

# TempTAB™

( Patent Pending )

## Measuring Furnace Performance Consistency

TempTABS offer the furnace operator a unique capability of assessing furnace performance at any time without interrupting production schedules and without the aggravation of thermocouples and all the associated wiring required for a thermocouple array. By benchmarking your furnace's profile during satisfactory operation you establish the basis for comparison any time in the future for trouble shooting or quality assurance. Establishing the baseline is essential for future comparisons. TempTABS are manufactured from blends of various inorganic materials best suited to meet the demands of rapid heating and quenching cycles typical in the metals industry. The material blends and processing are closely controlled to produce a calibrated product from batch to batch. This yields a sensor that can report temperature variations from your baseline as well as variations in temperature uniformity throughout the furnace.

For the benchmarking of your furnaces it is recommended that 10 surveys be conducted at 8-12 hour intervals to insure statistical significance of the data due to natural variations in furnace performance. The information gained from the 10 surveys should profile the natural variation of your furnace and establish an acceptable baseline. Since TempTABS are calibrated to provide the same reading when exposed to like furnace conditions, any subsequent surveys using TempTABS will confirm if the furnace is delivering the same thermal processing as recorded during the benchmarking surveys, or not. To conduct a survey utilizing TempTABS, the recommended placement of the TempTABS would be in the same locations you would place thermocouples when conducting a standard heat distribution uniformity survey. The TempTAB can be placed flat, on edge or fastened to the basket or fixture with wire through the hole in the center. The significant advantage of the TempTAB is the frequency at which you can evaluate your thermal process without any interruption of production schedules and with minimal effort. Even though Orton does not recommend using the TempTAB to confirm actual furnace control temperature, any change in the recorded "TempTAB temperature" will indicate the actual difference in temperature at any location between the two surveys. Therefore if the TempTAB temperature indicates a significant change in temperature, you can be assured there has been a change in furnace conditions. Of course if the TempTAB indicates no significant change in the recorded temperature, then you can be confident the furnace is operating as it was during benchmarking. A table or control chart can be used to build a history of furnace performance over time to establish furnace capabilities and operational competency for customer assurance or meeting established quality standards.

The measurement of the TempTAB is critical for repeatable accuracy. Since the measurement is tangential to the sides of the disk any slight rotation of the disk has the potential to alter the measurement. Orton recommends that the measurements not be made free-hand since it is literally impossible to measure each TempTAB exactly the same every time. Orton has designed a gauge stand that provides consistent placement of the TempTAB for measurement. The gauge stand comes with a Mitutoyo digital indicator, and is available from Orton or they will provide the specifications to build your own gauge stand. Consistent readings to two decimal places in millimeters will provide the accuracy and sensitivity from the TempTAB to support your furnace performance tracking program.



## How TempTabs Work

The controlled shrinkage of TempTabs is affected by both temperature and time at or near the maximum temperature sensed. Most important is the fact that TempTabs are calibrated to reproduce the measurement from batch to batch. The effect of time and temperature is why the TempTab temperature indicated may not coincide perfectly with your thermocouple readings since thermocouples measure temperature without regard to time. Once you benchmark your furnace you have actually calibrated the TempTab to your furnace profile. During a temperature uniformity survey using TempTabs, if a temperature difference is indicated by TempTab, the delta will be accurate. Therefore the actual TempTab temperature is not as important as the uniformity of the TempTab temperature within the survey or between periodic surveys.

