



Australian Government

MSL904001 Perform standard calibrations

Release: 1

MSL904001 Perform standard calibrations

Modification History

Release 1. Supersedes and is equivalent to MSL904001A Perform standard calibrations

Application

This unit of competency covers the ability to calibrate test and measurement equipment in accordance with standard calibration procedures and documented test methods. These procedures/methods specify all associated reference standards, materials, equipment and methods to be used and the required parameters or quantities and ranges to be tested, including the criteria for rejection or approval.

This unit of competency is applicable to laboratory and calibration technicians who carry out tests and/or calibrations using standard calibration methods in first, second and third party laboratories, and laboratories where testing and/or calibration forms part of inspection or product certification. Personnel are not permitted to deviate from explicit instructions in any manner, modify the procedure, nor substitute alternative equipment. They work under limited supervision and results of their work are interpreted and checked by the laboratory supervisor, quality inspector or designated signatory.

While no specific licensing or certification requirements apply to this unit at the time of publication, laboratory operations are governed by relevant legislation, regulations and/or external accreditation requirements. Local requirements should be checked.

Pre-requisite Unit

Nil

Competency Field

Calibration

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

- | | | | |
|---|--------------------------------------|-----|---|
| 1 | Prepare items for calibration | 1.1 | Select the authorised calibration procedure in accordance with workplace procedures |
| | | 1.2 | Identify hazards and use appropriate personal protective equipment (PPE), safety equipment and procedures |

- 1.3 Confirm all measuring equipment meets the laboratory's specification requirements and complies fully with the calibration procedure
 - 1.4 Assemble and set up specified reference standards and associated equipment prior to testing
 - 1.5 Verify performance of reference standards and measuring equipment prior to use and adjust or calibrate as necessary
 - 1.6 Identify and minimise potential sources of measurement error
- 2 **Perform calibration**
 - 2.1 Perform individual tests without variance according to the documented procedure to ensure repeatability of measurement
 - 2.2 Confirm readings are the result of a valid measurement and record data as required (as-found or before adjustment)
 - 2.3 Adjust device under test to bring readings within specification and record data (as-left or after adjustment) where required
 - 2.4 Analyse resulting test data to detect trends or inconsistencies that would significantly affect the accuracy or validity of test results
 - 2.5 Seek appropriate advice when interpretation of results is outside authorised scope of approval
- 3 **Document results**
 - 3.1 Estimate and document uncertainty of measurement in accordance with workplace procedures, where required
 - 3.2 Document compliance/non-compliance with test requirements and/or specifications
 - 3.3 Record the results of each test/calibration accurately, unambiguously and objectively
 - 3.4 Ensure confidentiality of workplace information

- | | | |
|---|-----------------------------|--|
| 4 | Finalise calibration | 4.1 Prepare and issue a final report on the job/item detailing testing carried out, traceability, statement of compliance and relevant information as required

4.2 Report any non-compliance and verify next course of action with supervisor

4.3 Attach calibration labels, equipment stickers, quality control tags and tamper resistant seals as required in workplace procedures

4.4 Store test equipment/measurement standards and results in accordance with workplace procedures |
|---|-----------------------------|--|

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Standards, codes, procedures and/or workplace requirements

Standards, codes, procedures and/or workplace procedures include the current version of one or more of:

- Australian and international standards and codes covering:
 - general requirements for the competence of testing and calibration laboratories, laboratory safety, quality and environmental management
 - accuracy of measurement methods and results, expression of uncertainty (GUM), quantifying uncertainty in analytical measurement, quality assurance of measurement equipment
- national work health and safety (WHS) standards and codes of practice
- registration/licensing and/or National Association of Testing Authorities (NATA) accreditation requirements
- safety requirements for equipment, materials or products; material safety data sheets (MSDS); and incident and accident/injury reports
- standard operating procedures (SOPs), recording and reporting

procedures

- quality manuals, equipment and operating/technical manuals
- test methods and calibration procedures (validated and authorised)
- test methods and calibration procedures published by international, national or regional standards, reputable technical organisations, scientific texts or journals and equipment manufacturers
- laboratory layout, work flows and schedules

Standard calibrations

Standard calibrations include, but are not limited to, testing and/or calibrating the following equipment and reference materials using standard methods and procedures:

- test equipment, such as anemometers, balances, barometers, callipers, environmental chambers, hygrometers, manometers, masses, micrometers, pressure equipment, spectrophotometers, tape measures, rules, temperature (digital) indicating systems, thermometers, thermocouples, timing devices, vibration analysis equipment and weighing instruments
- electrical reference standards, such as air-lines, analogue meters, attenuators, bridges-manual balance, capacitors, DC voltage references, digital instruments (calibrators, DMMs, electronic transfer standards), inductors, instrument and ratio transformers, instrument transformer test sets, potentiometers, resistors, radio frequency (RF) power meters, RF thermistor mounts and thermal converters, shunts, time interval and frequency standards, transfer standards AC-DC, voltage dividers, volt ratio boxes and watt-hour references
- working standards, instruments and testing equipment, such as electromagnetic compatibility (EMC) test equipment, field strength meters, flammability test equipment, gauges/test fingers/test pins, hipot testers, impact hammers, impulse testers, instrument calibrators, network analysers, signal generators and spectrum and harmonic analysers

