

# Thermocouple Wire and Cable Insulation THERMOCOUPLE AND EXTENSION GRADE WIRE Type K

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# Thermocouple Wire and Cable Insulation

Type	Product Description	Performance Features	Applications
<b>CFCF</b>	<b>Ceramic Fiber:</b> Highest temperature flexible insulation available. The braided yarn is a composition of the oxides of alumina, Boric and silicone. Each conductor as well as the overall jacket is braided with high temperature yarn to provide maximum flexibility at extremely high temperatures.	Designed for continuous use at temperatures to 2200°F (1205°C), intermittent use to 2600°F (1430°C). Good abrasion and chemical resistance.	<ul style="list-style-type: none"> <li>▶ Replacement for beaded T/C's</li> <li>▶ Heat treating</li> <li>▶ Coke Ovens</li> <li>▶ Soaking pits</li> <li>▶ Furnace Survey T/C's</li> <li>▶ Brick &amp; Tile Kilns</li> </ul>
<b>MCFCF</b>	<b>Ceramic Fiber &amp; Mica:</b> This construction has a mica barrier tape applied to each single conductor prior to being insulated with the ceramic fiber yarns. This construction is identical to the CFCF construction except for the addition of a light jacket of saturant and the mica tape, which protects against potential shorting from abrasion and chemical oxide	Designed for continuous use at temperatures to 2200°F (1205°C), intermittent use to 2600°F (1430°C). Good abrasion and chemical resistance. Helps prevent shorting caused from abrasion and chemical oxidation.	<ul style="list-style-type: none"> <li>▶ Replacement for beaded T/C's</li> <li>▶ Heat treating</li> <li>▶ Coke Ovens</li> <li>▶ Soaking pits</li> <li>▶ Furnace Survey T/C's</li> <li>▶ Brick &amp; Tile Kilns</li> </ul>
<b>GG</b>	<b>Fiberglass:</b> Most popular and widely applied of all glass insulation's. A color-coded fiberglass braid saturated with high-performance resin is used for insulation of the overall construction.	Designed for continuous use at temperatures to 950°F (480°C). Good moisture and chemical resistance,; fair abrasion resistance	<ul style="list-style-type: none"> <li>▶ Heat treating</li> <li>▶ Glass &amp; Ceramic Kilns</li> <li>▶ Foundries</li> <li>▶ Extensive use in aluminum Processing</li> </ul>
<b>HGHG</b>	<b>High Temp Glass:</b> A high temperature, high tensile strength fiberglass, either color-coded or with tracer yarn, is braided on both the single conductors and the overall jacket. Both are impregnated with a 500°F modified resin saturant.	Designed for continuous use at temperatures to 1200°F (650°C), intermittent temperatures to 1450°F (1450°C). Good moisture and chemical resistance; fair abrasion resistance	<ul style="list-style-type: none"> <li>▶ Preheating &amp; Stress relieving</li> <li>▶ Heat treating for annealing, aging or hardening</li> <li>▶ Furnace Temperature Surveys</li> </ul>
<b>RR</b>	<b>Refrasil (Vitreous Silica):</b> High temperature silica fibers are braided on the single conductors as well as the overall jacket. Because saturant is not used, this product is not recommended for abrasive applications. This construction is braided to provide maximum flexibility at extremely high temperatures. A tracer is braided into the insulation for polarity and calibration identification.	Designed for continuous use at temperatures to 1800°F (980°C), intermittent use to 2000°F (1095°C). Not recommended for applications where insulation may be subject to abrasion.	<ul style="list-style-type: none"> <li>▶ Furnace survey T/C's</li> <li>▶ Heat treating</li> </ul>
<b>STW</b>	<b>High Temp "S" Glass:</b> A high temperature, high tensile strength, <b>extra heavy fiberglass</b> yarn braided over each conductor. The insulated, color-coded conductors are impregnated with a high-temperature modified resin and twisted to form a pair. This product construction does not include an overall jacket	Designed for continuous use at 1200°F (650°C). Good abrasion resistance Easily stripped and terminated. Economically practical for short-duration applications.	<ul style="list-style-type: none"> <li>▶ Homogenizing furnaces for billet preheating</li> <li>▶ Furnace Temperature Surveys</li> <li>▶ Heat Treating.</li> </ul>

