

## CTL Provisional DECISION SHEET (PDSH)

Standard(s) (incl. year)	Subclause(s)	Tracking No.	Year
All	N/A	2141	2019
<b>Category</b>			
All			
Subject	Keywords	Developed by	To be approved
Climatic chamber and oven verification	<ul style="list-style-type: none"> <li>- chamber</li> <li>- oven</li> <li>- verification</li> </ul>	WG1	2020 CTL Plenary Meeting
Question			
Some test standards do not provide a reference document regarding the verification of climatic chambers and ovens. When a test standard does not provide criteria or a reference to an IEC document for verification of a climatic chamber or oven, what practices should be followed to support consistency and accuracy in testing?			
Decision			
Refer to the attached which can provide guidance when the test standard does not provide criteria for confirmation of performance of a climate chamber or oven.			
Explanatory notes			
Click here to enter text.			

The guidance provided herein can be utilized when the test standard does not provide criteria for confirmation of climate chamber or oven performance.

## References

ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
IEC 60068-1	Environmental testing – Part 1: General and guidance
IEC 60068-3-5	Environmental testing – Part 2-2: Tests – Test B: Dry heat
IEC 60068-3-6	Supporting documentation and guidance - Confirmation of the performance of temperature/humidity chambers
IEC 60068-3-7	Supporting documentation and guidance – Measurements in temperature chambers for tests A and B (with load)
IEC 60068-3-11	Environmental testing – Part 3-11: Supporting documentation and guidance – Calculation of uncertainty of conditions in climatic test chambers

## Terms and definitions

**Test Chamber** – An enclosure or space in some parts of which the temperature / humidity conditions can be achieved as specified in IEC 60068-2-X documents. The selected part 'X' standard is determined according to the intended use of the chamber.

**Verification (Z)** – Characterization of the working space of a climate chamber or oven using 9 or 15 sensors and related calibrated measuring equipment as specified by IEC 60068-3-5 or IEC 600668-3-6.

**Interim Verification (v)** – A check of the chamber working space conditions through measurement of temperature and humidity at a designated location in the working space of the chamber or oven utilizing calibrated equipment.

## Responsibility of the laboratory

In accordance with ISO/IEC 17025 section 6.4.1, the Laboratory shall assure proper selection of test equipment: *“The laboratory shall have access to equipment (including but not limited to, measuring instruments, software, measurement standards, reference materials, reference data, reagents, consumables or auxiliary apparatus) that is required for the correct performance of laboratory activities and that can influence the results.”*

- and ISO/IEC 17025 section 6.4.4 -

*“The laboratory shall verify that equipment conforms to specified requirements before being placed or returned to service.”*

Test chamber working space conditions are to be verified. Related measurement and indicating equipment is to be calibrated.

## Test Chamber Verification

1. ISO/IEC 17025:2017 distinguishes between measurement equipment and other laboratory equipment. Paragraph 6.4.5 states equipment used for measurement shall be capable of achieving the measurement accuracy and/or measurement uncertainty required to provide a valid result. The generated conditions in a test chamber working space are not considered as “equipment used for measurement”.
2. The environmental conditions within a test chamber working space are verified to determine compliance to the applicable test standard or verification procedure. Calibrated measurement equipment is used to perform the verification of the working space.
3. Where a verification procedure for a test chamber is not provided in the test standard, one or more of the following documents can be applied according to the intended use of the chamber:
  - i. Cold test chamber verification (*unloaded*): Apply IEC 60068-3-5. Utilize nine (9) temperature sensors for chambers 2000 liters or less, utilize fifteen (15) sensors over 2000 liters
  - ii. Dry heat test\* chamber verification (*unloaded*): Apply 60068-3-5. Utilize nine (9) temperature sensors for chambers 2000 liters or less, utilize fifteen (15) sensors over 2000 liters \*Dry heat test protocol is IEC 60068-2-2 (humidity in chamber not to exceed 50%)
  - iii. Humidity / Temperature test chamber: Apply IEC 60068-3-6 (unloaded). Utilize nine (9) temperature sensors for chambers 2000 liters or less, utilize fifteen (15) sensors over 2000 liters. A single humidity sensor is positioned at the center of the working space. The relative humidity is then calculated at each point in the working space where a temperature sensor is located by using the temperature difference as indicated in 60068-3-6. If the chamber is also used for dry heat tests, IEC 60068-3-5 is to be applied.
  - iv. For cold or dry heat tests, *where verification of a test chamber with load is required*: Apply IEC 60068-3-7 “Supporting documentation and guidance – Measurements in temperature chambers for tests A and B (with load)”. The load utilized may be the intended test specimen or the artificial loads described in IEC 60068-3-7. In accordance with paragraph 5.3.2, six (6) additional temperature sensors are required if the chamber walls are directly heated or cooled.
  - v. In accordance with IEC 60068-1: “Environmental testing – Part 1: General and guidance”, consideration is given for specimens that are heat dissipating and non-heat dissipating. Additionally, paragraph 8 states that the test specification shall determine whether the specimen is to be energized: “*Application of tests - General guidance on environmental testing is given in Annex B. The relevant specification shall prescribe whether tests are to be carried out on specimens in the “energized” or “non-energized” condition*”

