



**Agilent Technologies**

# **Calibration of Electronic Test Equipment: An Introduction to ISO 17025 & Accreditation**

**April 7, 2003**

*presented by:*

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# Today's Objectives

- **What is ISO 17025, and what is accreditation?**
- **How do they benefit me and my customers?**
- **What are the next steps that I need to take?**
- **Where can I find more information?**



# Why should I learn about ISO 17025?

- **Do you currently purchase calibrations that comply with ANSI/NCSL Z540?**
- **Do you or your customers sell products to the automotive industry?**
- **Do you conduct any environmental or EMC testing at your facility?**
- **If you answered “yes” to any of the above questions, then you need to know about ISO 17025**



# What is ISO 17025?

- **ISO/IEC 17025:1999 is an international standard for calibration and testing labs**
- **Requires labs to demonstrate that they:**
  - **Operate a quality system**
    - **Processes, documentation and quality management system**
  - **Generate technically valid results**
    - **Equipment, procedures, and personnel**
- **Replaces the ANSI/NCSL Z540-1994 standard in the U.S. and other countries**



# Who uses ISO 17025?

- **All national accreditation bodies have adopted ISO 17025**
- **Several industries or countries have incorporated it into their industry-specific or application-specific regulations**
  - **QS-9000: quality standard for the automotive industry**
  - **FCC Part 15: U.S. government regulation for the qualification testing of computers and peripherals**



# International Standards

## Quality Management System Requirements:

ISO 9000:1994



ISO/IEC 9000:2000

QS-9000-1994



ISO/TS 16949:2002

## Technical Management System Requirements:

Mil 45662A

ISO Guide 25



ISO/IEC 17025:1999

ANSI/NCSL Z540-1994



ANSI/NCSL Z540-2000



# Why a new Standard?

## A global standard to provide consistency

- **Customers need to determine the relative quality and capability of different cal labs**
  - **How do you compare the measurement results from different vendors?**
  - **For multi-national companies, how do you compare vendors in different countries?**
- **Customers gain a higher confidence level in the calibrations they purchase**
- **International trade is increased by reducing potential quality barriers**



# Why a new Standard?

## A third-party process to assess compliance

- **Vendors need to confirm their quality and competence**
  - **Can conduct an internal audit through their own quality department**
  - **Can undergo an external audit from each of their major customers**
- **Vendors can now schedule a single third-party audit and become accredited to a common set of requirements**





