) & (NPX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens NP is used as Positive leg for the thermocouple type-N (NP) as well as the Positive leg for extension type-N (NPX)

Leg	NICROSIL
Chemical Composition	(Ni 84% + 14% Cr + Si)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.5

Melting Point	
C	C- 1420
F	F- 2590

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
97.8

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	650	30	160
Hard	> 1.300	<2	400

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**400**	**600**	**800**	**1000**	**1200**
2	**E.m.f (mV) (NP)**	1.784	3.943	8.919	14.37	20.094	26.046	32.144
3	**E.m.f (mV) (NPX)**	1.784	3.943					

Tempsens NP & NPX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens NP & NPX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	9.00	110.6
9	3.658	11.2	89.65
10	3.251	14.1	70.81
12	2.642	21.4	46.76
14	2.032	36.2	27.66
16	1.626	56.50	17.71
18	1.219	100	9.96
19	1.016	145	6.92
20	0.914	179	5.6
21	0.813	226	4.43
22	0.711	295	3.39
24	0.559	478	2.09
26	0.457	715	1.4
30	0.315	1504	0.66
34	0.234	2726	0.37
36	0.193	4007	0.25

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.8	113.4
7	3.658	11.2	89.65
8	3.251	14.1	70.81
10	2.591	22.2	44.98
12	2.057	35.3	28.35
14	1.626	56.5	17.71
16	1.295	89.0	11.24
18	1.016	145.0	6.92
20	0.813	226.0	4.43
22	0.643	361.0	2.77
24	0.511	572.0	1.75
25	0.455	721.0	1.39
26	0.404	915.0	1.09
28	0.320	1458.0	0.69
32	0.203	3622.0	0.28

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.33	428.8	1.20	104	9.65
7.00	3.05	328.3	1.15	113	8.86
6.00	4.15	241.2	1.13	117	8.55
4.70	6.76	148	1.00	149	6.7
4.00	9.33	107.2	0.81	228	4.4
3.90	9.81	101.9	0.64	364	2.74
3.26	14.05	71.2	0.63	376	2.66
3.20	14.58	68.6	0.60	415	2.41
3.00	16.59	60.3	0.51	574	1.74
2.50	23.88	41.87	0.50	597	1.67
2.30	28.22	35.44	0.45	737	1.36
2.05	35.52	28.15	0.40	933	1.07
2.00	37.32	26.8	0.32	1458	0.69
1.63	56.18	17.8	0.30	1659	0.6
1.50	66.34	15.07	0.25	2388	0.42
1.40	76.16	13.13	0.20	3732	0.27
1.29	89.7	11.15			

TEMPSENS TECHNICAL DATA SHEET FOR (NN) & (NNX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens NN is used as negative leg for the thermocouple type-N (NN) as well as the negative leg for extension type-N (NNX)

Leg	NISIL
Chemical Composition	(Ni 95% + 5% Si)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.55

Melting Point	
C	C- 1330
F	F- 2425

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
34.6

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	650	30	130
Hard	>1.200	<2	450

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**400**	**600**	**800**	**1000**	**1200**
2	**E.m.f (mV) (NN)**	0.99	1.97	4.055	6.243	8.36	10.21	11.702
3	**E.m.f (mV) (NNX)**	0.99	1.97					

Tempsens EN & ENX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens EN & ENX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	9.0	111.3
9	3.658	11.1	90.17
10	3.251	14	71.22
12	2.642	21.3	47.04
14	2.032	35.9	27.82
16	1.626	56.10	17.82
18	1.219	100	10.01
19	1.016	144	6.96
20	0.914	178	5.63
21	0.813	225	4.45
22	0.711	294	3.41
24	0.559	475	2.11
26	0.457	711	1.41
30	0.315	1496	0.67
34	0.234	2710	0.37
36	0.193	3984	0.25