Hazards

Hazards include, but are not limited to, one or more of:

- electric shock
- disturbance or interruption of services
- manual handling of heavy equipment boxes
- sources of electromagnetic radiation (lasers and RF generators/transmitters)
- fluids under pressure
- heat sources, such as ovens

Safety procedures	Safety procedures include, but are not limited, to one or more of: • ensuring access to service shut-off points • use of PPE, such as hearing protection, gloves, safety glasses and coveralls • handling and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, and workplace procedures and regulations • regular cleaning of equipment and work areas
Reference materials	Reference materials include, but are not limited to, one or more of: • colour standards • graded granular materials • hardness blocks
WHS and environmental management requirements	WHS and environmental management requirements include: • complying with WHS and environmental management requirements at all times, which may be imposed through state/territory or federal legislation. These requirements must not be compromised at any time • applying standard precautions relating to the potentially hazardous nature of samples • accessing and applying current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health, where relevant

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSL904001A Perform standard calibrations

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>

Assessment Requirements for MSL904001 Perform standard calibrations

Modification History

Release 1. Supersedes and is equivalent to MSL904001A Perform standard calibrations

Performance Evidence

Evidence of competence in this unit must satisfy all of the requirements of the elements and performance criteria, and include demonstration of:

- selecting and applying appropriate test methods and calibration procedures
- safely calibrating test and measurement equipment in accordance with standard calibration procedures and documented test methods on at least two (2) occasions
- maintaining close attention to all relevant procedures, regulatory requirements and the accuracy and precision of measurement to ensure the quality and integrity of test/calibration results
- critically examining each calibration step to ensure repeatability and validity of data
- using calibration and correction charts
- performing calculations to give results in appropriate accuracy, precision and units
- using statistical analysis (means, ranges and standard deviations) and estimation of uncertainty of measurement, where required (can use software)
- preparing test/calibration documentation that is accurate and complies with requirements
- recognising problems or departures in systems and documentation and initiating actions to prevent or minimise them
- recognising and reporting opportunities for improvements.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- purpose of metrology and calibration, including common terminology, concepts, principles, procedures and applications
- National Association of Testing Authority's (NATA) and National Measurement Institute's (NMI) role in the measurement and testing system in Australia
- traceability, including legal requirements for traceability
- requirements for the competence of testing and calibration laboratories (e.g. AS ISO/IEC 17025) as they affect job role and responsibilities
- hierarchy and appropriate selection of reference materials and instruments
- non-conformance/non-compliance procedures and protocols associated with equipment, reference material and calibration procedures
- troubleshooting procedures for equipment and test methods
- reporting procedures and legislative requirements
- handling, transport, storage and operation of reference and working standards

- work health and safety (WHS) and laboratory environmental control requirements.

Additional knowledge requirements relevant to the workplace context that apply for different calibration fields must be assessed, including testing and calibration conducted in the following fields:

- acoustic and vibration measurement
- chemical testing
- construction materials testing
- electrical testing
- heat and temperature measurement
- mechanical testing
- metrology
- non-destructive testing
- optics and radiometry
- pressure measurement.

Assessment Conditions

- Judgement of competence must be based on holistic assessment of the evidence. Assessment methods must confirm consistency of performance over time, rather than a single assessment event.
- This unit of competency is to be assessed in the workplace or a simulated workplace environment. A simulated workplace environment must reflect realistic operational workplace conditions that cover all aspects of workplace performance, including the environment, task skills, task management skills, contingency management skills and job role environment skills.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
- Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept).
- This unit of competency may be assessed with:
 - MSL924001 Process and interpret data
 - relevant MSL974000 series unit/s of competency
 - relevant MSL975000 series unit/s of competency
- Holistic assessment methods include:
 - review of calibration results, uncertainty calculations and workplace documentation completed by the candidate
 - feedback from supervisors and/or customers regarding quality of calibration services provided by the candidate
 - observation of the candidate performing standard calibrations

- oral or written questioning to check required knowledge of standard calibration procedures.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - specialised calibration/test equipment, reference standards and laboratory facilities
 - calibration methods, procedures and equipment specifications
 - workplace quality manual and procedures.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competence and currency.
- Technical competence can be demonstrated through:
 - relevant VET or other qualification/Statement of Attainment AND/OR
 - relevant workplace experience
- Currency can be demonstrated through:
 - performing the competency being assessed as part of current employment OR
 - having consulted with a laboratory about performing the competency being assessed within the last twelve months.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>