

# Furnace Calibration / Thermal Mapping



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## Furnace Calibration

For Furnace Calibration two type of test are there

1. System Accuracy Test (SAT)
2. Temperature Uniformity Survey (TUS)

### 1. System Accuracy Test:



System Accuracy Test, commonly referred to as an SAT, is another critically important and often required test. System Accuracy Tests are performed to determine the error within the temperature control system (temperature control device/lead wire/thermocouple). Regardless of the application, knowing the error that exists in your temperature control system allows for more consistent control of quality.

### 2. Temperature Uniformity Survey:

Temperature Uniformity Survey (TUS) is a vital part of the overall equipment performance and validation that ensures the heat treat/vacuum furnace repeatedly and accurately produces the same quality parts with no variance. Temperature Mapping is performed to determine if a storage area can maintain temperature within defined limits (Fridges, Freezers, Rooms, Warehouses and Incubators etc.). Sensors are distributed throughout the unit/room in pre-defined locations to confirm it performs within predefined set points.

## How to do TUS

A TUS should be performed prior to the first use of the furnace; the frequency it is performed thereafter depends on what furnace classification / type. For we do the calibration as per AMS 2750E, we should always refer to specific requirement of AMS 2750E. As per standard requirements we should determine what the design capability and classification level of our furnace.

Furnace systems are classified into six categories: class 1 to class 6. Class 1 has the most stringent temperature requirements with the smallest allowable deviation in temperature uniformity, while class 6 applies the least restrictive temperature requirements and the widest allowable deviation in temperature uniformity. The range of Temperature Uniformity varies from  $\pm 3^{\circ}\text{C}$  to  $\pm 28^{\circ}\text{C}$ . If we are performing the TUS according to AMS 2750E the number of required TUS sensors is depended on the specific work zone volume of the furnace.

Why Thermal mappings is required

The purpose of the uniformity survey is to determine the range of temperatures present at different locations in the furnace under normal operating conditions standards. Temperature won't be the same everywhere, even if it is in a small fridge, large cool room, freezer or warehouse and can vary by as much as  $10^{\circ}\text{C}$  from one location to another. Temperatures in the corners will most likely be different to the centre of the space being measured. Temperature mapping will allow you to document any recorded hot and cold spots as well as identify the continuous monitoring positions required.

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