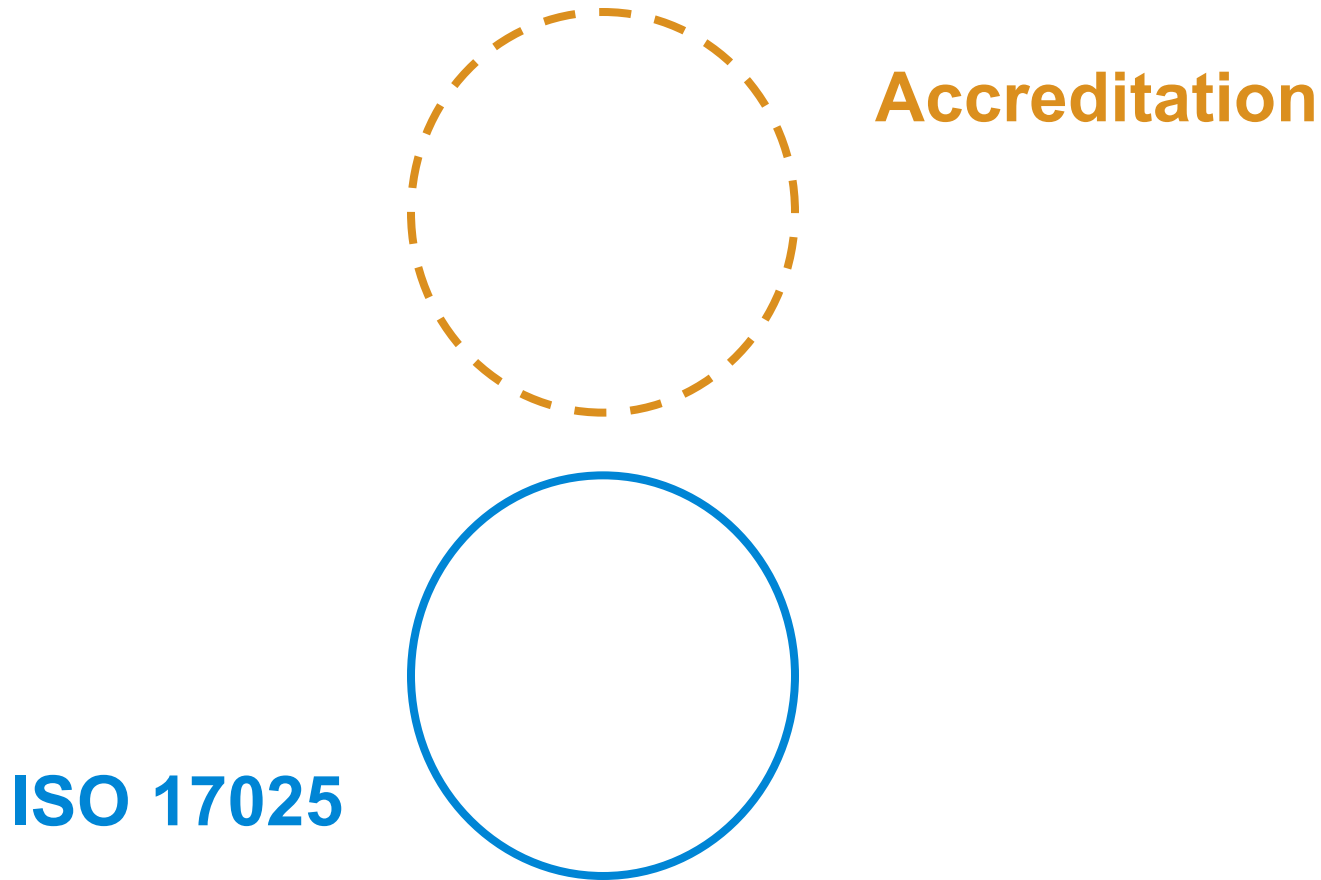
# What is Accreditation?

- **A formal recognition process where an authoritative body reviews and approves a calibration lab's quality system and technical competence**
- **Each country has its own accreditation body**
  - **NVLAP in U.S., UKAS in U.K., JCSS in Japan, etc**
- **All accreditation bodies use ISO 17025, but there are some country-to-country variations in what they require**



