

Trouble Shooting Guide		Temperature Variations in Heated Products
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Regarding Calibrations, Stability, and Uniformity –

The Temperature calibration, stability, and uniformity in heated ovens and furnaces are created by several factors. These include chamber shape, air movement (or lack of air movement), temperature set point, insulation materials, door seal integrity, controller operation settings, calibration accuracy, and temperature measuring systems.

In addition to these factors there are local conditions affecting the chamber interior temperatures. These include product loading conditions (hot or cold), load mass, ambient conditions, and electrical supplies.

Regarding Calibrations –

On most digital and analog temperature control systems there is a range of accuracy near the temperature calibration point. The size of this range varies with the factors listed above.

As temperature set points are operated away from the temperature calibration point, the independently measured temperature would likely increase in error from the display of measured temperature on the control system.

Thus a temperature calibration is usually made at the normal operating set point, or midway between two diverse set points to accommodate this normal error.

For example, with a temperature calibration made at 100°C, the measured temperature at a set point of 150°C may be 140 or 160°C. Similarly, if a temperature calibration is made at 50°C, when operated at a 100°C set point a measured temperature of 90 or 110°C may be found.

Regarding Stability –

Stability is defined as the temperature change over time at a specific measured point. Stability may be described as a temperature oscillation. Stability is better when the measured temperature change is small. The stability is often corrected with settings in the temperature controller. Most digital controllers have a feature called 'auto tune' or 'tuning' that will improve the stability.

Regarding Uniformity –

Uniformity is defined as multiple temperature measurements at a moment in time. Good uniformity is when the temperature differences are small. Good stability plays a major factor in achieving good uniformity, because as a single (or more) temperature measured points vary the range of uniformity increases.

All of the factors listed above may ultimately affect the temperature uniformity.