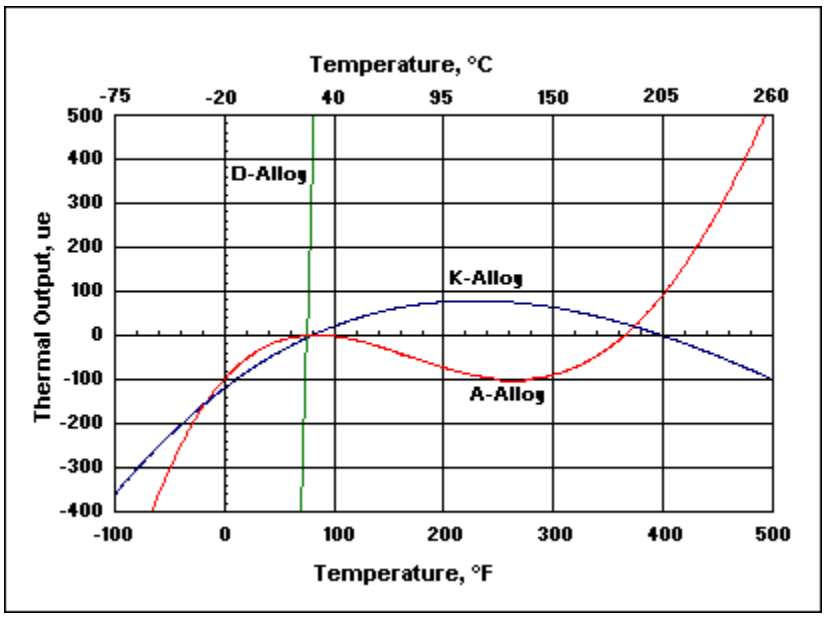
Self-Temperature Compensation

An important property shared by constantan and modified Karma strain gage alloys is their responsiveness to special processing for self-temperature compensation. Self-temperature-compensated strain gages are designed to produce minimum thermal output (temperature-induced apparent strain) over the temperature range from about -50 deg to +400 deg F (-45 deg to +200 deg C). When selecting either constantan (A-alloy) or modified Karma (K-alloy) strain gages, the self-temperature-compensation (S-T-C) number must be specified. The S-T-C number is the approximate thermal expansion coefficient in ppm/ deg F of the structural material on which the strain gage will display minimum thermal output.



The accompanying Thermal Output graph illustrates typical thermal output characteristics for A and K alloys. The thermal output of uncompensated isoelastic (D) alloy is included in the same graph for comparison purposes. In normal practice, the S-T-C number for an A- or K-alloy gage is selected to most closely match the thermal expansion coefficient of the test material. However, the thermal output curves for these alloys can be rotated about the room-temperature reference point to favor a particular temperature range. This is done by intentionally mismatching the S-T-C number and the expansion coefficient in the appropriate direction. When the selected S-T-C number is lower than the expansion coefficient, the curve is rotated counterclockwise. An opposite mismatch produces clockwise rotation of the thermal output curve. Under conditions of S-T-C mismatch, the thermal output curves for A and K alloys (supplied with each package of strain gages) do not apply, of course, and it will generally be necessary to calibrate the installation for thermal output as a function of temperature.

For additional information on strain gage temperature effects, see Vishay Measurements Group Tech Note TN-504, *Strain Gage Thermal Output and*

Gage Factor Variation with Temperature .

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