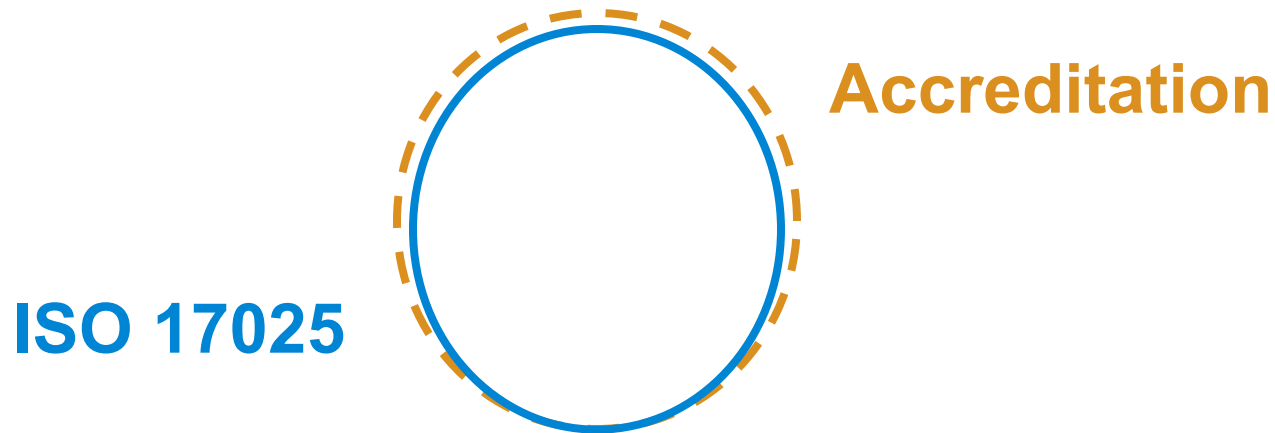
# ISO 17025 versus Accreditation

## Comparing Requirements



# ISO 17025 versus Accreditation

## Ideal Situation

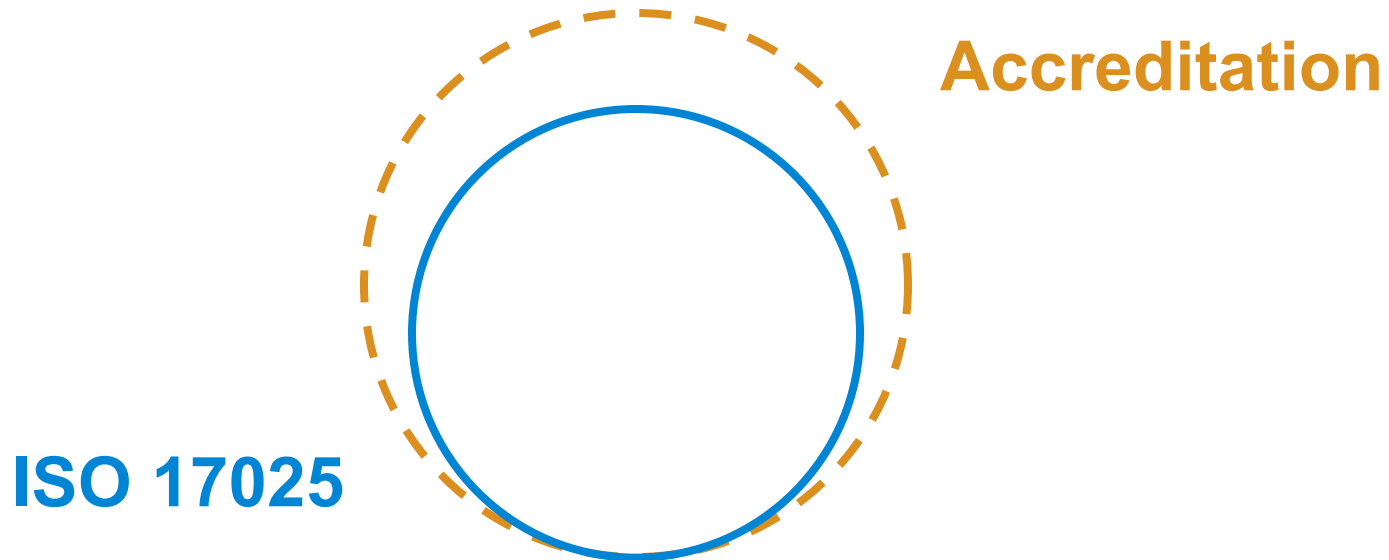


**ISO 17025 and accreditation requirements are identical**



# ISO 17025 versus Accreditation

## Typical Single Country Situation

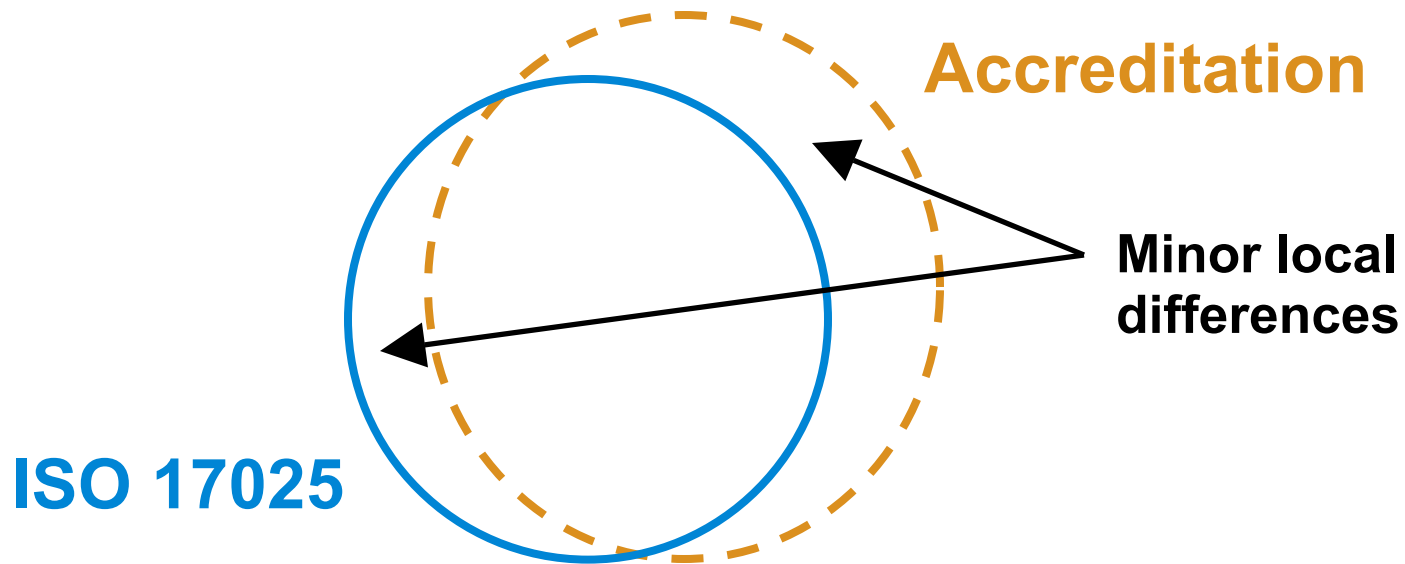


**Accreditation requirements are a super-set of ISO 17025 requirements**



# ISO 17025 versus Accreditation

## Current Global Situation



**Accreditation requirements (and sometimes how ISO 17025 is interpreted) are slightly different from country-to-country**



# What is the “Scope of Accreditation”?

- **Calibration labs are not accredited - specific measurement parameters are accredited**
  - **Some small vendors are only accredited for one parameter such as DC voltage**
  - **Some larger vendors are accredited for 15 or more parameters**
- **Accredited parameters are documented in the “scope of accreditation”**
  - **Includes approved parameters, ranges, and best measurement capabilities**



# Typical Calibration Deliverables

- **Calibration certificate and label**
- **Measurement reports**
  - **“As received” data for all parameters (before any adjustments)**
