NIST Traceable: What does it mean?

By Patrick Jester, JD – Compliance Manager, Michelli Weighing & Measurement

NIST Traceable means that the reference standards used in the calibration of a device have been calibrated themselves using certified reference standards. The calibration documentation for NIST Traceable devices provides an unbroken chain that can be traced directly to the SI Units through a National Metrological Institute (NMI), such as NIST.

There are several National Metrological Institutes to which a calibrated device can be traceable. Some of the other NMI around the world include the National Physical Lab (NPL) in England & Physikalisch-Technische Bundesanstalt (PTB) in Germany.

In the world of metrology, NIST Traceable is one of the most common terms, but is arguably the most misunderstood concept. When asking about NIST Traceability, customers often request a "NIST Number". A common misconception within our industry is that if given a "NIST number", NIST can confirm the calibration of the customer's device. This is not the case.

The term "NIST Number" refers to the unique identification number assigned to a calibration report. Also referred to as a certificate number or report number, this unique number is not directly associated with NIST or any other NMI. It is tied only to the device that was calibrated, which is identified as the "artifact".

When an artifact is calibrated and a calibration report is issued, that calibration report lists the reference standard used & includes the standard's manufacturer, model, serial number, calibration due date, and calibration report number. The calibration report of the reference standard will include the same information, and so on, creating an unbroken chain back to the SI Units.

The seven SI base units are comprised of the following:

Length - meter (m)
Amount of Substance - mole (mol)
Temperature - kelvin (K)
Mass - kilogram (kg)
Time - second (s)
Electric Current - ampere (A)
Luminous Intensity - candela (cd)

The SI Units are founded on seven (7) defining constants which are as follows:

1. The cesium hyperfine splitting frequency
2. The speed of light in vacuum
3. The Planck constant
4. The elementary charge (or the charge on a proton)
5. The Boltzmann constant
6. The Avogadro constant
7. The luminous efficacy of a specified monochromatic source

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The definitions of the seven (7) SI base units are expressed using an explicit-constant formulation and experimentally realized using a specific practical technique.[1]

In conclusion, NIST Traceability is a property of measurement. It gives us the ability to verify that a reference standard, or reference material, meets the very exacting specification that is claimed.

[1] Si Units **Isabel.chavez@nist.gov - https://www.nist.gov/pml/weights-and-measures/metric-si/si-units**

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