

INDUSTRIAL TEMPERATURE LLC & SILSE S.A.

Thermocouple Wire Type									
Only K type ANSI color code shown. To order other type or IEC, DIN, JIS color code, pls contact us online									
ANSI Color Code: Positive Wire, Yellow; Negative Wire, Red; Overall, Brown									
MICC Engineering does not use reprocessed PFA or PVC in manufacturing thermocouple wire									
Insulation	AWG No.	Model Number	Type Wire	Insulation		Max. Temp.		Nominal Size	Wt. † kg/300m(lb/1000')
				Conductor	Overall	°C	°F	mm (inch)	
Ceramic*	14	K-CF/CF-2*14	Solid	Ceramic Fiber	Ceramic Fiber	1090	2000	3.6 x 5.0 (0.140 x 0.200)	18 (38)
	20	K-CF/CF-2*20	Solid			980	1800	3.4 x 4.8 (0.135 x 0.190)	8 (16)
	24	K-CF/CF-2*24	Solid			870	1600	2.9 x 4.4 (0.115 x 0.175)	7 (15)
High Temp Glass	20	K-HH/HH-2*20	Solid	High Temp Glass	High Temp Glass	704	1300	1.5 x 2.7 (0.060 x 0.105)	4 (9)
	24	K-HH/HH-2*24	Solid	High Temp Glass	High Temp Glass	704	1300	1.4 x 2.3 (0.055 x 0.090)	3 (5)
Glass***	20	K-FG/FG-2*20	Solid	Glass Braid	Glass Braid	482	900	1.5 x 2.1 (0.060 x 0.095)	4 (9)
	20S	K-FG/FG-2*20S	7 x 28	Glass Braid		482	900	1.5 x 2.5 (0.060 x 0.100)	4 (9)
	24	K-FG/FG-2*24	Solid	Glass Braid		482	900	1.3 x 2.0 (0.050 x 0.080)	3 (5)
	24S	K-FG/FG-2*24S	7 x 32	Glass Braid		482	900	1.3 x 2.2 (0.050 x 0.085)	3 (5)
	26	K-FG/FG-2*26	Solid	Glass Wrap		482	900	1.1 x 1.9 (0.045 x 0.075)	2 (4)
	28	K-FG/FG-2*28	Solid	Glass Wrap		482	900	1.0 x 1.4 (0.040 x 0.055)	2 (3)
	30	K-FG/FG-2*30	Solid	Glass Wrap		482	900	0.9 x 1.3 (0.037 x 0.050)	2 (3)
Glass with Stainless Steel Overbraid***	20	K-FG/FG/SSB-2*20	Solid	Glass	Stainless Steel Braid over Glass	482	900	2.3 x 3.0 (0.090 x 0.120)	6 (14)
	20S	K-FG/FG/SSB-2*20S	7 x 28			482	900	2.3 x 3.2 (0.090 x 0.127)	7 (15)
	24	K-FG/FG/SSB-2*24	Solid			482	900	2.2 x 3.0 (0.085 x 0.117)	5 (11)
	24S	K-FG/FG/SSB-2*24S	7 x 32			482	900	2.0 x 2.8 (0.080 x 0.110)	5 (11)
