Background

TemCHEK tablets are ceramic products that verify the heat work being done inside a furnace. The tablets are fired using the process you wish to verify, then measured using the TempCHEK gauge. The TempCHEK gauge is a custom measurement tool for testing the shrinkage of Orton TempCHEK tabs. The shrinkage of each batch of these tablets is very well known and tables are provided by Orton to convert the final size of the tablet into a temperature. This data may be used to verify the thermal uniformity of a furnace or the repeatability of a process.

Equipment Needed

1. Orton TempCHEK tablets, according to test specification:
   1. PCB Item Number: 100-11770-90 (Package of 25)

Orton Part Number: P9033 HTS

Measurement Range: 1075°C – 1420°C (1970°F – 2580°F)

* 1. PCB Item Number: 100-11770-95 (Package of 25)

Orton Part Number: P9031 LTS

Measurement Range: 950°C – 1100°C (1560°F – 2010°F)

1. Kimwipe Delicate Task Wipes
2. Orton TempCHEK gauge
   1. PCB Gage ID: CD2733

Orton Part Number: K193 Desktop Gauge w/ Cable & Tool

Includes 1.00000” Grade AS-1 Gage Block

General Practice

1. Remove the tablets from the package and place them into the furnace. No measurements are necessary before using. They may be placed upright or laid flat. The tablets may optionally be labeled using a high temperature marker or scribed line for identification later.

NOTE: The arrangement of tablets inside a furnace is dictated by the unique design of the furnace. Reference AMS2750 for examples of how this may be done. If a specific furnace arrangement is required, it will be specified in the work instructions, router, or procedure.

1. After firing, remove the tablets and measure the shrinkage. Use the Orton TempCHEK gauge to record the width of each piece to the nearest 0.01 mm. It is important to measure each piece in the same way each time. Variation of +0.01 mm is common but this can be minimized with good technique.
2. Look up the equivalent temperature using the tables provided by Orton for each TempCHEK batch. The Batch Code and product type are stamped into the face of each TempChek. Use the table to determine the equivalent temperature for the fired TempCHEK. Locate the mm reading for the fired width and select the temperature nearest to that reading. Each table is calibrated for a 1 hour soak using a heating rate of 60"C/hr. If the soak time is more or less than 1 hour, use the graph provided by Orton to determine the temperature correction to apply. For a soak time longer than one hour, more heatwork is done, so the temperature correction is subtracted from the equivalent temperature. If the soak time is less, add the temperature correction.

NOTE: The temperature reading of the TempCHEK tablets does not correspond to the “true” temperature in the furnace at that location. It corresponds to the amount of heatwork absorbed throughout the entire firing run. A test using calibrated thermocouples and measurement equipment would be required to accurately determine temperatures.

Using the TempCHEK Gauge

# Assembly and Startup

1. Connect the plunger to the lower left side of the gauge.
2. [Optional] Connect the gauge to a computer for electronic data capture. Connect the data collection tool to the upper left side of the gauge using the data cable, then to a computer using the USB cable.
3. Turn the gauge on using the green “ON/OFF” button.
4. Turn the gauge to inch output using the light blue “MODE” button.
5. Verify the calibration using the gage block. The gauge should read 1.0000 inches. If it does, proceed to the Measurement section. If it does not, proceed to the Calibration section and correct the output.

# Verify Calibration

NOTE: The calibration block must be handled with gloved hands and cleaned before use with a dry Kimwipe.

1. Place the calibration block into the fixture.
2. Press and release the dark blue “SET” button.
3. Confirm the display has a flashing “P” and the output reads +1.0000 inches.
4. If the output does not read +1.0000 inches, follow the Re-Calibration process that follows.
5. Press and release the dark blue “SET” button again.
6. Verify the calibration by removing the gage block, replacing it and confirming the output reads 1.0000 in.
7. The gauge is now ready. Proceed to the Measurement section.

# Re-Calibration

NOTE: This will have to be done if the battery has been replaced.

1. Press and hold dark blue “SET” button for 5 seconds, then release.
2. Press the “SET” button again and hold until the “+” sign is flashing.
3. Press the “SET” button 2 times, so the second zero is flashing.
4. Press the light blue “MODE” button once, to change the zero to a 1.
5. Press the “SET” button 6 more times.
6. Press the “MODE” button to change the units to metric.
7. Place the calibration block into the fixture.
8. Press the “SET” button 2 times.

NOTE: The display should now be reading exactly 25.40mm. For further instructions, reference “Section 5.2 Setting of Preset Value” in the Mitutoyo Digimatic Indicator Instructions, available from the supplier.

# Measurement

1. Turn the gauge to mm output using the light blue “MODE” button, if it is not already.
2. Depress the plunger to retract the head.
3. Place a TempCheck tablet into the fixture, registering the flat bottom of the tab to the fixture.
4. Release the plunger to contact the head to the tablet.
5. [Optional] Record the measured value by pressing the large blue button on the data collection tool. The displayed output should immediately be sent to the worksheet.
6. Depress the plunger to retract the head.
7. Remove the TempCheck tablet and replace it with another, as needed.
8. Repeat the measurement process, as needed.

NOTE: The measurement of TempCHEK tablets requires measurement accuracy and precision down to the 0.01mm level (10m). It is common for furnace uniformity to be only a few of these increments in range. It is important when measuring the TempCHEK tablets to load them consistently and to regularly clean dust from the gauge. Not doing so will increase measurement variation and affect uniformity results.