THERMOCOUPLE AND EXTENSION GRADE

BARE WIRE

This Section Contains

Wire Tables by Calibration

Reference Data

Please CALL For Quote!

If you can't find what you need

CALL!!

Phone 618-465-7623

Fax 618-465-7679

E-mail www.info@ipscustom.com

Table of Contents

Bare Wire

Type B	B P	Platinum 30% Rhodium			
Catalog Number	Wire			Inches/ Troy Oz.	Mm/gm
	Gauge	Inch	mm		
BP-24	24	.020	0.51	343	280

B N	Platinum 6% Rhodium	
Catalog Number	Inches/ Troy Oz.	Mm/gm
BN-24	294	240

Type E	E P	Chromel			
Catalog Number	Wire			Feet/ Pound	Meters/ Kilogram
	Gauge	Inch	mm		
EP-8	8	.128	3.25	21	14.1
EP-14	14	.064	1.63	83	55.6
EP-20	20	.032	0.81	331	221.9
EP-24	24	.020	0.51	840	563.3
EP-28	28	.013	0.33	2130	1428.3

E N	Constantan	
Catalog Number	Feet/ Pound	Meters/ Kilogram
EN-8	21	14.1
EN-14	83	55.6
EN-20	331	221.9
EN-24	840	563.3
EN-28	2130	1428.3

Type J	J P	Iron			
Catalog Number	Wire			Feet/ Pound	Meters/ Kilogram
	Gauge	Inch	mm		
JP-8	8	.128	3.25	22.7	15.2
JP-14	14	.064	1.63	93	62.4
JP-16	16	.051	1.29	140	94.1
JP-20	20	.032	0.81	375	251.4
JP-24	24	.020	0.51	935	626.9
JP-28	28	.013	0.33	2130	1428.3

J N	Constantan	
Catalog Number	Feet/ Pound	Meters/ Kilogram
JN-8	21	14.1
JN-14	83	55.6
JN-16	130	87.4
JN-20	331	221.9
JN-24	840	563.3
JN-28	2130	1428.3

Type K	K P	Chromel			
Catalog Number	Wire			Feet/ Pound	Meters/ Kilogram
	Gauge	Inch	mm		
KP-8	8	.128	3.25	21	14.1
KP-14	14	.064	1.63	83	55.6
KP-16	16	.051	1.29	130	87.2
KP-20	20	.032	0.81	325	221.9
KP-24	24	.020	0.51	840	563.3
KP-28	28	.013	0.33	2130	1428.3

K N	Alumel	
Catalog Number	Feet/ Pound	Meters/ Kilogram
KN-8	21	14.1
KN-14	83	55.6
KN-16	130	87.2
KN-20	325	221.9
KN-24	840	563.3
KN-28	2130	1428.3

Matched Wire: To order wire matched for accuracy, order equal amounts of bare wire at the same time. Simply state type of wire and gauge to get a matched set. ***Example:*** **8JP + JN = 8J**

Special Limits Wire: Available on request. Double type designation letter and specify gauge. *Examples:* **JJ20, KK20**

Type N	N P	Nicrosil			
Catalog Number	Wire			Feet/ Pound	Meters/ Kilogram
	Gauge	Inch	mm		
NP-8	8	.128	3.25	21	14.1
NP-14	14	.064	1.63	83	55.6
NP-20	20	.032	0.81	325	221.9

N N	Nisil		
Catalog Number		Feet/ Pound	Meters/ Kilogram
NN-8		21	14.1
NN-14		83	55.6
NN-20		325	221.9

Type R	R P	Platinum 13% Rhodium			
Catalog Number	Wire			Inches/ TroyOZ.	Mm/gm
	Gauge	Inch	mm		
RP-24	24	.020	0.51	306	249
RP-30	30	.010	0.25	1230	1005

R N	Platinum		
Catalog Number		Inches/ TroyOZ.	Mm/gm
RN-24		282	230
RN-30		1127	920

Type S	S P	Platinum 10% Rhodium			
Catalog Number	Wire			Inches/ TroyOZ.	Mm/gm
	Gauge	Inch	Mm		
SP-24	24	.020	0.51	301	245
SP-30	30	.010	0.25	1206	986
SP-38	38	.004	0.10	7510	6130