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.8	114.1
7	3.658	11.1	90.17
8	3.251	14.0	71.22
10	2.591	22.1	45.24
12	2.057	35.1	28.51
14	1.626	56.1	17.82
16	1.295	88.5	11.3
18	1.016	144.0	6.96
20	0.813	225.0	4.45
22	0.643	359.0	2.79
24	0.511	568.0	1.76
25	0.455	717.0	1.4
26	0.404	909.0	1.10
28	0.320	1449.0	0.69
32	0.203	3601.0	0.28

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.32	431.3	1.20	103	9.7
7.00	3.03	330.2	1.15	112	8.91
6.00	4.12	242.6	1.13	116	8.6
4.70	6.72	148.9	1.00	148	6.74
4.00	9.27	107.8	0.81	226	4.42
3.90	9.76	102.5	0.64	362	2.76
3.26	13.96	71.62	0.63	374	2.67
3.20	14.49	69	0.60	412	2.43
3.00	16.49	60.65	0.51	571	1.75
2.50	23.74	42.12	0.50	594	1.68
2.30	28.05	35.65	0.45	733	1.37
2.05	35.31	28.32	0.40	927	1.08
2.00	37.10	26.95	0.32	1449	0.69
1.63	55.85	17.9	0.30	1649	0.61
1.50	65.95	15.16	0.25	2374	0.42
1.40	75.71	13.21	0.20	3710	0.27
1.29	89.181	11.21			

Tempsens Technical Data Sheet for (RNCA) & (SNCA) Type Conductor

Feature & Application Notes

Tempsens RNCA&SNCA is used as Negative leg for the Compensating grade Type R&S

Leg	CONSTANTAN
Chemical Composition	(Cu 95% + Ni 3%+Mn)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.91

Melting Point	
C	C- 1080
F	F- 1976

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
12

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	320	33	90
Hard	>500	2	>170

Thermoelectrical and Electrical Values in Soft-Annealed Condition

	Standard E.M.F. Against PT67	
1	**Temperature**	**100**
2	**E.m.f (mV) (RNCA)**	0.126
3	**E.m.f (mV) (SNCA)**	0.126

Tempsens RNCA & SNCA is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens RNCA & SNCA can also be supplied in the form of stranding wire and rods.

SWG

SWG	Diam. (mm)	Length (m/kg)	Weight (g/m)
8	4.064	8.70	115.6
9	3.658	10.7	93.64
10	3.251	13.5	73.96
12	2.642	20.5	48.85
14	2.032	34.6	28.89
16	1.626	54.00	18.5
18	1.219	96	10.4
19	1.016	138	7.22
20	0.914	171	5.85
21	0.813	216	4.63
22	0.711	283	3.54
24	0.559	457	2.19
26	0.457	684	1.46
30	0.315	1440	0.69
34	0.234	2610	0.38
36	0.193	3836	0.26

B & S (AWG)

B & S or AWG	Diam. (mm)	Length (m/kg)	Weight (g/m)
6	4.115	8.4	118.5
7	3.658	10.7	93.64
8	3.251	13.5	73.96
10	2.591	21.3	46.98
12	2.057	33.8	29.61
14	1.626	54.0	18.5
16	1.295	85.2	11.74
18	1.016	138.0	7.22
20	0.813	216.0	4.63
22	0.643	346.0	2.89
24	0.511	547.0	1.83
25	0.455	690.0	1.45
26	0.404	876.0	1.14
28	0.320	1390.0	0.72
32	0.203	3468.0	0.29

METRIC

Diam. (mm)	Length (m/kg)	Weight (g/m)	Diam. (mm)	Length (m/kg)	Weight (g/m)
8.00	2.23	447.9	1.20	99	10.08
7.00	2.92	342.9	1.15	108	9.25
6.00	3.97	251.9	1.13	112	8.94
4.70	6.47	154.6	1.00	143	7.00
4.00	8.93	112	0.81	218	4.59
3.90	9.40	106.4	0.64	349	2.87
3.26	13.45	74.37	0.63	360	2.78
3.20	13.96	71.66	0.60	397	2.52
3.00	15.88	62.98	0.51	549	1.82
2.50	22.86	43.74	0.50	572	1.75
2.30	27.01	37.02	0.45	706	1.42
2.05	34	29.41	0.40	893	1.12
2.00	35.73	27.99	0.32	1396	0.72
1.63	53.78	18.59	0.30	1588	0.63
1.50	63.51	15.75	0.25	2286	0.44
1.40	72.91	13.72	0.20	3573	0.28
1.29	85.87	11.65			