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# Thermocouple Wire and Cable Insulation, continued

Type	Product Description	Performance Features	Applications
SFSF	<b>Synthetic Fiber:</b> Tough, heavy insulation for use where abrasion resistance on braided insulation is required. Conductors are insulated with braided composite synthetic yarn & impregnated with a color-coded moisture resistant saturant. The insulated conductors are laid parallel & insulated with a heavy yarn composite fiber jacket which is then coated with the same saturant.	Designed for continuous use at temperatures to 550°F (290°C); intermittent readings to 650°F (340°C). Excellent abrasion & good chemical resistance.	<ul style="list-style-type: none"> <li>▶ Glass Manufacturing</li> <li>▶ Ceramic Manufacturing</li> <li>▶ Heat treating</li> <li>▶ Metal working plants</li> </ul>
KK	<b>Kapton* Tape:</b> Very tough, durable double-wrap of heat-fused polyimide tape applied over each conductor. Each insulated single conductor is coated with an ANSI color-coded polyimide varnish. The jacket consists of a double-wrapped heat-fused polyimide tape.	Designed for continuous use at temperatures to 500°F (315°C), intermittent readings to 650°F (430°C). Color-coding offers easy identification. Excellent abrasion, moisture & chemical resistance	<ul style="list-style-type: none"> <li>▶ Power Plants</li> <li>▶ Kilns</li> <li>▶ Petroleum Plants</li> <li>▶ Aerospace Industry</li> <li>▶ Cryogenic Applications</li> </ul>
KAP	<b>Kapton* Tape:</b> Very tough, durable double wrap of heat-fused polyimide tape applied over each conductor. Insulated conductors are <b>twisted</b> with a <b>stranded drain wire</b> and the twisted construction is covered with <b>aluminum/ Kapton tape</b> . The outer jacket consists of a double wrapped heat-fused polyimide tape.	Designed for continuous use at temperatures to 500°F (315°C), intermittent readings to 650°F (430°C). Color-coding offers easy identification. Excellent abrasion, moisture & chemical resistance. <b>Twisted/ Shielded</b> construction minimizes electrical interference.	<ul style="list-style-type: none"> <li>▶ Power Plants</li> <li>▶ Kilns</li> <li>▶ Petroleum Plants</li> <li>▶ Aerospace Industry</li> <li>▶ Cryogenic Applications</li> </ul>
PAP	<b>Polyvinyl Insulation, Overall Shielding:</b> Single & Multi-pair cables with an overall shield are constructed by insulating the single conductors with 220°F (105°C) PVC. One conductor of each pair is numbered and twisted with its counterpart. The twisted pairs are cabled with an insulated copper communications wire and the entire construction is wrapped with an aluminum/Mylar tape shield. A copper drain wire is applied under the extruded 195°F (90°C) PVC jacket.	Continuous temperature rating of 220°F (105°C). Shielded construction provides noise protection. Excellent moisture resistance; good chemical & abrasion resistance. <b>Approved UL Sub 13 PLTC</b>	▶ General Plant Use
PAAP	<b>Polyvinyl Insulation Individual and Overall Shielding:</b> This construction is the same as the PAP construction, except this construction has an aluminum/Mylar tape and drain wire over each single pair. This provides isolation for each separate pair in the construction and eliminates internal and external noise in the circuit.	Continuous temperature rating of 220°F (105°C). Dual Shielding construction provides excellent noise protection. Excellent moisture resistance; good chemical & abrasion resistance. <b>Approved UL Sub 13 PLTC</b>	▶ General Plant Use
PP	<b>Polyvinyl Duplex:</b> The least expensive wire insulation available. The PVC individual color-coded conductors are insulated with 15 mils (nominal) of PVC, then parallel conductors are given a 20 mil PVC jacket. The jacket is easily stripped for separation of insulated conductors.	Designed for continuous use at temperatures to 220°F (105°C). Good abrasion & chemical resistance.	<ul style="list-style-type: none"> <li>▶ Permanent Sensor Fabrication</li> <li>▶ Laboratories</li> <li>▶ Test Facilities</li> <li>▶ General Plant Use.</li> </ul>

