HPI
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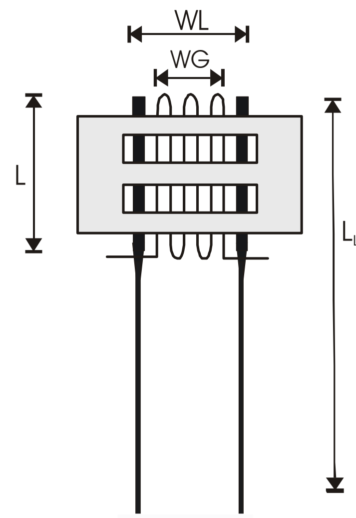
HFK SERIES

Free Filament Strain Gages For Elevated Temperature Static Measurements To 650°F (350°C)



FEATURES:
- Standard Sizes 1/8", 1/4", grid lengths
- Ceramic cement application
- Tight resistance tolerances
- Unmatched grid alignment

HFK Series Free Filament Strain Gages are the result of 40 years of high temperature strain gage experience. The fixturing and unique capabilities that produce these gages are the result of engineering programs developed by the most experienced staff in the world.

SPECIFICATIONS

Gage Grid: .... Karma Alloy, Heat Treated
Gage Carrier: .... Fiberglas/Teflon with Silicone Adhesive
Leads: .... Chromel A-0.003" Dia.
Shelf Life: .... Carrier Adhesive 9 Months
Fatigue Life: .... Nominal 2 x 10^6 cycles at ± 1500μ"/"

Gage Factor	Grid Length	Grid Width	Nominal Resistance	Resistance Tolerance	Lead Length	Nominal Gage Factor
HFK-12-125-SCW	0.125 inch 3.17 mm	0.060 inch 1.52 mm	120 Ω	± 2 Ω	2 3/4" 70 mm	2.0
HFK-35-250-SCW	0.250 inch 6.35 mm	0.130 inch 3.30 mm	350 Ω	± 4 Ω	2 3/4" 70 mm	2.0

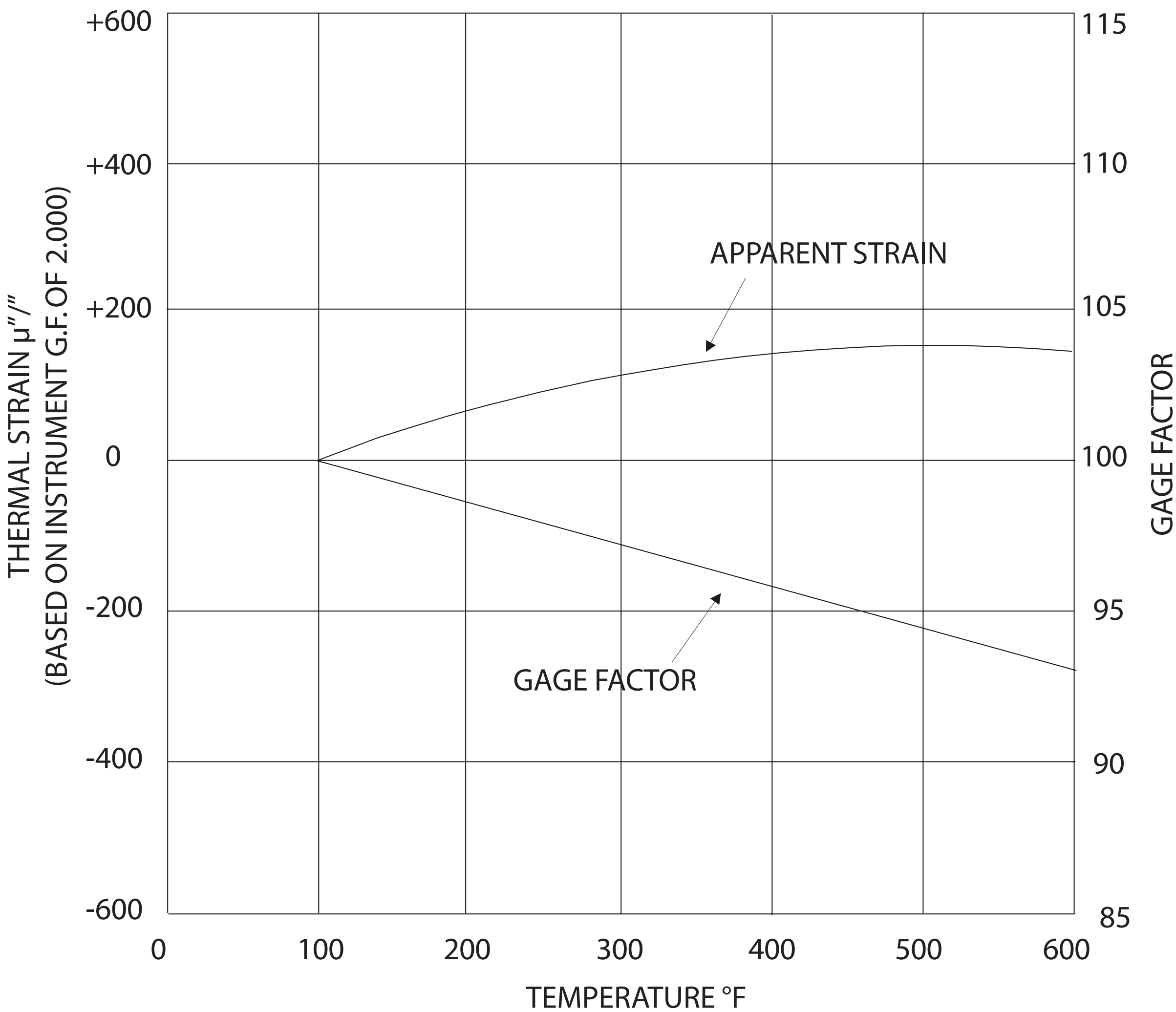
APPLICATION .... All gage lengths can be applied with ceramic cement or supplied on weldable form.

