



## The Value of a Calibration System in EIS Testing

Every laboratory is concerned with calibration. After all, it is a thorough calibration process that confirms both the validity and reliability of the data a lab will generate. Calibration itself covers several aspects - from calibration methods, calibration validation, calibration procedures and calibration records. Another part of calibration is the selection and use of *Reference Standards* and *Reference Materials*.

*Reference Standards* are used for conducting internal calibration of test equipment. *Reference Materials* are used to confirm that the equipment is set up and measuring data correctly.

In this Data Journal, we will look more closely at how ELTEK's Calibration Program ensures the validity and reliability of the data that comes from our Electrical Insulation Systems (EIS) Lab.

### Calibration of Equipment Used for EIS Testing

All test equipment used in the evaluation (testing) of an EIS is conducted in accordance with standard calibration procedures and practices following ISO 17025, as based in our International Accreditation Service (IAS) accreditation. In addition, all calibration equipment is traceable to National Institute of Standards and Technology (NIST) standards.

### Calibration of the EIS Lab

Because of the critical nature of the data resulting from an EIS evaluation, ELTEK Labs technicians expand the concept of Reference Materials and integrates it into our calibration process. Our EIS Lab technicians build, thermally age, condition and test an established EIS on a regular cycle. The system is aged at three or more elevated temperatures and follows the full test procedure through to completion.



ELTEK Labs' IEEE-117 low-voltage calibration system

A total of four (4) EIS are tested as part of this process. The four calibration EIS are:

1. Calibration EIS #1 = IEEE 117: Low Voltage EIS for use up to 600 VAC, random wound using 18 AWG ( $\leq 600$  volts)
2. Calibration EIS #2 = IEEE 117: Low Voltage EIS for use up to 600 VAC, random wound using 24 AWG ( $\leq 600$  volts)
3. Calibration EIS #3 = IEEE 1776: Medium Voltage EIS, form wound ( $\leq 15,000$  volts)
4. Calibration EIS #4 = Encapsulated EIS; low voltage ( $\leq 600$  volts)

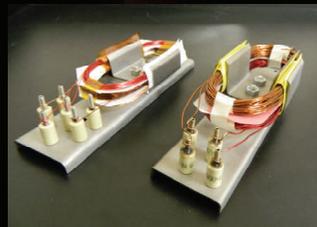
By testing these four calibration EIS, the calibration process incorporates all aspects of the EIS test program. The aspects are:

1. The aging temperatures cover a wide range of our aging ovens, bringing the actual operation of the ovens and controllers into the calibration process.
2. The test specimen performance is influenced while being conditioned; test specimens are exposed to some combination of vibration, exposure to cold, exposure to humidity only, or exposure resulting in visible condensation. The equipment used to apply each of these conditions is incorporated into our calibration process by conducting this full program.
3. The human factor is also part of the test process. The handling of the specimens can cause physical damage if the specimens are improperly handled during removal from ovens, when securing to the vibration table, inserting and removing EIS from the humidity chamber, making the electrical connections, placing into the drying oven, and returning to the aging ovens.



### EIS Test Programs

IEEE 99  
IEEE 117  
IEEE 259  
IEEE 1776  
IEC 61857, Part 1  
IEC 61857, Part 21  
IEC 61857, Part 22  
IEC 61858  
UL 1446



4. The application of the electrical stresses for the evaluation of the EIS incorporates the function of the test equipment used in testing and is part of this calibration process.
5. The calibration of the EIS Lab links to our Electrical Insulating Materials (EIM) Lab, which brings the EIM evaluation and all of the related lab equipment into the calibration process.

**Calibration Time and Intervals**

The calibration process of the EIS Lab requires approximately two (2) years from the start of the construction of the test specimens to the completion of the long term thermal aging. The calibration interval is five (5) years. The calibration is valid for a five-year period. The new calibration process begins near the end of the third year of the five-year cycle in order for the new calibration to be completed by the end of the previous calibration period.

**The Added Value of the Calibration EIS**

The EIS used for this calibration process is available for our customers to use in their EIS program and is referred to as the "Control" or "Reference", or "Known" EIS.

By utilizing our calibration EIS in customer's projects, we have the reference data (reference line and correlation time) available at the beginning of the customer's project. This allows us to make evaluations of the progress of the candidate EIS throughout the thermal aging process.

By utilizing our calibration EIS, our customers do not need to pay for the construction and aging of a control/reference EIS. This approach can save our customers considerable time and money.

**Calibration for Electrical Insulation Materials (EIM) Lab for Long Term Thermal Aging (LTTA) Testing**

All test equipment used in the evaluation (testing) of an EIM is conducted in accordance with standard calibration procedures and practices following ISO 17025. All equipment calibration is traceable to NIST.

**Use of the Calibration EIM**

ELTEK Labs strives to coordinate our internal evaluations to match our customer's projects. When possible, the material used for our lab calibration process can be offered as the "control" or "reference" material for our customer's LTTA project.

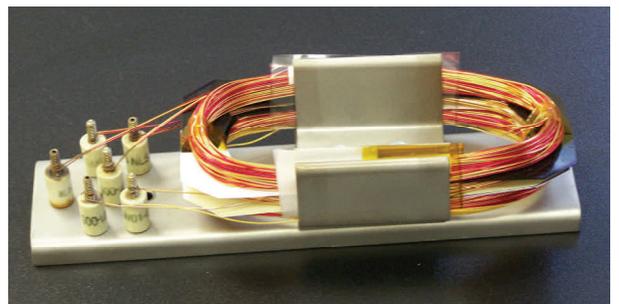


*Two of the many high-voltage test apparatus designed, fabricated, calibrated and maintained at ELTEK Labs.*

ELTEK Labs expands the level of calibration beyond basic requirements of most Quality Systems. We conduct full LTTA of established EIS and EIM on an ongoing basis. Our approach to calibration is focused on inclusion of all aspects of the lab process; from calibration of the equipment, to Reference Standards and Reference Materials as well as the influence of our lab personnel and all related test equipment.

ELTEK Labs offers a strong commitment to calibration – the validity and accuracy of data – based upon nearly 30 years in the industry and a rigorous Quality System based on ISO 17025. All this is backed by our IAS Accreditation.

To learn more about our calibration processes, contact ELTEK Labs.



**Committed to the Industry and our Customers**

As members of various organizations, ELTEK technical staff take an active role on both Technical Panels and Working Groups. In the past year we've been to meetings in China, Japan and Florida.

**IEC**  
TC -112 Working Group 6

**IEEE**  
1776 (275/429)

Member of the USNC to the IEC TC-112 General Meeting

We are now becoming involved in the growing field of Photovoltaic testing as well. Look for more details in the next Data Journal issue.

**ELTEK International Laboratories**

[www.ELTEK Labs.com](http://www.ELTEK Labs.com)

248 Hughes Lane  
Saint Charles, MO 63301  
Phone: 636-949-5835  
Email: [info@eltek labs.com](mailto:info@eltek labs.com)