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# Thermocouple Wire and Cable Insulation, continued

* Trademark of E. I. DuPont Type	Product Description	Performance Features	Applications
<b>PFPF</b>	<b>Extruded PFA Teflon:</b> Color-coded PFA Teflon is extruded over each single conductor. A PFA Teflon jacket is extruded over the insulated parallel singles to form a duplex construction.	Designed for continuous use at temperatures to 500°F (260°C); intermittent readings to 600°F (315°C). Provides the highest temperature rating of our extruded products. Excellent moisture and chemical resistance; good abrasion resistance.	<ul style="list-style-type: none"> <li>▶ Food Processing</li> <li>▶ Glass Plants</li> <li>▶ Ceramic Plants</li> <li>▶ Brick Plants</li> <li>▶ Power Plants</li> </ul>
<b>PFAPF</b>	<b>Extruded, Shielded PFA Teflon*:</b> Color-coded PFA Teflon is extruded over each single conductor. Insulated conductors are twisted with a stranded drain wire, the twisted construction is covered with an aluminum/Mylar tape. A PFA Teflon jacket is extruded over the shielded pairs or triads.	Designed for continuous use at temperatures to 500°F (260°C); intermittent readings to 550°F (290°C). Twisted/Shielded construction minimizes electrical interference. Excellent abrasion, moisture and chemical resistance.	<ul style="list-style-type: none"> <li>▶ General Plant Use</li> <li>▶ Aerospace Industry</li> <li>▶ Glass Plants</li> <li>▶ Ceramic Plants</li> <li>▶ Brick Plants</li> <li>▶ Power Plants</li> </ul>
<b>TT</b>	<b>Extruded FEP Teflon*:</b> Color-coded FEP Teflon is extruded over each single conductor. The single insulated conductors are laid parallel and insulated with an extruded jacket of FEP Teflon.	Designed for continuous use at temperatures to 400°F (205°C); intermittent readings to 500°F (260°C). Most economic and popular of the Teflon construction. Excellent low-friction jacket facilitates easy pulling of wire through conduits.	<ul style="list-style-type: none"> <li>▶ Power Generating Plants</li> <li>▶ Petroleum Plants</li> <li>▶ Field Heat Treating</li> </ul>
<b>TAT</b>	<b>Extruded, Shielded FEP Teflon*:</b> Color-coded FEP Teflon is extruded over each single conductor. Insulated conductors are twisted with stranded drain wire and the twisted construction is covered with an aluminum/Mylar tape. An FEP Teflon jacket is extruded over the shielded pairs or triads.	Designed for continuous use at temperatures to 400°F (205°C); intermittent readings to 500°F (260°C). Twisted/Shielded construction minimizes electrical interference. Excellent abrasion, moisture and chemical resistance.	<ul style="list-style-type: none"> <li>▶ Power Generating Plants</li> <li>▶ Petroleum Plants</li> <li>▶ Field Heat Treating</li> </ul>
<b>TFTF</b>	<b>Fused TFE Tape:</b> A double wrap of heat-fused TFE tape is spirally applied over each single conductor and as an overall jacket. Duplex construction.	Designed for continuous use at temperatures to 500°F (260°C); intermittent use to 600°F (315°C). All the advantages of an extruded product while providing the additional temperature rating. Excellent moisture and chemical resistance; good abrasion resistance.	<ul style="list-style-type: none"> <li>▶ Petroleum Plants</li> <li>▶ Power Plants</li> <li>▶ Aircraft Bonding</li> <li>▶ Glass Plants</li> <li>▶ Ceramic Plants</li> <li>▶ Brick Plants</li> </ul>
<b>TFATF</b>	<b>Fused TFE Tape:</b> A double wrap of heat-fused TFE tape is spirally applied over each single conductor. Insulated conductors are twisted with a stranded drain wire and the twisted construction is covered with an aluminum/Mylar tape. The outer jacket consists of a double-wrapped heat-fused TFE jacket.	Designed for continuous use at temperatures to 500°F (260°C); intermittent use to 600°F (315°C). All the advantages of an extruded product while providing the additional temperature rating. Excellent moisture and chemical resistance; good abrasion resistance. Twisted/ Shielded construction minimizes electrical interference	<ul style="list-style-type: none"> <li>▶ Petroleum Plants</li> <li>▶ Power Plants</li> <li>▶ Aircraft Bonding</li> <li>▶ Glass Plants</li> <li>▶ Ceramic Plants</li> <li>▶ Brick Plants</li> </ul>