TEMPSENS TECHNICAL DATA SHEET FOR (TP) & (TPX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens TP is used as Positive leg for the thermocouple type-T (TP) as well as the Positive leg for extension type-T (TPX)

Leg	COPPER
Chemical Composition	(Cu 100%)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.91

Melting Point	
C	C- 1080
F	F- 1976

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
1.7

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	200	30	55
Hard	400	3	120

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**300**	**400**
2	**E.m.f (mV) (TP)**	0.773	1.837	3.149	4.69
3	**E.m.f (mV) (TPX)**	0.773	1.837		

Tempsens TP & TPX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens TP & TPX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	8.70	115.6
9	3.658	10.7	93.64
10	3.251	13.5	73.96
12	2.642	20.5	48.85
14	2.032	34.6	28.89
16	1.626	54.00	18.5
18	1.219	96	10.4
19	1.016	138	7.22
20	0.914	171	5.85
21	0.813	216	4.63
22	0.711	283	3.54
24	0.559	457	2.19
26	0.457	684	1.46
30	0.315	1440	0.69
34	0.234	2610	0.38
36	0.193	3836	0.26

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.4	118.5
7	3.658	10.7	93.64
8	3.251	13.5	73.96
10	2.591	21.3	46.98
12	2.057	33.8	29.61
14	1.626	54.0	18.5
16	1.295	85.2	11.74
18	1.016	138.0	7.22
20	0.813	216.0	4.63
22	0.643	346.0	2.89
24	0.511	547.0	1.83
25	0.455	690.0	1.45
26	0.404	876.0	1.14
28	0.320	1390.0	0.72
32	0.203	3468.0	0.29

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.23	447.9	1.20	99	10.08
7.00	2.92	342.9	1.15	108	9.25
6.00	3.97	251.9	1.13	112	8.94
4.70	6.47	154.6	1.00	143	7.00
4.00	8.93	112	0.81	218	4.59
3.90	9.40	106.4	0.64	349	2.87
3.26	13.45	74.37	0.63	360	2.78
3.20	13.96	71.66	0.60	397	2.52
3.00	15.88	62.98	0.51	549	1.82
2.50	22.86	43.74	0.50	572	1.75
2.30	27.01	37.02	0.45	706	1.42
2.05	34	29.41	0.40	893	1.12
2.00	35.73	27.99	0.32	1396	0.72
1.63	53.78	18.59	0.30	1588	0.63
1.50	63.51	15.75	0.25	2286	0.44
1.40	72.91	13.72	0.20	3573	0.28
1.29	85.87	11.65			

TEMPSENS TECHNICAL DATA SHEET FOR (TN) & (TNX) TYPE CONDUCTOR

Feature & Application Notes

Tempsens TN is used as negative leg for the thermocouple type-T (TN) as well as the negative leg for extension type-T (TNX)

Leg	CONSTANTAN
Chemical Composition	(Ni 44% +56% Cu)
Application Standard	ASTM E 230/77, IEC 60584.3
Density (g/cm^3)	8.90

Melting Point	
C	C- 1330
F	F- 2425

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
49

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	420	30	95
Hard	> 740	2	>230

Thermoelectrical and Electrical Values in Soft-Annealed Condition

Standard E.M.F. Against PT67

1	**Temperature**	**100**	**200**	**300**	**400**
2	**E.m.f (mV) (TN)**	3.505	7.451	11.713	16.182
3	**E.m.f (mV) (TNX)**	3.505	7.451		

Tempsens TN & TNX is supplied in the form of bare wire with dimension from 8.00 MM to 0.20 MM. Tempsens TN & TNX can also be supplied in the form of stranding wire and rods.