Kapton***	20	K-KPT/KPT-2*20	Solid	Kapton	Kapton	260	500	1.5 x 2.5 (0.060 x 0.100)	5 (11)
	20S	K-KPT/KPT-2*20S	7 x 28			260	500	1.5 x 2.7 (0.060 x 0.105)	5 (11)
	24	K-KPT/KPT-2*24	Solid			260	500	1.3 x 1.9 (0.050 x 0.075)	3 (6)
	24S	K-KPT/KPT-2*24S	7 x 32			260	500	1.3 x 2.2 (0.050 x 0.085)	3 (6)
	30	K-KPT/KPT-2*30	Solid			260	500	1.0 x 1.4 (0.040 x 0.055)	3 (5)
PFA Glass***	30	K-PFA/FG-2*30	Solid	PFA	Glass Braid	260	500	0.9 x 1.2 (0.034 x 0.047)	1 (2)
	36	K-PFA/FG-2*36	Solid			260	500	0.7 x 1.0 (0.028 x 0.038)	1 (2)
	40	K-PFA/FG-2*40	Solid			260	500	0.7 x 0.9 (0.026 x 0.035)	1 (2)
Neoflon PFA***	20	K-PFA/PFA-2*20	Solid	PFA	PFA	260	500	1.7 x 3.0 (0.068 x 0.116)	5 (11)
	20	K-PFA/PFA-2*20S	7 x 28			260	500	1.9 x 3.2 (0.073 x 0.126)	5 (11)
	22	K-PFA/PFA-2*22S	7 x 30			260	500	1.7 x 3.4 (0.065 x 0.133)	4 (9)
	24	K-PFA/PFA-2*24	Solid			260	500	1.4 x 2.4 (0.056 x 0.093)	3 (6)
	24	K-PFA/PFA-2*24S	7 x 32			260	500	1.6 x 2.6 (0.063 x 0.102)	3 (6)
	30	K-PFA/PFA-2*30††	Solid			260	500	0.6 x 1.0 (0.024 x 0.040)	1 (2)
	36	K-PFA/PFA-2*36††	Solid			260	500	0.5 x 0.8 (0.019 x 0.030)	1 (2)
PFA Twisted and Shielded***	20	K-PFA/PFA/TWSH-2*20	Solid	PFA	PFA and Shielding	260	500	3.7 (0.15)	9 (20)
	20S	K-PFA/PFA/TWSH-2*20S	7 x 28			260	500	3.8 (0.15)	9 (20)
	24	K-PFA/PFA/TWSH-2*24	Solid			260	500	2.7 (0.11)	4 (9)
	24S	K-PFA/PFA/TWSH-2*24S	7 x 32			260	500	2.9 (0.12)	4 (9)
Neoflon FEP***	20	K-FEP/FEP-2*20	Solid	FEP	FEP	200	392	1.7 x 3.0 (0.068 x 0.116)	5 (11)
	24	K-FEP/FEP-2*24	Solid			200	392	1.4 x 2.4 (0.056 x 0.092)	3 (6)
FEP Twisted and Shielded***	20	K-FEP/FEP/TWSH-2*20	Solid	FEP	FEP and Shielding	200	392	3.7 (0.15)	9 (20)
	20S	K-FEP/FEP/TWSH-2*20S	7 x 28			200	392	3.8 (0.15)	9 (20)
	24	K-FEP/FEP/TWSH-2*24	Solid			200	392	2.7 (0.11)	4 (9)
	24S	K-FEP/FEP/TWSH-2*24S	7 x 32			200	392	2.9 (0.12)	4 (9)
PVC***	24	K-PVC/PVC-2*24	Solid	PVC	PVC	105	221	2.0 x 3.4 (0.082 x 0.134)	3 (5)
	24	K-PVC/PVC-2*24S	7 x 32			105	221	2.0 x 3.4 (0.082 x 0.134)	3 (5)