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# Thermocouple Wire Metal Overbraid

Ordering Code Suffix	Product Description	Performance Features
-S	<b>304 Stainless-Steel</b> braid material is made of round wire braid. Continuous service temperatures of 1600°F (900°C). 85% minimum coverage. General purpose stainless steel, subject to carbide precipitation between 900°F and 1600°F.	Added mechanical protection.
-Cu	<b>Tinned Copper</b> round wire braid with a minimum 85% coverage.	Added mechanical protection and shields against electrostatic interference.
-I600	<b>Inconel 600</b> round wire braid with a continuous service temperature of 2100°F (1500°C)	Excellent for severely corrosive applications and has high resistance to oxidizing and reducing atmospheres. Added Mechanical protection.
-X	<b>Wrapped Spiral Armor</b> is a Half-Oval Galvanized Iron, 90% minimum coverage	Better resistance to crushing and cutting than braided products.

## Ordering Code Example

Part number J-20-GG: Type “J” 20 gauge thermocouple wire with Glass on singles and glass overall, selected from the Insulated Thermocouple Wire section.

**Manufactured with Stainless Steel Overbraid  
should be ordered as:**

**J-20-GG-S**

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# Thermocouple Grade Wire

## Type K Insulated Wire

Color Code: Positive, Yellow (Chromel); Negative, Red, (Alumel); Overall Brown, Yellow Tracer

