Status of Verification of Temperature/Humidity Chambers within IECEE CB Scheme

Cannes 2018
IECEEx ExTAG Training
Presenter: Katy Holdredge
Background

- Committee of Testing Laboratories (CTL) ~ IECEx ExTAG
- CTL WG 01, "Metrology and Accuracy/Uncertainty"

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<td>CTL WG 01</td>
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<td>Mr Andersen Morten</td>
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<td>Ms Zhu Lin</td>
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Research

- Several years’ work
- Standards analysis
  - > 2500 IEC standards
  - ~1000 unique standards
- All IECEE categories except:
  - EMC
  - INST – Installation accessories & connection devices
  - TOOL
  - TOY
Results - Standards

• 135 standards - Defined RH / T values
• 250 different set point values
• 181 standards reference directly or indirectly:
  - IEC 60068-3-5 (Temperature) or
  - IEC 60068-3-6 (Temperature & Humidity)
Results – Climate Graph

Graph 1

“Ideal” climate graph of RH / T values in IEC standards examined
Results – Common RH/T Values

Graph 3

Commonly occurring RH / T values among standards examined

- RH AVG of max. 8 min.
- DBX AVG of max. 8 min.
- RH accuracy
- T accuracy

%RH and deg C

Typically 85 deg C +/- 2 deg C @ 85% RH +/- 5

Typically 40 deg C +/- 2 deg C @ 93% RH +/- 3

Typically 39 deg C +/- 2 deg C @ 93% RH +/- 3

Typically 20 deg C +/- 2 deg C @ 93% RH +/- 3
Chamber Design & Performance

• Performance typically point or dimensioned area
• Mounting of RH/T sensors
• Control circuit design for humidity & temperature not necessarily coordinated
• 1°C can create change of ~4% RH
• Heat sources for air heating and humidity generation create fluctuations in RH/T control circuits as chamber attempts to maintain the desired set point
Empty Chamber Working Space Characterization

- Understand basic RH / T gradients across working space
- Good first approximation of chamber performance
- Test sample affect air flow
  - Creating potential “dead” spots
  - Airflow may be more turbulent
  - Either may be beneficial or detrimental to test
Base Line Profile

• Chamber specs do not always provide full details
• Knowledge of conditions allow proper sample placement
• IEC 60068-3-6:
  - 9 temperature < 2000 liters
  - 15 temperature sensors > 2000 liters
  - At least one humidity sensor within the chamber.
  - Variation in RH across the chamber (gradient) due to temperature differences at the temperature sensor locations provides means to calculate the RH
OD Draft Development

• Early stages
  - Approval by CTL WG01 still needed
  - Approval by CTL still needed – maybe 2019?
• Purpose – Verification temperature/humidity chambers
• Scope – Only when test standard does not provide criteria verification
• Proposed full verification intervals – no longer than 36 months
• Defines calibration requirements for equipment used for verification
• Measurement uncertainty requirements