Notes:

† Weight of spool and wire rounded to the next highest kg (lb) (does not include packing material).

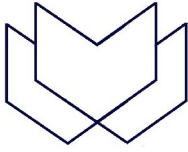
†† Overall color clear.

††† To order special limits of error wire, add "SLE" to model number before spool length.






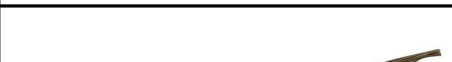
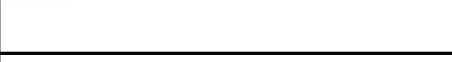


* Has color tracers on jacket and conductors.

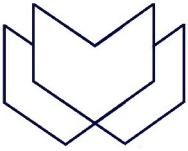
** HH Wire has trace thread in positive leg, negative leg is red, overall has trace thread.

*** Extension Grade mark with KX, JX, TX, EX, NX, SX, RX



INDUSTRIAL TEMPERATURE LLC & SILSE S.A.

Thermocouple Wire Insulation Identification							
Insulation Code	Insulation		Appearance of Thermocouple Wire	Temperature Range, Insulation	Abrasion Resistance	Flexibility	Water Submersion
	Overall	Conductors					
PVC	Polyvinyl Chloride (PVC)	Polyvinyl Chloride (PVC)		-40 to 105°C -40 to 221°F	Good	Excellent	Good
FEP	Teflon or Neoflon	Teflon or Neoflon		-200 to 200°C -338 to 392°F	Excellent	Good	Excellent
SIL	Silicon Rubber	Silicon Rubber		-200 to 200°C -338 to 392°F	Fair	Excellent	Excellent
PFA	PFA Teflon or Neoflon	PFA Teflon or Neoflon		-200 to 200°C -338 to 393°F	Excellent	Good	Excellent
KPT	Kapton	Kapton		-200 to 200°C -338 to 394°F	Excellent	Good	Good
PFA/FG	Glass Braid	PFA Teflon or Neoflon		-73 to 260°C -100 to 500°F	Good	Good	Excellent
FG	Glass Braid	Glass Braid		-73 to 482°C -100 to 900°F	Poor	Good	Poor
HH	High Temp Glass Braid	High Temp Glass Braid		-73 to 704°C -100 to 1300°F	Poor	Good	Poor
CF	Ceramic Fiber	Ceramic Fiber		-73 to 1204°C -100 to 2200°F	Poor	Good	Poor



INDUSTRIAL TEMPERATURE LLC & SILSE S.A.

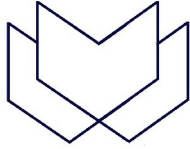
Thermocouple Wire Tolerances(Reference Junction at 0°C)					
American Limits of Error ASTM E230-ANSI MC 96.1					
ANSI Code		Standard Limits		Special Limits	
K	Temp Range	>0 to 1250°C	>32 to 2282°F	0 to 1250°C	32 to 2282°F
	Tolerance Value	2.2°C or 0.75%	4.0°F or 0.75%	1.1°C or 0.4%	2.0°F or 0.4%
	Temp. Range	-200 to 0°C	-328 to 32°F		
	Tolerance Value	2.2°C or 2.0%	4.0°F or 2.0%		
J	Temp Range	>0 to 750°C	>32 to 1382°F	0 to 750°C	32 to 1382°F
	Tolerance Value	2.2°C or 0.75%	4.0°F or 0.75%	1°C or 0.4%	2.0°F or 0.4%
T	Temp Range	>0 to 350°C	>32 to 662°F	0 to 350°C	32 to 662°F
	Tolerance Value	1.0°C or 0.75%	8°F or 0.75%	0.5°C or 0.4%	1°F or 0.4%
	Temp. Range	-200 to 0°C	-328 to 32°F		
	Tolerance Value	1.0°C or 1.5%	1.8°F or 1.5%		
E	Temp Range	>0 to 900°C	>32 to 1652	0 to 900°C	32 to 1652°F
	Tolerance Value	1.7°C or 0.5%	3°F or 0.5%	0°C or 0.4%	1.8°F or 0.4%
	Temp. Range	-200 to 0°C	-328 to 32°F		
	Tolerance Value	1.7°C or 1.0%	3°F or 1.0%		
N	Temp Range	>0 to 1300°C	>32 to 2372°F	0 to 1300°C	32 to 2372°F
	Tolerance Value	2.2°C or 0.75%	4.0°F or 0.75%	1.1°C or 0.4%	2.0°F or 0.4%
	Temp. Range	-270 to 0°C	-454 to 32°F		
	Tolerance Value	2.2°C or 2.0%	4.0°F or 2.0%		
R/S	Temp Range	0 to 1450°C	32 to 2642°F	0 to 1450°C	32 to 2642°F
	Tolerance Value	5°C or 0.25%	2.7°F or 0.25%	0.6°C or 0.1%	1°F or 0.1%
B	Temp Range	800 to 1700°C	1472 to 3092°F	Not Established	
	Tolerance Value	0.5%	0.5%		