Catalog Number	Wire Gauge	Type Wire	Insulation		Temp. °F		Lbs/ 1000 Ft.	Nominal Size (In)
			Singles	Overall	Continuos	Intermittent		
K-14-MCFCF	14	Solid	Mica Ceramic Braid	Ceramic Braid	2200	2600	42	.160 X .280
K-16-MCFCF	16	Solid	Mica Ceramic Braid	Ceramic Braid	2200	2600	30	.145 X .255
K-20-MCFCF	20	Solid	Mica Ceramic Braid	Ceramic Braid	2200	2600	16	.125 X .195
K-14-CFCF	14	Solid	Ceramic Braid	Ceramic Braid	2200	2600	40	.138 X .235
K-16-CFCF	16	Solid	Ceramic Braid	Ceramic Braid	2200	2600	28	.120 X .210
K-20-CFCF	20	Solid	Ceramic Braid	Ceramic Braid	2200	2600	14	.110 X .180
K-20-RR	20	Solid	Refrasil	Refrasil	1800	2000	15	.102 X .168
K-24-RR	24	Solid	Refrasil	Refrasil	1800	2000	5	.090 X .145
K-14-HGHG	14	Solid	Hi Temp Fiberglass	Hi Temp Fiberglass	1200	1500	36	.115 X .205
K-16-HGHG	16	Solid	Hi Temp Fiberglass	Hi Temp Fiberglass	1200	1500	20	.105 X .185
K-20-HGHG	20	Solid	Hi Temp Fiberglass	Hi Temp Fiberglass	1200	1500	15	.085 X .145
K-24-HGHG	24	Solid	Hi Temp Fiberglass	Hi Temp Fiberglass	1200	1500	10	.075 X .120
K-20-STW	20	Solid	Hi Temp Fiberglass	None: Single Twist	1200	1500	10	.145
K-14-GG	14	Solid	Fiberglass	Fiberglass	950	1200	34	.102 X .185
K-16-GG	16	Solid	Fiberglass	Fiberglass	950	1200	18	.087 X .155
K-20-GG	20	Solid	Fiberglass	Fiberglass	950	1200	9	.058 X .105
K-20S-GG	20	Stranded	Fiberglass	Fiberglass	950	1200	10	.065 X .125
K-24-GG	24	Solid	Fiberglass	Fiberglass	950	1200	5	.042 X .070
K-14-SFSF	14	Solid	Synthetic Fiber	Synthetic Fiber	500	600	40	.195 X .285
K-16-SFSF	16	Solid	Synthetic Fiber	Synthetic Fiber	500	600	32	.170 X .215
K-20-SFSF	20	Solid	Synthetic Fiber	Synthetic Fiber	500	600	18	.140 X .200
K-16-KK	16	Solid	Kapton*	Kapton	500	650	21	.072 X .140
K-20-KK	20	Solid	Kapton	Kapton	500	650	11	.052 X .102
K-20-KAK	20	Solid	Kapton	Kapton Tw/Sh	500	650	13	.052 X .102
K-24-KK	24	Solid	Kapton	Kapton	500	650	5	.042 X .075
K-20-TFTF	20	Solid	TFE Tape	TFE Tape	500	600	11	.060 X .104
K-24-TFTF	24	Solid	TFE Tape	TFE Tape	500	600	5	.050 X .080
K-20-TFATF	20	Solid	TFE Tape	TFE Tape Tw/Sh	500	600	17	.135
K-20-PFPF	20	Solid	PFA Teflon*	PFA Teflon	500	600	11	.067 X .115
K-20-PFAPF	20	Solid	PFA Teflon*	PFA Teflon Tw/Sh	500	600	22	.146
K-24-PFPF	24	Solid	PFA Teflon	PFA Teflon	500	600	7	.055 X .090
K-20-TT	20	Solid	FEP Teflon*	FEP Teflon	400	500	11	.072 X .124
K-20-TAT	20	Solid	FEP Teflon*	FEP Teflon	400	500	20	.135
K-24-TT	24	Solid	FEP Teflon	FEP Teflon	400	500	7	.060 X .100
K-14-PP	14	Solid	Polyvinyl	Polyvinyl	220	220	40	.174 X .278
K-16-PP	16	Solid	Polyvinyl	Polyvinyl	220	220	37	.151 X .235
K-20-99	20	Solid	Polyvinyl	Polyvinyl	220	220	21	.132 X .194

Above temperatures are insulation ratings and product rating may be lower due to conductor Size. See chart this section. Special limits of error wire available on certain constructions. To order special limits, repeat calibration symbol in order code.

(Example: KK-20-GG)

High performance metal overbraid and armor may be applied over the above insulation to provide additional abrasion and mechanical resistance. Note: Ceramic, Refrasil and Hi-Temp Fiberglass insulation are color-coded with tracers.

Respooling charge of \$10.00 for orders of less than 1000 continuous feet. IPS reserves the right to ship within ± 10% of quantity ordered and bill accordingly.