  - **“As shipped” data for all parameters (after any adjustments)**
- **Safety test label and tamper-resistant seals**



# Additional ISO 17025 Deliverables

## Measurement uncertainties

- **Is:** Point-by-point measurement uncertainty
  - Per ISO Guide to the Expression of Uncertainty in Measurement (or GUM)
  - Measurement uncertainty is provided for **all** parameters
- **Is not:** Test Accuracy Ratio (or TAR)
  - Per ANSI/NCSL Z540 and MIL-45662A
  - Measurement uncertainty is provided **only** if the TAR is less than 4:1

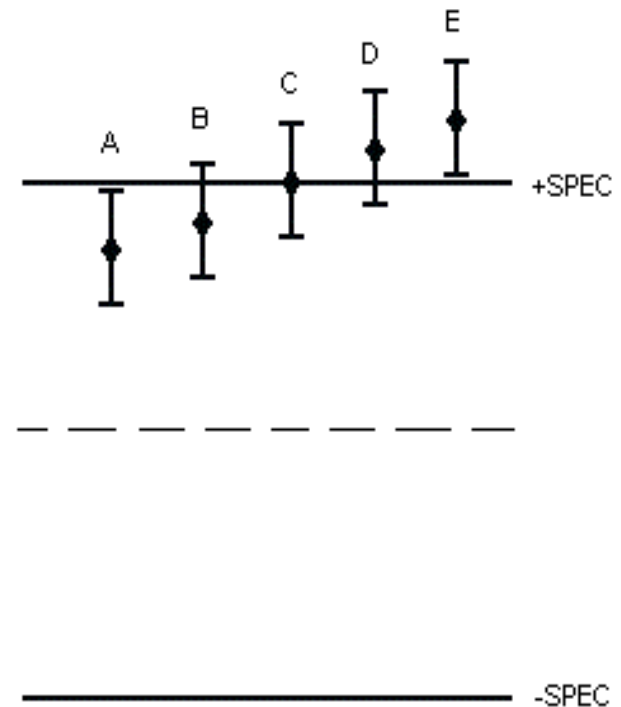




# Additional ISO 17025 Deliverables

## Guard bands and “Statement of Compliance”

- If a vendor states that the unit complies with a specification, then the measurement uncertainty must be taken into account
  - For example, test limits can be adjusted to reflect the uncertainty



# Additional Accredited Deliverables

## Country-specific requirements

- **Measurement uncertainties and guard bands**
  - **Same as the ISO 17025 calibration**
- **Additional country-specific requirements from the local accreditation body**
  - **Specific test procedures, equipment, locations, personnel, etc**
- **Special calibration certificate**
  - **Includes the name and logo of the local accreditation body**