IEC Tolerance Class EN 60584-2; JIS C 1602				
IEC Code		Class 1	Class 2	Class 3
K	Temp Range	-40 to 375°C	*-40 to 333°C	-167 to 40°C
	Tolerance Value	±1.5°C	±2.5°C	±2.5°C
	Temp. Range	375 to 1000°C	333 to 1200°C	-200 to -167°C
	Tolerance Value	±0.4%	0.75% Reading	±1.5% Reading
J	Temp Range	-40 to 375°C	-40 to 333°C	Not Established
	Tolerance Value	±1.5°C	±2.5°C	
	Temp. Range	375 to 750°C	333 to 750°C	
	Tolerance Value	0.4% Reading	0.75% Reading	
T	Temp Range	-40 to 125°C	*-40 to 133°C	-67 to 40°C
	Tolerance Value	±0.5°C	±1°C	±1°C
	Temp. Range	125 to 350°C	133 to 350°C	-200 to -67°C
	Tolerance Value	±0.4% Reading	±0.75% Reading	1.5% Reading
E	Temp Range	-40 to 375°C	-40 to 333°C	-167 to 40°C
	Tolerance Value	±1.5°C	±2.5°C	±2.5°C
	Temp. Range	375 to 800°C	333 to 900°C	-200 to -167°C
	Tolerance Value	±0.4% Reading	±0.75% Reading	±1.5% Reading
N	Temp Range	-40 to 375°C	*-40 to 333°C	-167 to 40°C
	Tolerance Value	±1.5°C	±2.5°C	±2.5°C
	Temp. Range	375 to 1000°C	333 to 1200°C	-200 to -167°C
	Tolerance Value	±0.4%	0.75% Reading	±1.5% Reading
R/S	Temp Range	0 to 1100°C	0 to 600°C	Not Established
	Tolerance Value	±1°C	±1.5°C	
	Temp. Range	1100 to 1600°C	600 to 1600°C	
	Tolerance Value	±[1 + 0.3% x (Rdg-1100)]°C	±0.25% Reading	
B	Temp Range	Not Established	600 to 1700°C ±0.25% Reading	600 to 800°C
	Tolerance Value			+4°C
	Temp. Range			800 to 1700°C
	Tolerance Value			±0.5% Reading



INDUSTRIAL TEMPERATURE LLC & SILSE S.A.

Thermocouple Wire Application Guide						
Insulation Code	Resistance To:					Comments
	Solvent	Acid	Base	Flame	Humidity	
PVC	Fair	Good	Good	Good	Good	Color Coded PVC Extruded Over Each Bare Wire. PVC Applied Over Insulated Primaries. Affected by Ketones, Esters
FEP	Excellent	Excellent	Excellent	Excellent	Excellent	Color Coded PVC Extruded Over Each Bare Wire. PVC Applied Over Insulated Primaries. Affected by Ketones, Esters
PFA	Excellent	Excellent	Excellent	Excellent	Excellent	Color Coded PFA Extruded Over Each Bare Wire. PFA Jacket Extruded Over Insulated Primaries. Superior Abrasion and Moisture Resistance. Same Basic Characteristics as FEP but Higher Temperature Rating
KPT	Good	Good	Good	Good	Excellent	Fused Kapton Tape Approx. 0.15 mm Applied to Conductors. 0.10 mm Jacket Is Then Applied to Both. Excellent Moisture and Abrasion Resistance, High Dielectric Strength (7 kV/mil) Retains Much Physical Integrity After Gamma Radiation. FEP Is Used as Adhesive Binding Agent (Melts at approx. 260°C [500°F])
PFA/FG	Excellent	Excellent	Excellent	Excellent	Excellent	PFA Extruded Over Each Bare Wire and a Glass Braid on the Jacket. May Be Used for Single Measurement to 343°C (650°F)
FG	Excellent	Excellent	Excellent	Excellent	Fair	0.12 mm Glass Braid Over Each Conductor, and Binder Impregnated. Overall Glass Braid Applied and Binded. Binder Improves Moisture and Abrasion Resistance but Is Destroyed Above 204°C (400°F)
HH	Excellent	Excellent	Excellent	Excellent	Fair	High Temp. Glass Braid Over Each Conductor, and Binder Impregnated. Overall High Temp Glass Braid Applied and Binded. Binder Improves Moisture and Abrasion Resistance but Is Destroyed Above 400°F
CF	Excellent	Good	Good	Excellent	Fair	High Temp, Alumina-Boria-Silica Ceramic Fiber Braided Over Each Conductor Then Over Both. Not Recommended or Platinum Thermocouples or Exposure to Molten Tin and Copper, Hydrofluoric or Phosphoric Acids, or Strong Alkalies