S N	Platinum		
Catalog Number		Inches/ TroyOZ.	Mm/gm
SN-24		282	230
SN-30		1127	920
RN-38		7040	5745

Type T	T P	Copper			
Catalog Number	Wire			Feet/ Pound	Meters/ Kilogram
	Gauge	Inch	mm		
TP-14	14	.064	1.63	83	55.6
TP-16	16	.051	1.29	140	94.1
TP-20	20	.032	0.81	331	221.9
TP-24	24	.020	0.51	840	563.3
TP-28	28	.013	0.33	2130	1428.3

T N	Constantan		
Catalog Number		Feet/ Pound	Meters/ Kilogram
TN-14		83	55.6
TN-16		130	87.4
TN-20		331	221.9
TN-24		840	563.3
TN-28		2130	1428.3

Quantities of bare wire ordered under 25 pounds are sold by double foot matched spools only. Quantities shipped may vary plus or minus 10% from quantity ordered unless otherwise arranged with factory. Wire straightened and cut to length available upon request.

THERMOCOUPLE WIRE REFERENCE DATA

ANSI COLOR CODE FOR THERMOCOUPLE AND THERMOCOUPLE EXTENSION WIRE							
ANSI TYPE	WIRE ALLOYS	POLARITY	THERMOCOUPLE WIRE COLOR		ANSI TYPE	T/C EXTENSION WIRE COLOR	
			INDIVIDUAL	OVERALL		INDIVIDUAL	OVERALL
T	COPPER CONSTANTAN	+TP -TN	BLUE RED	BROWN	TX	BLUE RED	BLUE
J	IRON CONSTANTAN	+JP -JN	WHITE RED	BROWN	JX	WHITE RED	BLACK
E	CHROMEL™ CONSTANTAN	+EP -EN	PURPLE RED	BROWN	EX	PURPLE RED	PURPLE
K	CHROMEL™ ALUMEL™	+KP -KN	YELLOW RED	BROWN	KX	YELOW RED	YELLOW
N	NICROSIL NISIL	+NP -NN	ORANGE RED	BROWN	NX	ORANGE RED	ORANGE
R	PLAT 13% RHOD RHODIUM	+RP -RN			RX	BLACK RED	GREEN
S	PLAT 10% RHOD PLATINUM	+SP -SN			SX	BLACK RED	GREEN
B	PLAT 30% RHOD PLAT 6% RHOD	+BP -BN			BX	GREY RED	GREY

BARE THERMOCOUPLE WIRE FEET PER POUND AND GAUGE							
WIRE GA. B & S	WIRE SIZE DIA.	TYPE J		TYPE K		TYPE E	
		IRON+ JP	CONSTANTAN JN	CHROMEL+ KP	ALUMEL- KN	CHROMEL+ EP	CONSTANTAN- EN
6	.162	14.2	12.6	13	13	13	12.6
7	.144	18.0					
8	.128	22.8	20.2	21	21	21	20.2
14	.064	91.2	80.9	83	83	83	80.9
16	.050	144	127	130	130	130	127
18	.040	233	207	212	212	212	207
20	.032	365	324	331	331	331	324
24	.020	925	821	838	838	838	821
26	.015	1478	1312	1340	1340	1340	1312
28	.012	2353	2089	2130	2130	2130	2089
30	.010	3736	3316	3370	3370	3370	3316
36	.005	14940	13260	13500	13500	13500	13260

THERMOCOUPLE WIRE DATA continued

NOMINAL THERMOCOUPLE RESISTANCE OHMS PER DOUBLE FOOT@ 68°F (20° C)								
Wire Ga. B & S	Wire Size Dia.	ANSI TYPES						
		J	K	T	E	S	R	B
6	.162	.014	.023	.012	.027	.007	.007	.008
*7	.144	.021						
8	.128	.022	.036	.019	.044	.010	.010	.013
14	.064	.089	.147	.074	.176	.044	.044	.054
16	.050	.141	.232	.117	.277	.069	.069	.086
18	.040	.229	.377	.190	.450	.112	.113	.139
20	.032	.357	.588	.297	.702	.175	.178	.218
24	.020	.905	1.488	.745	1.778	.449	.453	.550
26	.015	1.441	2.45	1.20	2.84	.701	.708	.875
28	.012	2.297	3.59	1.92	4.33	1.062	1.073	1.392
30	.010	3.65	6.02	2.94	7.19	1.794	1.813	2.213
36	.005	14.66	24.08	12.22	28.80	7.150	7.226	8.897

