THERMOCOUPLE AND EXTENSION GRADE WIRE COLOR CODES

ANSI Code	Alloy Combination		Maximum Useful Temperature Range ++	Maximum Thermocouple Grade Temperature Range	EMF (mV) Over Max. Temperature Range	Standard Limits of Error (above 0ºC)	Special Limits of Error (above 0ºC)
	+ Lead	– Lead					
J	IRON Fe (magnetic)	Constantan Copper-Nickel Cu-Ni	Thermocouple Grade 32 to 1382ºF 0 to 750ºC Extension Grade 32 to 392ºF 0 to 200ºC	-346 to 2193ºF -210 to 1200ºC	-8.095 to 69.553	greater of 2.2ºC or 0.75%	greater of 1.1ºC or 0.4%
K	Chromel Nickel–Chromium Ni-Cr	Alumel Nickel–Aluminum Ni-Al (magnetic)	Thermocouple Grade -328 to 2282ºF -200 to 1250ºC Extension Grade 32 to 392ºF 0 to 200ºC	-454 to 2501ºF -270 to 1372ºC	-6.458 to 54.886	greater of 2.2ºC or 0.75%	greater of 1.1ºC or 0.4%
V▼	Copper Cu	Constantan Copper-Nickel Cu-Ni	Extension Grade 32 to 176ºF 0 to 80ºC				
T	Copper Cu	Constantan Copper-Nickel Cu-Ni	Thermocouple Grade -328 to 662ºF -250 to 350ºC Extension Grade -76 to 212ºF -60 to 100ºC	-454 to 752ºF -270 to 400ºC	-6.528 to 20.872	greater of 1.0ºC or 0.75%	greater of 0.5ºC or 0.4%
E	Nickel–Chromium Ni-Cr	Constantan Copper-Nickel Cu-Ni	Thermocouple Grade -328 to 1652ºF -200 to 900ºC Extension Grade 32 to 392ºF 0 to 200ºC	-454 to 1832ºF -270 to 1000ºC	-9.835 to 76.373	greater of 1.7ºC or 0.5%	greater of 1.0ºC or 0.4%
N	Nicrosil Ni-Cr-Si	NISIL Ni-Si-Mg	Thermocouple Grade -450 to 2372ºF -270 to 1300ºC Extension Grade 32 to 392ºF 0 to 200ºC	-450 to 2372ºF -270 to 1300ºC	-4.345 to 47.513	greater of 2.2ºC or 0.75%	greater of 1.1ºC or 0.4%
R	Platinum- 13% Rhodium Pt-13% Rh	Platinum Pt	Thermocouple Grade 32 to 2642ºF 0 to 1450ºC Extension Grade 32 to 300ºF 0 to 150ºC	-58 to 3214ºF -50 to 1768ºC	-0.226 to 21.101	greater of 1.5ºC or 0.25%	greater of 0.6ºC or 0.1%
S	Platinum- 10% Rhodium Pt-10% Rh	Platinum Pt	Thermocouple Grade 32 to 2642ºF 0 to 1400ºC Extension Grade 32 to 300ºF 0 to 150ºC	-58 to 3214ºF -50 to 1768ºC	-0.236 to 18.693	greater of 1.5ºC or 0.25%	greater of 0.6ºC or 0.1%
U▼	Copper Cu	Copper-Low Nickel Cu-Ni	Extension Grade 32 to 122ºF 0 to 50ºC				
B	Platinum- 30% Rhodium Pt-30% Rh	Platinum 6% Rhodium Pt-6% Rh	Thermocouple Grade 32 to 3092ºF 0 to 1700ºC Extension Grade 32 to 212ºF 0 to 100ºC	32 to 3308ºF 0 to 1820ºC	0 to 13.820	0.5% over 800ºC	Not Established
G▼ **(W)**	Tungsten W	Tungsten- 26% Rhenium W-26% Re	Thermocouple Grade 32 to 4208ºF 0 to 2320ºC Extension Grade 32 to 500ºF 0 to 260ºC	32 to 4208ºF 0 to 2320ºC	0 to 38.564	greater of 4.5ºC or 1.0%	Not Established
C▼ **(W5)**	Tungsten- 5% Rhenium W-5% Re	Tungsten- 26% Rhenium W-26% Re	Thermocouple Grade 32 to 4208ºF 0 to 2320ºC Extension Grade 32 to 1600ºF 0 to 870ºC	32 to 4208ºF 0 to 2320ºC	0 to 37.066	greater of 4.5ºC or 1.0%	Not Established
D▼ **(W3)**	Tungsten- 3% Rhenium W-3% Re	Tungsten- 25% Rhenium W-25% Re	Thermocouple Grade 32 to 4208ºF 0 to 2320ºC Extension Grade 32 to 500ºF 0 to 260ºC	32 to 4208ºF 0 to 2320ºC	0 to 39.506	greater of 4.5ºC or 1.0%	Not Established