## Calibration of measurement and indicating equipment

1. Calibration is performed on test chamber measurement and the indicating equipment which monitors conditions within the chamber working space, as well as the measurement equipment which is used for the verification of the working space. Refer to IEC 60068-3-6 regarding traceable calibrations and calibration intervals for this equipment.
2. The accuracy of RH and/ or temperature measuring equipment used for verification of a climate chamber working space must be equal to, or better than, the specifications of the test chamber.

## Measurement uncertainty

1. IEC 60068-3-6 specifies the determination of measurement uncertainty for the system used to verify the working space of climate chambers.
2. IEC 60068-3-11 provides guidance for analyzing uncertainties of temperature and humidity in climatic test chambers. For purposes of the guidance provided herein, the indication in IEC 60068-3-11 to 'calibrate' the working space of a chamber is considered 'verification' of the working space environmental conditions.

## Verification and calibration intervals

1. Verification of the chamber working space conditions and the calibration of the chamber measurement and indicating equipment must be performed at intervals to assure the required performance of the chamber. Interval extensions are appropriate where supporting data demonstrates that the chamber will continue to perform to the requirements throughout the extended interval.
2. Initially, calibration (K) of the measurement equipment that is used to control the chamber is to be performed. Concurrent with this calibration activity, a full verification (Z) using a 9 (or 15) point verification to determine characteristics of the chamber environment is to be performed. After a 12 month period, the calibration (K) and verification (Z) are to be repeated for comparison to the initial data.
3. Following any modifications or repairs, calibration (K) of the chamber measuring equipment, with a verification (Z) according to IEC 60068-3-5 or IEC 60068-3-6, is to be performed before recommissioning the chamber. This includes, but is not limited to cooling / heating system repairs, ventilation system repairs or alterations, door seal replacement or similar repairs to the chamber enclosure.
4. Intervals for calibration (K) and full verification (Z) are independent events that are applied following the initial calibration and verification of the chamber. The maximum permitted interval for chamber measurement equipment calibration (K) and full 9 (or 15) point verification (Z) is recommended to be 36 months unless supporting data indicates longer intervals are appropriate. Examples of verification and calibration intervals are shown in table 1.

## Interim verification

1. Climate chamber interim verification (v) may be performed with a single RH probe and single temperature sensor at a designated location in the working space. Interim verification using a single point is only valid if no modifications or repairs have been made to the chamber working space or the chamber measurement equipment / control equipment. If not permanently mounted, the location of the single sensor is to be identified to permit correct placement when performing future interim verifications (v).
2. In order for the chamber measurement equipment and sensor to be utilized for a single point interim verification (v), a full verification (Z) must first be performed to determine correlation between readings at the location of the single point sensor and readings at other sensor locations within the chamber working space.
3. The measurement equipment provided with the test chamber may be utilized for the single point interim verification providing the equipment and related sensor calibrations are traceable to SI units in accordance with ISO / IEC 17025.

**Table 1**

<b>K</b> = Calibration <b>Z</b> = Full 9 or 15 point verification <b>v</b> = 1 point interim verification <b>◆</b> = 3 month period	
KZ ◆◆◆KZ ◆◆◆KZ ◆◆◆KZ ◆◆◆KZ ◆◆◆ KZ.....etc.	(K) = annual calibration of measuring equipment (Z) = chamber working space full verification
KZ ◆◆◆◆◆ K ◆◆v◆◆◆ KZ ◆◆◆◆◆ K ◆◆v	<b>Extension of calibration (K) to 18 month</b> (K) = calibration of measuring equipment (Z) = chamber working space full verification (v) = single point interim verification every 24 months
KZ ◆◆◆ v ◆◆◆ Kv ◆◆◆◆KZ ◆◆◆◆ v ◆◆◆◆ Kv ◆◆◆◆ KZ	<b>Extension of calibration (K) to 24 month</b> (K) = calibration of measuring equipment (Z) = chamber working space full verification (v) = single point interim verification every 12 months
KZ ◆◆◆◆◆◆◆◆◆◆KZ ◆◆◆◆◆◆◆◆◆◆ KZ	(K) = Extension of calibration to 36 months (Z) = extension of full verification to 36 months

**END**