SWG			
SWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8	4.064	8.66	115.4
9	3.658	10.69	93.53
10	3.251	13.54	73.88
12	2.642	20.5	48.79
14	2.032	34.65	28.86
16	1.626	54.11	18.48
18	1.219	96.27	10.39
19	1.016	138.6	7.22
20	0.914	171.2	5.84
21	0.813	216.4	4.62
22	0.711	283	3.53
24	0.559	457.8	2.18
26	0.457	685	1.46
30	0.315	1442	0.69
34	0.234	2613	0.38
36	0.193	3841	0.26

B & S (AWG)			
B & S or AWG	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
6	4.115	8.4	118.4
7	3.658	10.7	93.53
8	3.251	13.5	73.88
10	2.591	21.3	46.93
12	2.057	33.8	29.58
14	1.626	54.1	18.48
16	1.295	85.3	11.72
18	1.016	139.0	7.22
20	0.813	216.0	4.62
22	0.643	346.0	2.89
24	0.511	548.0	1.83
25	0.455	691.0	1.45
26	0.404	877.0	1.14
28	0.320	1397.0	0.72
32	0.203	3472.0	0.29

METRIC					
Diam. (mm)	**Length (m/kg)**	**Weight (g/m)**	**Diam. (mm)**	**Length (m/kg)**	**Weight (g/m)**
8.00	2.24	447.4	1.20	99	10.07
7.00	2.92	342.5	1.15	108	9.24
6.00	3.97	251.6	1.13	112	8.93
4.70	6.48	154.4	1.00	143	6.99
4.00	8.94	111.8	0.81	218	4.59
3.90	9.41	106.3	0.64	349	2.86
3.26	13.46	74.29	0.63	360	2.77
3.20	13.97	71.58	0.60	397	2.52
3.00	15.9	62.91	0.51	550	1.82
2.50	22.89	43.69	0.50	572	1.75
2.30	27.04	36.98	0.45	707	1.42
2.05	34.04	29.38	0.40	894	1.12
2.00	35.77	27.96	0.32	1397	0.72
1.63	53.84	18.57	0.30	1590	0.63
1.50	63.58	15.73	0.25	2289	0.44
1.40	72.99	13.7	0.20	3577	0.28
1.29	85.97	11.63			

TEMPSENS TECHNICAL DATA SHEET FOR 80/20 NI CR RESISTANCE WIRE

Feature & Application Notes

80/20 Ni Cr alloy is an nickel-chromium alloy for use at temperatures up to 1200°C.
80/20 Ni Cr alloys are known for their high mechanical strength and their high creep strength.
Common names: NiCr 80/20, Ni80Cr20, Chromel A, N8, Nikrothal 80, Resistohm 80, Cronix 80, Nichrome V, HAI-NiCr 80, X20H80.

Leg	Chromium - 19.5% , Manganese - .40%, Silicon - 1.25% , Nickel - Balance , Iron - .50%
Application Standard	ASTM B344
Density (g/cm^3)	8.3

Melting Point	
C	1400
F	2550

Magnetic Attraction
No

Electrical Resistivity in µΩ x cm at +20°C
1.09

Mechanical Properties at +20°C in Annealed Condition

Tensile Strength (Mpa)		Elongation	Hardness (HV10)
Soft	800	30	190
Hard	750	30	170

TEMPERATURE FACTOR OF RESISTIVITY

1	**Temperature °C**	**100**	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1000**	**1100**	**1200**
2	**Temperature °F**	212	392	572	752	932	1112	1292	1472	1652	1832	2012	2192
3	**Ct**	1.01	1.02	1.03	1.04	1.04	1.04	1.04	1.04	1.04	1.05	1.06	1.07

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