* Double feet 7 gauge Type J = 7 gauge Iron and 8 gauge Constantan

AMERICAN WIRE GAUGE DIMENSION IN INCHES							
AWG	DIA.	AWG	DIA.	AWG	DIA.	AWG	DIA.
6/0	.5800	9	.1144	23	.0226	37	.00445
5/0	.5165	10	.1019	24	.0201	38	.00396
4/0	.4600	11	.0907	25	.0179	39	.00353
3/0	.4096	12	.0808	26	.0159	40	.00314
2/0	.3648	13	.0720	27	.0142	41	.00280
1/0	.3249	14	.0641	28	.0126	42	.00249
1	.2893	15	.0571	29	.0113	43	.00222
2	.2576	16	.0508	30	.0100	44	.00198
3	.2294	17	.0453	31	.00893	45	.00176
4	.2043	18	.0403	32	.00795	46	.00157
5	.1819	19	.0359	33	.00708	47	.00140
6	.1620	20	.0320	34	.00630	48	.00124
7	.1443	21	.0285	35	.00561	49	.00111
8	.1285	22	.0253	36	.00500	50	.00099

THERMOCOUPLE WIRE DATA GENERAL

UPPER TEMPERATURE LIMITS FOR THERMOCOUPLES AND THERMOCOUPLE WIRE						
THERMOCOUPLE TYPE	**ANSI TYPE SYMBOL**	**WIRE GAUGE (AWG)**				
		8 ga.	**14 ga.**	**20 ga.**	**24 ga.**	**30 ga.**
Copper – Constantan	**T**		370°C (700°F)	260°C (500°F)	200°C (400°F)	150°C (300°F)
***Iron - Constantan**	**J**	760°C (1400°F)	600°C (1100°F)	500°C (900°F)	370°C (700°F)	320°C (600°F)
Chromel™ - Constantan	**E**	870°C (1600°F)	650°C (1200°F)	550°C (1000°F)	430°C (800°F)	430°C (800°F)
Chromel™ - Alumel™	**K**	1260°C (2300°F)	1100°C (2000°F)	1000°C (1800°F)	870°C (1600°F)	760°C (1400°F)
Nicrosil - Nisil	**N**	1260°C (2300°F)	1100°C (2000°F)	1000°C (1800°F)	870°C (1600°F)	760°C (1400°F)
Platinum – 10% Rhodium	**S**				1480°C (2700°F)	
Platinum – 13% Rhodium	**R**				1480°C (2700°F)	

™ Trademark Hoskins Mfg. Co.

*** Magnetic**

THERMOCOUPLE WIRE DATA GENERAL

Accuracy of IPS Thermocouple Wire

IPS insulated and bare thermocouple wire is matched to meet standard initial calibration tolerances (Standard limits) for temperatures above 0°C as given in ANSI MC96.1 and shown in the table.

Wire conforming to special initial calibration tolerances (Special limits),and wire with certified traceable calibration is available on request. Designate special limit grade wire using a double ANSI symbol (e. g. KK, JJ).

Thermocouple wire may be used to manufacture a thermocouple, keeping in mind the temperature limitations of wire size.

