

Thermocouples must be selected to meet application conditions and only general recommendations of size and type can be given. Selection considerations involve useful length of service life, temperature, atmosphere, and response time. Smaller gauges provide faster response times and less service life. Larger gauges provide longer service life and reduced response times. The recommended temperature limits below are to be used as a guideline in the selection process, and the table is only for thermocouples protected by a suitable protecting tube, sheath, or well. The color coding chart below provides ANSI/ASTM standard color codes found on thermocouple wire, extension wire, and plug and jack connectors.

Suggested Upper Temperature Limits For Protected Industrial Thermocouples

TYPE	MAXIMUM TEMPERATURE													
	8 GAGE		11 GAGE		14 GAGE		20 GAGE		24 GAGE		28 GAGE		30 GAGE	
	°C	[°F]	°C	[°F]	°C	[°F]	°C	[°F]	°C	[°F]	°C	[°F]	°C	[°F]
T					370	[700]	260	[500]	200	[400]	200	[400]	150	[300]
J	760	[1400]			590	[1100]	480	[900]	370	[700]	370	[700]	320	[600]
E	870	[1600]			650	[1200]	540	[1000]	430	[800]	430	[800]	370	[700]
K, N	1260	[2300]			1090	[2000]	980	[1800]	870	[1600]	870	[1600]	760	[1400]
M			1287	[2250]	1287	[2250]								
R, S									1480	[2700]				
B									1700	[3100]				
C									2330	[4200]				

Thermocouples in conventional closed-end protecting tubes. These limits do not apply to sheathed thermocouples having compacted mineral oxide insulation.

Upper Temperature Limit For Various MgO Insulated Sheath Diameters

SHEATH IN.	DIAMETER [mm]	TYPE T		TYPE J		TYPE E		TYPE K, N	
		°C	[°F]	°C	[°F]	°C	[°F]	°C	[°F]
0.020	[0.5]	260	[500]	260	[500]	300	[570]	700	[1290]
0.032	[0.8]	260	[500]	260	[500]	300	[570]	700	[1290]
0.040	[1.0]	260	[500]	260	[500]	300	[570]	700	[1290]
0.062	[1.6]	260	[500]	440	[825]	510	[950]	920	[1690]
0.093	[2.4]	260	[500]	480	[900]	580	[1075]	1000	[1830]
0.125	[3.2]	315	[600]	520	[970]	650	[1200]	1070	[1960]
0.188	[4.8]	370	[700]	620	[1150]	730	[1350]	1150	[2100]
0.250	[6.3]	370	[700]	720	[1330]	820	[1510]	1150	[2100]
0.375	[9.5]	370	[700]	720	[1330]	820	[1510]	1150	[2100]

This table gives the suggested upper temperature limits for the various thermocouples in several common sheath sizes. It does not take into account environmental temperature limitations of the sheath material itself, nor does it address compatibility considerations between the thermoelement materials and the sheath containing them. Note 2 - The temperature limits given here are intended only as a guide to the user and should not be taken as absolute values nor as guarantees of satisfactory life or performance. These types and sizes are sometimes used at temperatures above the given limits, but usually at the expense of stability, life or both. In other instances, it may be necessary to reduce the given limits in order to achieve adequate service.

Thermocouples Type Color Codes

TYPE	THERMOELEMENT DESIGNATION	MAGNETIC		COLOR CODING			
		YES	NO	SINGLE CONDUCTOR	OVERALL T/C WIRE	OVERALL EXTENSION GRADE WIRE	PLUG & JACK
T	TP (+)		X	Blue	Brown	Blue	Blue
	TN (-)		X	Red			
J	JP (+)	X		White	Brown	Black	Black
	JN (-)		X	Red			
E	EP (+)		X	Purple	Brown	Purple	Purple
	EN (-)		X	Red			
K	KP (+)		X	Yellow	Brown	Yellow	Yellow
	KN (-)	X		Red			
N	NP (+)		X	Orange	Brown	Orange	Orange
	NN (-)		X	Red			
S	SP (+)		X	Black		Green	Green
	SN (-)		X	Red			
R	RP (+)		X	Black		Green	Green
	RN (-)		X	Red			
B	BP (+)		X	Gray		Gray	White (Uncompensated)
	BN (-)		X	Red			
C	CP (+)		X	Green		Red	Red
	CN (-)		X	Red			