

Tungsten-Rhenium Thermocouples Calibration Equivalents

CALIBRATIONS G AND C

The nominal emf versus temperature values for WM26Re (type G) and W5ReM26Re (type C) thermocouples are defined by fifth degree polynomials. The emf in absolute millivolts (IPTS68) is determined, using the equation and coefficients shown below, from the temperature in Fahrenheit degrees.

Gen. Form: $EMF = AT + BT^2 + CT^3 + DT^4 + ET^5 + K$

Temp. Range: 32°F to 4200°F (0 to 2315°C)

CALIBRATION D

A similar equation is used to generate emf versus temperature values for W3ReM25Re thermocouples. For this combination, however, the curve is broken into two functions and the temperature is expressed in Celsius degrees.

Gen. Form: $EMF = AT + BT^2 + CT^3 + DT^4 + ET^5$

Temp. Range: 32 to 4208°F (0 to 2320°C)




THERMOCOUPLE WIRE IDENTIFICATION GUIDE

| Coefficients | W/W26Re | W5Re/W26Re |
|--------------|------------------------------|------------------------------|
| A | 0.2883146×10^{-3} | 0.7190027×10^{-2} |
| B | 0.6783829×10^{-5} | 0.3956443×10^{-5} |
| C | $-0.1795965 \times 10^{-8}$ | $-0.1842722 \times 10^{-8}$ |
| D | $0.2125270 \times 10^{-12}$ | $0.3471851 \times 10^{-12}$ |
| E | $-0.1176051 \times 10^{-16}$ | $-0.2616792 \times 10^{-16}$ |
| K | $-0.1580014 \times 10^{-1}$ | -0.234471 |

| Coefficients | T < 783°C | T ≥ 783°C |
|--------------|------------------------------|------------------------------|
| A | 9.5685256×10^{-3} | 9.9109462×10^{-3} |
| B | 2.0592621×10^{-5} | 1.8666488×10^{-5} |
| C | $-1.8464573 \times 10^{-8}$ | $-1.4935266 \times 10^{-8}$ |
| D | $7.9498033 \times 10^{-12}$ | $5.3743821 \times 10^{-12}$ |
| E | $-1.4240735 \times 10^{-15}$ | $-7.9026726 \times 10^{-16}$ |

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THERMOCOUPLE WIRE IDENTIFICATION GUIDE

| Letter Code | Alloy Combination | | Color Coding Ext. Grade | Maximum Useful Temperature Range | EMF(mV) Over Useful Temperature Range | Standard Limits of Error | Comments Environment Bare Wire |
|-------------|-----------------------------|-------------------------------|---|--|---------------------------------------|----------------------------------|--|
| | +Lead | -Lead | | | | | |
| G | TUNGSTEN W | TUNGSTEN 26% RHENIUM W-26% Re |  + WHITE - RED WHITE - BLUE TRACE | 32 TO 4208°F 0 TO 2320°C Thermocouple Grade 32 to 500°F 0 to 260°C Extension Grade | 0 TO 38.564 | 4.5°C TO 425°C 1.0% TO 2320°C | Vacuum Inert Hydrogen. Beware of Embrittlement. Not Practical Below 750°F Not for Oxidizing Atmosphere |
| C | TUNGSTEN 5% RHENIUM W-5% Re | TUNGSTEN 26% RHENIUM W-26% Re |  + WHITE - RED WHITE - RED TRACE | 32 TO 4208°F 0 TO 2320°C Thermocouple Grade 32 to 1600°F 0 to 870°C Extension Grade | 0 TO 37.066 | 4.5°C TO 425°C 1.0% TO 2320°C | Vacuum Inert Hydrogen. Beware of Embrittlement. Not Practical Below 750°F Not for Oxidizing Atmosphere |
| D | TUNGSTEN 3% RHENIUM W-3% Re | TUNGSTEN 25% RHENIUM W-56% Re |  + WHITE - RED WHITE - YELLOW TRACE | 32 TO 4208°F 0 TO 2320°C Thermocouple Grade 32 to 5000°F 0 to 260°C Extension Grade | 0 TO 39.506 | 4.5°C TO 425°C 1.0% TO 2320°C | Vacuum Inert Hydrogen. Beware of Embrittlement. Not Practical Below 750°F Not for Oxidizing Atmosphere |





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