Color Code & Initial Calibration Tolerances

Thermocouple Wire

Type	Color Code	Initial Calibration Tolerances		
Wire Alloys	+/- Individual (Jacket)	Temperature Range	Standard Limits	Special Limits
**Iron (+) vs. Constantan(TM) (-) ANSI Symbol = J	white/red (brown)	+32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +1400°F (+750°C)	+/- 4°F (2.2°C) +/- .75%	+/- 2°F (1.1°C) +/- .4%
CHROMEL®* (+) vs. **ALUMEL®* (-) ANSI Symbol = K	yellow/red (brown)	-330°F (-200°C) to -165°F (-110°C) -165°F (-110°C) to +32°F (0°C) +32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +2300°F (+1250°C)	+/- 2% +/- 4°F (2.2°C) +/- 4°F (2.2°C) +/- .75%	 +/- 2°F (1.1°C) +/- .4%
Copper (+) vs. Constantan(TM) (-) ANSI Symbol = T	blue/red (brown)	-330°F (-200°C) to -85°F (-65°C) -85°F (-65°C) to +270°F (+130°C) +270°F (+130°C) to +660°F (+350°C)	+/- 1.5% +/- 1.8°F (1°C) +/- 75%	+/- .8% +/- .9°F (.5°C) +/- .4%
CHROMEL®* (+) vs. Constantan(TM) (-) ANSI Symbol = E	purple/red (brown)	-330°F (-200°C) to -270°F (-170°C) -270°F (-170°C) to +480°F (+250°C) +480°F (+250°C) to +640°F (+340°C) +640°F (+340°C) to +1600°F (+900°C)	+/-1% +/-3°F (1.7°C) +/-3°F (1.7°C) +/- .5%	+/- 1.8°F (1°C) +/- 1.8°F (1°C) +/- .4% +/- .4%
Nicrosil(TM) (+) vs. Nisil(TM) (-) ANSI Symbol = N	orange/red (brown)	+32°F (0°C) to +545°F (+285°C) +545°F (+285°C) to +2300°F (+1250°C)	+/- 4°F (2.2°C) +/- .75%	+/- 2°F (1.1°C) +/- .4%

NOTE: Percent limits apply directly to temperature in °C units, but for °F equivalents are applied to the numbers of °F above or below the ice point (+32°F).
(i.e. Limit (°F) = (Temp. °F-32°F) x Percentage)

Thermocouple wire cannot be expected to meet the limits of error at temperatures below the ice point unless specified at time of purchase.

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* CHROMEL® and ALUMEL® are registered Trademarks of Hoskins Manufacturing Company. IPS reserves the right to substitute equivalent product to CHROMEL® and ALUMEL® at any time.

THERMOCOUPLE WIRE DATA GENERAL

Accuracy of IPS Thermocouple Extension Wire

Thermocouple extension wire has approximately the same thermoelectric characteristic as thermocouple wire but its accuracy is guaranteed over a more limited range of temperatures. Thermocouple extension wire can offer a less expensive when used to connect a thermocouple to an instrument.

For noble metal types, an entirely different alloy is formulated to match the noble metal characteristics over a specified temperature range. This is necessary due to the high cost of the noble metals. The “X” in the ANSI code denotes extension grade wire.

Due to composition, you can not manufacture a thermocouple from noble metal extension wire.

Color Code & Initial Calibration Tolerances Thermocouple Extension Wire

Thermocouple Type		Color Code		Initial Calibration Tolerances		
Wire Alloys	ANSI Symbol	+/- Individual	Jacket	Temperature Range	Standard Limits	Special Limits
**Iron vs. Constantan(TM)	JX	white/red	black	+32°F (0°C) to +400°F (+200°C)	+/- 4°F (2.2°C)	+/- 2°F (1.1°C)
CHROMEL®* vs. **ALUMEL®*	KX	yellow/red	yellow	+32°F (0°C) to +400°F (+200°C)	+/- 4°F (2.2°C)	+/- 2°F (1.1°C)
Copper vs. Constantan(TM)	TX	blue/red	blue	-75°F (-60°C) to +210°F (+100°C)	+/- 2°F (1.1°C)	+/- 1°F (.5°C)
CHROMEL®* vs. Constantan(TM)	EX	purple/red	purple	+32°F (0°C) to +400°F (+200°C)	+/- 3°F (1.7°C)	+/- 2°F (1.1°C)
Nicrosil(TM) vs. Nisil(TM)	NX	orange/red	orange	+32°F (0°C) to +400°F (+200°C)	+/- 4°F (2.2°C)	+/- 2°F (1.1°C)
Copper vs. Copper Alloy	SX RX	black/red	green	+75°F (+25°C) to +400°F (+200°C)	+/- 9°F (5°C)	-

NOTE: Percent limits apply directly to temperature in °C units, but for °F equivalents are applied to the numbers of °F above or below the ice point (+32°F).
(i.e. Limit (°F) = (Temp. °F-32°F) x Percentage)

Thermocouple wire cannot be expected to meet the limits of error at temperatures below the ice point unless specified at time of purchase.

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