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# Extension Grade Wire

## Type KX Insulated Wire

Color Code: Positive, Yellow (Chromel); Negative, Red, (Alumel); Overall Yellow

Catalog Number	Wire Gauge	Type Wire	Insulation		Temp. (°F)	Lbs/1000 Ft.	Nominal Size
			Singles	Overall	Continuous		(In)
KX-14-GG	14	Solid	Fiberglass	Fiberglass	400	40	.174 X .278
KX-16-GG	16	Solid	Fiberglass	Fiberglass	400	18	.087 X .155
KX-20-GG	20	Solid	Fiberglass	Fiberglass	400	9	.058 X .105
KX-16-KAK	16	Solid	Kapton*	Kapton	400	30	.160
KX-20-KAK	20	Solid	Kapton*	Kapton	400	15	.120
KX-16-SFSF	16	Solid	Synthetic Fiber	Braided Synthetic Fiber	400	32	.170 X .215
KX-20-SFSF	20	Solid	Synthetic Fiber	Braided Synthetic Fiber	400	18	.140 X .200
KX-16-PFPF	16	Solid	PFA Teflon*	PFA Teflon*	400	32	.108 X .158
KX-16-PFAPF	16	Solid	PFA Teflon*	PFA Teflon* Tw/Sh	400	38	.180
KX-20-PFPF	20	Solid	PFA Teflon*	PFA Teflon*	400	11	.067 X .115
KX-20-PFAPF	20	Solid	PFA Teflon*	PFA Teflon* Tw/Sh	400	22	.146
KX-16-TT	16	Solid	FEP Teflon*	FEP Teflon*	400	32	.107 X .158
KX-16-TAT	16	Solid	FEP Teflon*	FEP Teflon* Tw/Sh	400	38	.180
KX-20-TT	20	Solid	FEP Teflon*	FEP Teflon*	400	11	.072 X .124
KX-20-TAT	20	Solid	FEP Teflon*	FEP Teflon* Tw/Sh	400	22	.146
KX-14-PP	14	Solid	Polyvinyl	Polyvinyl	220	40	.174 X .278
KX-16-PP	16	Solid	Polyvinyl	Polyvinyl	220	26	.120 X .207
KX-16-PAP	16	Solid	Polyvinyl	Polyvinyl	220	39	.250
KX-16S-PP	16	Stranded	Polyvinyl	Polyvinyl	220	26	.140 X .230
KX-20-PP	20	Solid	Polyvinyl	Polyvinyl	220	14	.095 X .150
KX-20-PAP	20	Solid	Polyvinyl	Polyvinyl	220	22	.165
KX-20S-PP	20	Stranded	Polyvinyl	Polyvinyl	220	16	.105 X .170

Continuous temperature is for extension wire or insulation, whichever is lower.

High performance metal overbraid and armor may be applied over the above insulation to provide additional abrasion and mechanical resistance. See page 17 for additional information.

Respooling charge of \$10.00 for orders of less than 1000 continuous feet.

IPS reserves the right to ship within ± 10% of quantity ordered and bill accordingly.

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# Cable

## UL PLTC 300 Volt PVC Insulation & Jacket Overall Shield

### Cable Specifications

Conductors: 20 AWG Solid Thermocouple Extension Wire  
Singles Insulation: 15 Mils 105°C PVC

Color Code: Jacket and individual pairs are per ANSI MC96.1

Construction: Twisted Pairs

Identification of Pairs: One conductor of each pair is numbered

Twist: Lay is approximately 2.5 inches

Overall Shield: .002" aluminized polyester backed tape overlapped to provide 100% coverage when flexed

Overall Drain Wire: Stranded uninsulated tinned copper in continuous contact with shield

Communications Wire: 22 AWG stranded copper wire insulated and color coded orange

Ripcord: Assists in jacket removal

Jacket Insulation: 90°C Flame retardant PVC

## Overall Shielded Type KX Cable

Order Number	Number Of Pairs	Nominal	Nominal O. D. (Inches)	Minimum	Maximum	Net Wt. (Lbs./ 1000 Ft)
		Outer Jacket Thickness		Bending Radius (Inches)	Pulling Tension (Lbs.)	
<b>KX-14-UPAP</b>	1	.035	.256	2.00	40	40
<b>KX-16-UPAP</b>	1	.035	.220	2.00	32	37
<b>KX-20-UPAP</b>	1	.035	.184	1.45	26	27
<b>KX-2-20-UPAP</b>	2	.042	.322	2.00	40	50
<b>KX-4-20-UPAP</b>	4	.042	.370	2.50	75	76
<b>KX-6-20-UPAP</b>	6	.052	.440	2.70	105	110
<b>KX-8-20-UPAP</b>	8	.052	.475	3.00	142	129
<b>KX-10-20-UPAP</b>	10	.052	.540	3.25	170	155
<b>KX-12-20-UPAP</b>	12	.052	.560	3.25	210	175
<b>KX-16-20-UPAP</b>	16	.062	.670	4.00	330	280
<b>KX-20-20-UPAP</b>	20	.062	.745	4.80	405	325
<b>KX-24-20-UPAP</b>	24	.062	.745	4.80	405	325
<b>KX-36-20-UPAP</b>	36	.072	.890	6.00	600	470
<b>KX-50-20-UPAP</b>	50	.072	.995	6.00	830	640

