



## ULTRA PRECISION WIREWOUND RESISTORS

### Resistance Wire

Mills selects the optimal type and size of resistance wire alloy for winding its resistors based upon the physical size of the resistor and the resistance and temperature coefficient required. These typically non-magnetic alloys possess properties that enhance the utility of each resistor manufactured, including high electrical resistivity, low temperature coefficient of resistance ( $\leq 10$  ppm/ $^{\circ}\text{C}$ ) over a wide temperature range ( $-65^{\circ}\text{C}$  to  $125^{\circ}\text{C}$ ), low thermal EMF vs. copper, and high tensile strength. The high resistivity of these alloys allows Mills to place very high resistance values in very small packages. In addition, Mills uses other alloys to achieve temperature coefficients of up to 6,000 ppm/ $^{\circ}\text{C}$ .

### Termination

All ultra-precision resistors produced by Mills are welded in the sandwich or layered style to guarantee accuracy and stability. All welding is performed under high-power binocular microscopes. Welding equipment, electrode pressures and heat cycles are monitored regularly. Terminal materials are selected for maximum weldability and low thermal EMF.

### Lead Material

On our standard resistors, the solder coated, oxygen free copper lead is molded into the winding bobbin to assure structural integrity. Other lead materials are possible; Nickel, Brass, and Dumet are some of the more popular.

### Bobbins

Bobbins are made from molded high temperature epoxy. The thermal expansion properties of this product is similar to the wire used in the resistor and designed to minimize any stress on the resistor due to environmental changes.

### Quality Control

Mills Resistor meets all applicable quality assurance standards. Our quality control manual is available upon request.

### Encapsulation

After the resistor has been wound, terminated, and aged, a special coating is applied to the windings to further protect the windings during the encapsulation process. An epoxy resin specially selected because its linear expansion capabilities match that of the wire is used to encapsulate the resistor element.

### Wattage Ratings

The wattage ratings listed on the following pages for ultra-precision wirewound resistors are maximum wattage ratings. They are based upon an ambient temperature of  $125^{\circ}\text{C}$ . Ultra-precision wirewound resistors should not be used at a combination of full wattage and maximum ambient temperature where reliability is an important factor. When high reliability is required, a multiplication factor of 0.6 should be applied to the wattage listed. Also as tolerances get tighter, the resistor can only operate at a fraction of its rated power (see derating chart).

