N.I.S.T. Traceability….what does it mean?

It is a common misconception that having a NIST number on a cert establishes "Traceability to NIST". The reality is that a NIST number is nothing more than some other labs certificate number of an item they sent directly to NIST. A NIST number is not proof of traceability.

What is N.I.S.T. and what does NIST Traceability really mean?

N.I.S.T. stands for The **N**ational **I**nstitute for **S**tandards and **T**echnology. It is easier to pull words directly from NIST's web-site in order to better define what they do;

The mission of NIST is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. To help meet the measurement and standards needs of U.S. industry and the nation, NIST provides calibrations, standard reference materials, standard reference data, test methods, proficiency evaluation materials[1], measurement quality assurance programs, and laboratory accreditation services that assist a customer in establishing traceability of measurement results.

The National Institute of Standards and Technology (NIST) (http://www.nist.gov/) is an agency of the Department of Commerce. Its role as the National Metrology Institute (NMI) for the United States was established by Congress in 1901. As such, NIST has the responsibility "to develop, maintain and retain custody of the national standards of measurement, and to provide the means and methods for making measurements consistent with those standards; to assure the compatibility of United States national measurement standards with those standards; and to assure the compatibility of United States national measurement standards with those of other nations." [15 U.S.C. 271] The job of NIST is twofold: to ensure U.S. national standards are accurate realizations of the SI units and to transfer the values of those standards to the U.S. measurement system through calibrations and other types of measurement services.

Traceability as defined by NIST, is:

Metrological traceability requires the establishment of an unbroken chain of calibrations to specified references. NIST assures the traceability of measurement results that NIST itself provides, either directly or through an official NIST program or collaboration. Other organizations are responsible for establishing the traceability of their own results to those of NIST or other specified references. NIST has adopted this policy statement to document the NIST role with respect to traceability.

A similar definition as found in the International Vocabulary of Metrology is:

property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty. (International Vocabulary of Metrology - Basic and General concepts and Associated Terms (VIM), definition 2.41, see Reference [1]).

Subsequently, the following FAQ on NIST's website gives additional insight:

Question: I.C.3 What is meant by the phrase "traceable to NIST"?

Answer: According to the internationally recognized VIM definition, metrological traceability is a property of a measurement result by which that result is ***related to specified reference standards, not to***

***institutions**. Accordingly, the phrase "traceable to NIST", in its most proper sense, is shorthand for "metrologically traceable to NIST's practical realization of the definition of a measurement unit" (see 2.43 in Reference [1]).*

So how is Traceability established?

A2LA (American Association for Laboratory Accreditation) explains this fairly well in their Normative document P102 Policy on Measurement Traceability;

To establish an audit trail for traceability, a proper calibration result should include:

- *The assigned value*
- *A stated uncertainty*
- *Identification of the standards used in the calibration*
- *Specification of any environmental conditions*

Within this same policy document, A2LA further explains; *test report numbers issued by NIST are intended to be used solely for administrative purposes. Although they are often used to uniquely identify documents which bear evidence of traceability,* ***test report numbers shall not be used nor required as proof of the adequacy or traceability of a test or measurement.*** (See http://www.a2la.org/press_releases/PR7799PolicyNIST.htm for more details).

Below is a relevant frequently asked question from the NIST website:

Question: I.C.9 Given that NIST operates the National Voluntary Laboratory Accreditation Program (NVLAP), does this mean that NIST stands behind claims of traceability made by NVLAP-accredited labs?

Answer: No, laboratory accreditation, whether conducted by NIST/NVLAP or any other recognized accreditation body, is a finding of a laboratory's competence and capability to provide technically sound and appropriate measurement services within their scope of accreditation. Embedded in the process is an evaluation of the lab's ability to achieve and maintain traceability for the accredited services. Accreditation to ISO/IEC 17025 [3] determines that a laboratory has all of the necessary facilities, equipment, standards, procedures, uncertainty analyses, personnel, etc., which make it capable of providing traceable measurement results. Laboratory accreditation does not speak to the specifics of any individual measurement result but to the overall capability of a lab to provide the service. NIST experts often participate in the accreditation process, but again, the end result is a finding of competence and capability only.

So to sum this all up in simplistic terms, NIST is the official National "Measuring Stick". Just because you have a NIST number on a cert does not prove traceability. If a calibration lab is accredited to ISO 17025, that accreditation body has certified that calibration lab as "capable of providing traceable measurement results". If the particular certificate in question contains assigned values, measurement uncertainties, identification of standards used, and environmental conditions, it is proof of traceability.

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