I SQUARED R ELEMENT

Starbar® Heating Element
Standard Calibration Procedure

Our heating elements are normally calibrated in open air by applying a voltage to them that will cause them to dissipate approximately 15.5 watts/cm^2 (100 watts/in^2). The Starbars are calibrated in amperes rather than ohms, for it is a more convenient unit to use.

Experience shows that a Starbar, when being calibrated in open air at a loading of 15.5 watts/sq.cm (100 watts/sq.inch), will come to a surface temperature of approximately 1071°C (1960°F) in anywhere from three to eight minutes, depending upon the size of the Starbar. Then, the current will drop slightly and another two or three minutes is required before the Starbar becomes stable at a temperature of approximately 1071°C (1960°F).

If the Starbars that are calibrated in free air are placed in an enclosure or in a semi-enclosure backed by a reflector, the ambient temperature will rise above that of the surrounding room with the result that the resistance of the Starbar will be affected.

It is possible to check the ampere rating of an element while it is at temperature in the furnace. A true RMS clamp-on ammeter is required, and readings are taken by clamping around the aluminum braided terminal strap. The value is a comparative figure which can be used to relate other elements in the furnace or other elements measured with the same method. To compute the resistance, measure the voltage drop across each element, then divide the voltage by the current. This will give you the resistance in ohms of the element.

It is possible to calibrate used elements on a higher voltage than was originally used, the advantage being a higher voltage will make it easier to detect any unevenness in resistance or to detect any defects or non-uniformities that might have developed during the operation of the elements. If used elements are calibrated on the same voltage as new elements, the elements will not have the same surface temperature because they have increased in resistance, but if the elements are matched in this manner, they will still be very close to being matched at a higher voltage.

If you elect to calibrate used elements at a higher voltage, the simplest way to select a voltage for recalibration is to multiply the initial nominal resistance of the element by the estimate of the increase in resistance. If you had an element that had doubled in resistance multiply the nominal resistance by two. If the element has tripled in resistance, multiply the nominal resistance by three. The recalibration voltage can be determined by using the equation $V=\sqrt{WR}$. Where W equals the surface area of the element (square centimeters or square inches) times 15.5 (watts/cm^2) or 100 (watts/in^2), and R is the used element resistance.

The crayoned markings on the Starbar indicate a number of different things:

The marking on the left side of the bar is a manufacturing date code. The first letter on the left indicates the month. A through L, (A is for January, B for February, etc.). The second is a number 0 through 9. This indicates the year the Starbar was manufactured within a 10-year period (e.g. “B5” is February 2015).

The marking on the right side of the Starbar indicates the calibration amperage, the operator who calibrated the element, and which calibration unit the element was calibrated on.

The first number(s) on the right end of the element is the amp rating. The first character, after the amp rating, is the initial of the operator who calibrated the element. The second character stands for the piece of equipment the element was calibrated on.