

Thermal Test Unit

The thermal testing unit has been modified multiple times based on the requested parameters set forth by the FTC staff, the thermal experts, attorney(s) and all other parties involved in the on-going process.

The testing unit was fabricated and engineered based on the requirements of ASTM C-518 and has been modified in accordance with the current practices and methodologies of using a modified C-518 test procedure.

The Unit is comprised of a hot and cold side respectfully and a variety of measurement, temperature and other recorded testing parameters as required by the ASTM C-518 test method.

The hot side is comprised of a heating source (heating element or incandescent bulb), hot side test chamber, hot plate and multiple thermocouples that are precisely placed and calibrated to read to an accuracy of +/- two degrees. The heating source is controlled by an autonics temperature controller and the automated computer testing program. The thermocouple readings are recorded every thirty seconds via two separate data logging devices a Datataker DT 80-M and a Simex Multicon data logger. These records are also captured and recorded in the automated computer testing software and are part of the final test report.

The cold side is comprised of two cooling sources (Peltier Cooling Systems), cold side test chamber, cold plate and multiple thermocouples that are precisely placed and calibrated to read to an accuracy of +/- two degrees. The cooling source is controlled by two TC-720 temperature controllers and the automated computer testing program. The thermocouple readings are recorded every thirty seconds via two separate data logging devices a Datataker DT 80-M and a Simex Multicon data logger. These records are also captured and recorded in the automated computer testing software and are part of the final test report.

The last parameter of the testing system is the heat flux sensor and how it functions. The heat flux is recorded in a raw microvolt reading via a green teg XM-26-9C heat flux sensor. These readings are recorded every thirty seconds via two separate data logging devices a Datataker DT 80-M and one Omega Panel Meter. These records are also captured and recorded in the automated computer testing software and are part of the final test report.

Finally we also have a control switch for the heating source, a power switch for the entire system and a Fan Control Switch to power on and control the installed fan if needed.

Operating Procedure

Version 2

Date: July 1, 2016

Startup Procedure

1. Assure unit is plugged into surge protector and wall outlet.
2. Manually Turn Power Switch "On".
3. Manually Turn on Lap-Top Computer.
4. Launch Thermal Testing Software.

Sample Set Up Procedure

1. Measure and cut appropriate sized reference standard material and test sample that will fit into sample area.
2. Place sample to be tested into sample area, evenly spaced between both sample holders located under top cover of unit.
3. Mark sample and reference standard material accordingly to differentiate between the two.
4. Allow sample to acclimate to ambient temperature while unit is warming up.

Warm Up Period Procedure

1. Choose and power on the appropriate heat source either "heating element" or "Incandescent bulb".
2. Power on cold side fan/blower units and allow them to come to set temperature.
3. Set test parameters in computer software which are based on requirements from standard test method.
4. Allow ample time for unit to acclimate and reach set point temperature which will be indicated by software with "waiting for temp." message until cold temperature set point is met and software message reads "ready".

Sample Load Procedure (Reference Standard Material and Test Sample (s))

1. Once unit is up to temperature and sample is prepared, place sample and sample holder into unit below top cover in sample area.
2. Assure that sample has no or minimal ripples or air pockets present before beginning analysis.
3. Allow sample ample time to acclimate to starting set point temperature.
4. Once sample is loaded into test chamber and all test parameters are at a ready state select start test on computer software.

Calculations and Test Results

1. After all temperatures have been tested based on the standard test method calculate results (R-Value) based on calculation(s) set forth by the standard test method.
2. A Test Result Page, Graphically charted R-value results and all times, temperatures and test parameters based on required ASTM C-518 Test method will be generated at the completion of the test via the computer software.
3. Report Test Results and Calculations based on the requirements of the standard test method.
4. Assure all calculations and samples meet the reproducibility requirements as documented in the standard test method.
5. Submit results, calculations or any other required documentation in report form based on the requirements of the standard test method.

Shut Down Procedure

1. After analysis is complete set temperature controls to ambient temperature and allow ample time for unit to cool down.
2. After unit is completely cooled down to ambient temperature and all thermocouple readings and ambient temperature sensor readings have acclimated turn off fan/blower unit.
3. After unit is completely cooled down to ambient temperature and all thermocouple readings and ambient temperature sensor readings have acclimated turn off temperature recorders.
4. After unit is completely cooled down to ambient temperature and all thermocouple readings and ambient temperature sensor readings have acclimated turn off heat source.
5. After unit is completely cooled down to ambient temperature and all thermocouple readings and ambient temperature sensor readings have acclimated turn off main power.

Sample Removal

1. After unit is completely cooled down to ambient temperature and all thermocouple readings and ambient temperature sensor readings have acclimated and main power is turned off open cover and remove sample and sample holder.
2. Remove sample from sample holder, check for any defects, tears, imperfections, deteriorations etc. and document any and all findings.
3. Once Sample is removed label and keep sample as a retain.

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