# Hierarchy of Calibration Quality

## Quality Level:

## Audit Type:

**ACCREDITED**  
to ISO 17025

**EXTERNAL**

Conformant  
to ISO 17025

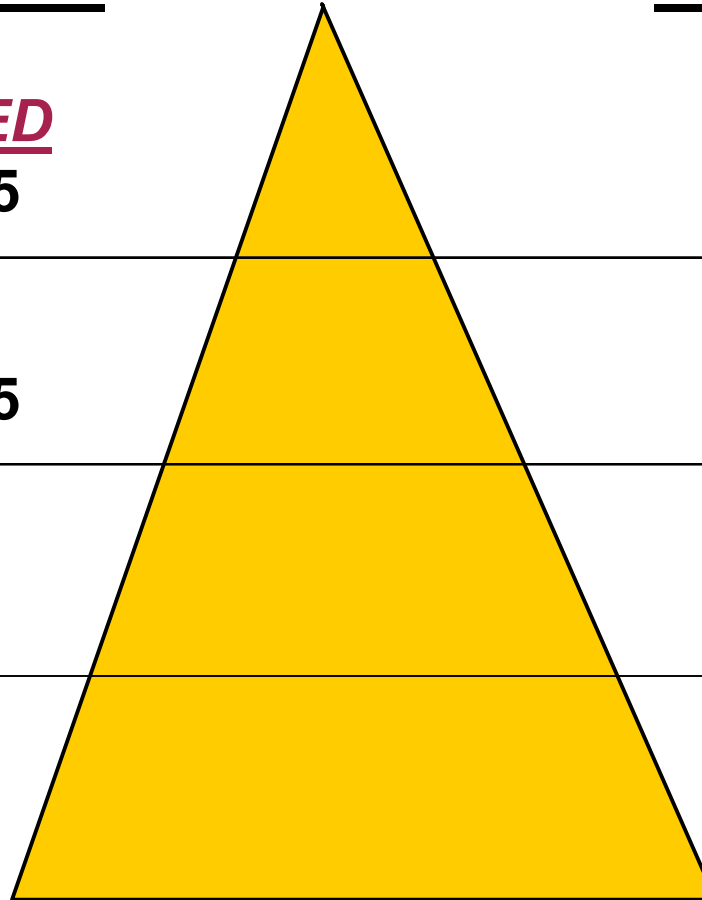
Internal

**CERTIFIED**  
to ISO 9000

**EXTERNAL**

Conformant  
to ISO 9000

Internal



# Checklist for Calibration Customers

- **Confirm what level of compliance is required for your industry or country**
  - **For example, QS-9000 requirements are more rigorous in Europe than in the U.S.**
- **Ask yourself the following questions:**
  - **Do you need to purchase calibrations from an accredited vendor?**
  - **If so, is the vendor accredited for all the parameters that your equipment requires?**



# Checklist for Calibration Customers

**(continued)**

- **Do you need to purchase an ISO 17025 calibration?**
  - **Complies with ISO 17025, but may not meet all the requirements of the local accreditation body**
- **Or do you need to purchase an accredited calibration?**
  - **Meets all the additional requirements of the local accreditation body**



# For more information

## Global resources

- **International Organization for Standardization**
  - <http://www.iso.org>
- **National Conference of Standards Laboratories International (NCSLI)**
  - <http://www.ncsli.org>
- **International Laboratory Accreditation Cooperation (ILAC)**
  - <http://www.ilac.org>
  - **Directory of national accreditation bodies**



# For more information

## Country-specific resources

- **American Association for Laboratory Accreditation (A2LA)**
  - <http://www.a2la.org>
  - **Features a search function for approved calibration labs and their scopes of accreditation**
  - **Includes the complete list of accredited parameters, ranges, and best measurement capabilities**



# For more information

## Agilent Technologies resources

- **Agilent Metrology Forum**
  - <http://metrologyforum.tm.agilent.com>
  - **Articles on metrology and calibration**
  - **Agilent service centers and their accredited parameters**
- **Agilent Calibration Services**
  - <http://www.agilent.com/find/calibration>
  - **New portfolio of calibration services and purchasing alternatives**