Features: UL Listed under Subject 13  
Passes IEEE 383 70,000 Btu 1 Hr flame test (Non-propagating)  
Excellent moisture, chemical & abrasion resistance

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# Cable

## UL PLTC 300 Volt PVC Insulation & Jacket Individual & Overall Shield

### Cable Specifications

Conductors: 20 AWG Solid Thermocouple Extension Wire  
 Singles Insulation: 15 Mils 105°C PVC  
 Color Code: Jacket and individual pairs, per ANSI MC96.1  
 Construction: Twisted Pairs  
 Identification of Pairs: One conductor of each pair is numbered  
 Twist: Lay is approximately 2.5 inches  
 Pair Shield: Aluminized Polyester-backed tape overlapped to provide coverage when flexed

Pair Drain Wire: Stranded uninstalled tinned copper in continuous contact with shield  
 Overall Shield: .002" aluminized polyester backed tape overlapped to provide 100% coverage when flexed  
 Overall Drain Wire: Stranded uninstalled tinned copper in continuous contact with shield  
 Communications Wire: 22 AWG stranded copper wire insulated and color coded orange  
 Ripcord: Assists in jacket removal  
 Jacket Insulation: 90°C Flame retardant PVC

### Overall Shielded Type KX Cable

Order Number	Number Of Pairs	Nominal	Nominal O. D. (Inches)	Minimum	Maximum	Net Wt. (Lbs./ 1000 Ft)
		Outer Jacket Thickness		Bending Radius (Inches)	Pulling Tension (Lbs.)	
<b>KX-2-20-UPAAP</b>	2	.040	.365	2.90	50	64
<b>KX-4-20-UPAAP</b>	4	.052	.450	3.40	95	105
<b>KX-6-20-UPAAP</b>	6	.052	.525	4.20	140	140
<b>KX-8-20-UPAAP</b>	8	.052	.570	4.45	180	170
<b>KX-10-20-UPAAP</b>	10	.062	.685	6.45	225	222
<b>KX-12-20-UPAAP</b>	12	.062	.690	5.45	260	250
<b>KX-16-20-UPAAP</b>	16	.062	.765	5.90	340	310
<b>KX-20-20-UPAAP</b>	20	.062	.845	6.70	430	375
<b>KX-24-20-UPAAP</b>	24	.072	.930	7.50	520	455
<b>KX-36-20-UPAAP</b>	36	.072	1.040	8.20	780	625
<b>KX-50-20-UPAAP</b>	50	.072	1.200	9.45	1090	835

Features: UL Listed under Subject 13  
 Passes IEEE 383 70,000 Btu 1 Hr flame test (Non-propagating)  
 Excellent moisture, chemical & abrasion resistance

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# Bare Wire

## Bare Wire

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

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.

Discount Quantities			Types E,J,K,N,T	
Discount	Net	10%	20%	Consult Factory
<b>Pounds</b>	Below 24	25 – 49	50 - 99	100 & up
<b>Kilograms</b>	Below 11	12 - 22	23 – 45	46 & up

Discount Quantities			Types B,R, & S
Discount	Net	10%	Consult Factory
<b>Inches</b>	Below 143	144 - 282	288 & up
<b>Millimeters</b>	Below 3,632	3633 – 7289	7290 & up

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# 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	YELLOW 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

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# 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

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# 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

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# 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%
CHROMELI® (+) 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.

\*\* Magnetic

\* 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.

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# 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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