INDUSTRIAL TEMPERATURE LLC & SILSE S.A.

Thermocouple Wire Color Standard								
ANSI Code	ANSI MC 96.1 Color Coding		Alloy Combination		Maximum T/C Grande temp. range	EMF(mv)Over Max.temp.range	IEC 584-3 Color Coding	IEC Code
	Thermocouple grade	Extension grade	+ Lead	- Lead				
K			NICKEL-CHROMIUM Ni-Cr	NICKEL-ALUMINUM Ni-Al	-270 to 1372 °C -454 to 2501 °F	-6.458 to 54.886		K
J			IRON Fe (magnetic)	CONTANTAN COOPER-NICKEL Cu-Ni	-210 to 1200 °C -346 to 2193 °F	-8.095 to 69.553		J
T			COPPER Cu	CONTANTAN COOPER-NICKEL Cu-Ni	-270 to 400 °C -454 to 752 °F	-6.258 to 20.872		T
E			NICKEL-CHROMIUM Ni-Cr	CONTANTAN COOPER-NICKEL Cu-Ni	-270 to 1000 °C -454 to 1832 °F	-9.835 to 76.373		E
N			NICROSIL Ni-Cr-Si	NISIL Ni-Si-Mg	-270 to 1300 °C -450 to 2372 °F	-4.345 to 47.513		N
S	NONE ESTABLISHED		PLATINUM-10% RHODIUM Pt-10%Rh	PLATINUM Pt	-50 to 1768 °C -58 to 3214 °F	-0.236 to 18.693		S
R	NONE ESTABLISHED		PLATINUM-13% RHODIUM Pt-13%Rh	PLATINUM Pt	-50 to 1768 °C -58 to 3214 °F	-0.226 to 21.101		R
B	NONE ESTABLISHED		PLATINUM-30% RHODIUM Pt-30%Rh	PLATINUM-6% RHODIUM Pt-6%Rh	0 to 1820 °C 32 to 3308 °F	0 to 13.820		B



INDUSTRIAL TEMPERATURE LLC & SILSE S.A.

Thermocouple Cable Request:	
Grade:	Extension Grade or Thermocouple Grade
temperature range, deg. C	-50... +200
type of conductor:	K, J, T, E, N, S, R, KX, JX, TX, EX, NX, SX, RX
number of conductors:	1,2,3,4,6
Conductor type	Strand or Solid
section area of each core, mm ² (Conductor Size AWG)	20, 24, 30, 32,36,40
material of insulation:	extruded teflon FEP (up to 200 °C)
material of jacket:	extruded teflon FEP (up to 200 °C)
shielding material:	SSB mean Stainless Steel Braid (CUB mean Tinned Copper Braid)
color:	ANSI Positive- green, Neg- white, jacket green (K)
quantity and length of coil, m(ft)	10x100m, 5x200m, 2x500m, 1x1000m, 3x1000ft, 1x2000ft,