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Strain Gage Selection

Constantan Alloy

Of all modern strain gage alloys, constantan is the oldest, and still the most widely used. This situation reflects the fact that constantan has the best overall combination of properties needed for many strain gage applications. This alloy has, for example, an adequately high strain sensitivity, or gage factor, which is relatively insensitive to strain level and temperature. Its resistivity is high enough to achieve suitable resistance values in even very small grids, and its temperature coefficient of resistance is not excessive.

In addition, constantan is characterized by good fatigue life and relatively high elongation capability. It must be noted, however, that constantan tends to exhibit a continuous drift at temperatures above +150 deg F (+65 deg C); and this characteristic should be taken into account when zero stability of the strain gage is critical over a period of hours or days.

A-Alloy

Very importantly, constantan can be processed for self-temperature compensation to match a wide range of test material expansion coefficients. A alloy is supplied in self-temperature-compensation (S-T-C) numbers 00, 03, 05, 06, 09, 13, 15, 18, 30, 40 and 50, for use on test materials with corresponding thermal expansion coefficients (expressed in ppm/ deg F).

P-Alloy

For the measurement of very large strains, 5% (50 000 microstrain) or above, annealed constantan (P alloy) is the grid material normally selected. Constantan in this form is very ductile; and, in gage lengths of 0.125 in (3 mm) and longer, can be strained to >20%. It should be borne in mind, however, that under high cyclic strains the P alloy will exhibit some permanent resistance change with each cycle, and cause a corresponding zero shift in the strain gage. Because of this characteristic, and the tendency for premature grid failure with repeated straining, P alloy is not ordinarily recommended for cyclic strain applications. P alloy is available with S-T-C numbers of 08 and 40 for use on metals and plastics, respectively.