PACKAGING .... Gages are supplied on glass slides, 5 gages per package.

CUSTOM CONFIGURATION .... Custom gages are available in various sizes, configurations and options. Also available as weldable gages pre-installed on shims. Contact factory for your special requirements.

HFK gages are made with a Karma Alloy that is factory heat treated to provide temperature compensation on standard materials, 6PPM/°F (10.8PPM°C); ØPPM/°F

TEMPERATURE INDUCED APPARENT STRAIN



GAGE TYPE: HFK-35-250-SCW
HEAT NO: 12902
LOT: Typical
TESTED ON: 1018 Steel

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HFK INSTRUCTIONS

Three Wire Circuit

In most cases the lead wires used to connect a self-temperature compensated gage to an instrument, are not themselves self-temperature compensated. In order to achieve the best results, close attention to detail should be given to the lead wire installation. Figure 1 is a diagram of a three-wire lead system, which, if properly installed, will minimize lead wire errors in a constant voltage system. It is necessary, if the temperature induced resistance changes in R_D and R_G are to cancel, that R_D and R_G must be stable, have exactly the same resistance, be from the same spool, and subject to exactly the same temperatures.

The HFK strain gage leads are Chromel*. These leads, because they are of small mass and unbonded will respond to temperature fluctuations more rapidly than the gage. It is therefore good practice to clip these leads as short as possible. Note in Figure 1, that to achieve lead wire compensation, R_g plus R_x must be equal to R_d. If these are not equal, then the temperature coefficient of the leads will alter the apparent strain curve of the installation. The location of the third lead wire must be the same for each installation and should be as close to the gage grid as possible, preferably not more than 6mm away. The three-wire circuit works in theory only. Don't assume perfect compensation. There is enough variation from wire to wire to cause an apparent strain, which often times is quite large. This error determination should be part of the gage calibration procedures.

Desensitization

The addition of lead wire resistance in series with the strain gage reduces the sensitivity of the installation. The resistance and gage factor given for the strain gage does not include the resistance of the leads. The gage factor for the completed installation is determined as follows:

$$\text{G.F. (installation)} = \text{G.F. (gage)} \times \frac{R}{R + R_g + R_G + R_x}$$

The value for $R + R_g + R_G + R_x$ must be measured for the installation to the degree of accuracy required. Where extreme accuracy is required, it is recommended that R be measured after the gage installation and cure are complete and just prior to lead wire connection. If the lead wires have a high temperature coefficient of resistance, then the lead resistance must be measured at operating temperature and the correction applied to the elevated temperature gage factor.

**T.M. Hoskins Mfg. Co., Detroit, MI*

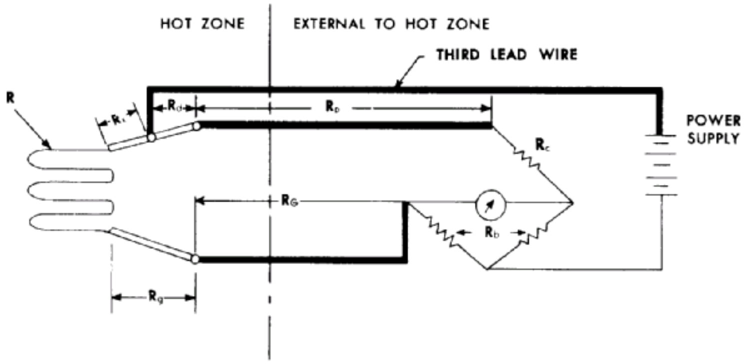

Figure 1. THREE WIRE INSTALLATION

SYMBOLS

- R= Resistance of gage grid only
- R_x= Resistance of gage lead between grid and connection of third lead (as short as possible)
- R_d= Resistance of gage lead wire between connection of third lead wire and main lead (R_D)
- R_D= Resistance of main lead wire
- R_g= Resistance of gage lead wire between grid and main lead wire (R_G)
- R_G= Resistance of main lead wire
- R_C= Resistance of compensating gage
- R_b= Resistance of bridge