++Except as further restricted by temperature limits for T/C diameter and insulation tables that follow. ▼*Not official symbol or standard designation.*

Color Coding		International IEC 584-3	International IEC 584-3 Intrinsically Safe	CZECH British to BS 1843	Netherlands German to DIN 43710	Japanese to JIS C 1610-1981	French to NFE-18001	Comments Environment–Bare Wire	ANSI Code
Thermocouple Grade	Extension Grade								
+ –	+ –	+ –	+ –	+ –	+ –	+ –	+ –	Reducing Vacuum, Inert. Limited Use in Oxidizing at High Temperatures. Not Recommended for Low Temperatures.	J
+ –	+ –	+ –	+ –	+ –	+ –	+ –	+ –	Clean Oxidizing and Inert. Limited use in Vacuum or Reducing. Wide Temperature Range. Most Popular Calibration.	K
None Established	None Established	+ –	+ –	+ –		+ –	+ –	Alternative to KX Type Extension Wire for Low Temperature. Not Recommended for General Use.	V▼
+ –	+ –	+ –	+ –	+ –	+ –	+ –	+ –	Mid Oxidizing, Reducing Vacuum or Insert. Good Where Moisture is Present. Low Temperature and Cryogenic Applications.	T
+ –	+ –	+ –	+ –	+ –	+ –	+ –	+ –	Oxidizing or Inert. Limited Use in Vacuum or Reducing Highest EMF Change Per Degree	E
+ –	+ –	+ –	+ –	+ –	No Standard Use American Color Code			Alternative to Type K More Stable at High Temperature	N
None Established	+ –	+ –	+ –	+ –	+ –	+ –	+ –	Oxidizing or Inert. Do Not Insert in Metal Tubes. Beware of contamination. High Temperature	R
None Established	+ –	+ –	+ –	+ –	+ –	+ –	+ –	Oxidizing or Inert. Do No Insert in Metal Tubes. Beware of Contamination. High Temperature	S
None Established	+ –	+ –	+ –	+ –	+ –	+ –	+ –	Extension Guide Connecting Wire for R and S Thermocouples Also Known as RX and SX Extension Wire	U▼
None Established	+ –			No Color Standard	+ –	+ –	No Color Standard	Oxidizing or Inert. Do Not Insert in Metal Tubes. Beware of Contamination. High Temperature. Common Use in Glass Industry.	B
None Established	+ –			No Standard Use American Color Code				Vacuum, Inert, Hydrogen. Beware of Embittlement. Not Practical Below 399ºC (750ºF) Not for Oxidizing Atmosphere.	G▼ (W)
None Established	+ –			No Standard Use American Color Code				Vacuum, Inert, Hydrogen. Beware of Embittlement. Not Practical Below 399ºC (750ºF) Not for Oxidizing Atmosphere.	C▼ (W5)
None Established	+ –			No Standard Use American Color Code				Vacuum, Inert, Hydrogen. Beware of Embitterment. Not Practical Below 399ºC (750ºF)–Not for Oxidizing Atmosphere.	D▼ (W3)

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