

The following tables list the ASTM stated INITIAL thermocouple material tolerances and the INITIAL thermocouple tolerances. The accuracies stated are only for new, cleaned, fully annealed thermocouples prior to their being exposed to elevated temperatures and to detrimental environments. The stated limits of error may not indicate the accuracies of thermocouples in actual service.

Tolerances on Initial Values of EMF vs Temperature for Thermocouples

Reference Junction 0 °C [32 °F]. Published in ASTM E230

TYPE	TEMPERATURE RANGE for STANDARD TOLERANCES	STANDARD TOLERANCES	TEMPERATURE RANGE for SPECIAL TOLERANCES	SPECIAL TOLERANCES
J	(0 to 293) °C [32 to 559] °F (293 to 760) °C [559 to 1400] °F	± 2.2 °C [± 4 °F] ± 0.75%	(0 to 275) °C [32 to 527] °F (275 to 760) °C [527 to 1400] °F	± 1.1 °C [± 2 °F] ± 0.4%
K	(-200 to -110) °C [-328 to -166] °F (-110 to 0) °C [-166 to 32] °F (0 to 293) °C [32 to 559] °F (293 to 1260) °C [559 to 2300] °F	± 2% ^[1] ± 2.2 °C [± 4 °F] ^[1] ± 2.2 °C [± 4 °F] ± 0.75%	(0 to 275) °C [32 to 527] °F (275 to 1260) °C [527 to 2300] °F	^[2] ^[2] ± 1.1 °C [± 2 °F] ± 0.4%
N	(0 to 293) °C [32 to 559] °F (293 to 1260) °C [559 to 2300] °F	± 2.2 °C [± 4 °F] ^[1] ± 0.75%	(0 to 275) °C [32 to 527] °F (275 to 1260) °C [527 to 2300] °F	± 1.1 °C [± 2 °F] ± 0.4%
T	(-200 to -67) °C [-328 to -89] °F (-67 to 0) °C [-89 to 32] °F (0 to 133) °C [32 to 271] °F (133 to 370) °C [271 to 700] °F	± 1.5% ^[1] ± 1 °C [± 1.8 °F] ^[1] ± 1 °C [± 1.8 °F] ± 0.75%	(0 to 125) °C [32 to 257] °F (125 to 370) °C [257 to 700] °F	^[2] ^[2] ± 0.5 °C [± 0.9 °F] ± 0.4%
E	(-200 to -170) °C [-328 to -274] °F (-170 to 0) °C [-274 to 32] °F (0 to 340) °C [32 to 644] °F (340 to 870) °C [644 to 1600] °F	± 1% ^[1] ± 1.7 °C [± 3.1 °F] ^[1] ± 1.7 °C [± 3.1 °F] ± 0.5%	(0 to 250) °C [32 to 482] °F (250 to 870) °C [482 to 1600] °F	^[2] ^[2] ± 1 °C [± 1.8 °F] ± 0.4%
R	(0 to 600) °C [32 to 1112] °F (600 to 1480) °C [1112 to 2642] °F	± 1.5 °C [± 2.7 °F] ± 0.25%	(0 to 600) °C [32 to 1112] °F (600 to 1480) °C [1112 to 2700] °F	± 0.6 °C [± 1.1 °F] ± 0.1%
S	(0 to 600) °C [32 to 1112] °F (600 to 1480) °C [1112 to 2700] °F	± 1.5 °C [± 2.7 °F] ± 0.25%	(0 to 600) °C [32 to 1112] °F (600 to 1450) °C [1112 to 2642] °F	± 0.6 °C [± 1.1 °F] ± 0.1%
B	(870 to 1700) °C [1600 to 3100] °F	± 0.5%	(870 to 1700) °C [1600 to 3100] °F	± 0.25%
C	(0 to 400) °C [32 to 752] °F (400 to 2315) °C [752 to 4200] °F	± 4.4 °C [± 8 °F] ± 1.0%	Not Available	

[1] Thermocouples and thermocouple materials are supplied to meet the limits of error specified for temperatures above 0 °C. A thermocouple material may not conform to the published sub-zero limits of error for that material when purchased, unless conformance is agreed upon by customer and Pyromation when ordering.

[2] Special limits of error for sub-zero temperatures have not yet been established. The following limits for calibrations E and T are useful to start discussion between customer and Pyromation.

(-200 to 0) °C Type E ± 1 °C or ± 0.5%, whichever is greater
Type T ± 0.5 °C or ± 0.8%, whichever is greater

Initial values of tolerance for Type J and Type K thermocouples below 0 °C are not given due to the characteristics of the materials.

Tolerances on Initial Values of EMF vs Temperature for Thermocouples

CODE	MATERIAL	TEMPERATURE RANGE	LIMITS OF ERROR
M	Ni18Mo/Ni	(-50 to 1410) °C [-58 to 2570] °F	± 0.75%
P	Platinel II	(0 to 1395) °C [32 to 4200] °F	± 0.10 mV