

NVLAP Proficiency Testing for Calibration Laboratories

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Proficiency Testing: What's it Good For?

- PT is useful to ensure that a quality system is active
- Provides additional *assurance* and *evidence* of the *capability* and *competence* of the lab to make measurements within its stated uncertainties
- Provides a snapshot

PT Providers

- NVLAP does not subcontract proficiency testing
 - Results of PTs by others not acceptable without a full evaluation to determine the technical validity and fit-for-purpose
- So-called “accredited” providers are not included in any MRA of which NVLAP is a signatory, therefore, NVLAP is not obligated to accept the results.

Types of NVLAP PTs

One-on-One Direct Test

- NVLAP acquires an artifact
- Initial characterization or calibration to determine the reference value and uncertainty
 - NIST Technical Division
 - NVLAP Accredited Lab
- Artifact is sent to lab being tested
 - Measurements are made, results are reported to NVLAP along with uncertainty

Types of NVLAP PTs

One-on-One Direct Test (cont.)

- NVLAP compares measured value and uncertainty to reference value and uncertainty
 - Calculate the error of the measurement, normalized with respect to the uncertainty of the measurement:
(See flip chart demonstration!)
 - Test results are satisfactory if $|E_n| \leq 1$

Types of NVLAP PTs

One-on One Direct Tests (cont.)

- Laboratory is instructed to make measurement and report the results to NVLAP, the customer
- Time limits are given
- Complete instructions on how to make the measurement if required
- Results given “informally” and no formal report published.

Types of NVLAP PTs

Multiple Participant Sequential

- Multiple participants
- Design planned with consideration of
 - Criteria for participation
 - Order of participation
 - Stability of artifact and how assured
 - Circulation Pattern
 - Timing
 - Reporting results
 - Analysis
 - Satisfactory results are also determined by En with different methods used to determine the reference value

Multiple Participant Sequential (cont.)

- Participants submit results electronically upon completion for comparison to preliminary reference values.
- Obvious problems – corrective action is immediately implemented.
- Results rarely published BUT participants receive report of pass/fail with details of how the determination was made.

Types of NVLAP PTs

Special Tests

- Levels of Uncertainty can determine the need for a special test
 - Resistance thermometry conducted in collaboratively with the Thermometry Group within the NIST Process Measurements Division
 - Thermocouple calibrations with a test designed by the Thermometry Group after a query of capabilities

Other Methods of Proficiency Testing

- NVLAP may accept results of other proficiency tests IF Lab fully discloses all aspects of the test:
 - Evidence of artifact used
 - Reference values and uncertainties
 - Path of traceability for these values
 - Who conducted the test
 - How the data were analyzed
 - Results

Other Methods of Proficiency Testing (cont.)

- NVLAP accepts results of measurement activities between NIST Technical Divisions and accredited laboratories:
 - Labs are responsible for scheduling the test
 - Comparisons are made
 - Results are reported to the laboratory
 - Laboratory must either grant permission to the NIST technical division to release the data/results to NVLAP or to submit the results directly

Other Methods of Proficiency Testing (cont.)

- NVLAP generally accepts results from participation in formal regional Interlaboratory Comparisons (ILC)
 - APLAC
 - EA
- Full review before acceptance is considered.

ISO/IEC Guide 43-1:1997

- Relevant requirements applied as appropriate to ALL NVLAP Cal lab PT schemes.
- Generally, all fall under schemes identified in Clause 4.2 of Guide 43
- PT Schemes planned and designed by experts and consider all relevant requirements of Section 5.1

NVLAP and NIST Technical Units

- Guidance and assistance of relevant measurement experts from various NIST Measurement Services Divisions
 - NISTIR 6988, *NVLAP Partnerships with NIST Technical Units*
- Additional expertise in statistical analysis also employed.