



Australian Government

MSL905003 Create or modify automated calibration procedures

Release: 1

MSL905003 Create or modify automated calibration procedures

Modification History

Release 1. Supersedes and is equivalent to MSL905003A Create or modify automated calibration procedures

Application

This unit of competency covers the ability to create, edit, test and document computer controlled calibration procedures for test and measurement instruments. This may be in response to the introduction of alternative or new equipment, changing test circumstances, activities involved in research and development trials or to meet client needs. The unit covers performance of automated, including computer-aided, calibrations as well as the programming and control of automated calibration systems.

This unit of competency is applicable to calibration technicians/specialists who carry out tests and/or calibrations in first, second and third-party laboratories, and laboratories where testing and/or calibration forms part of inspection or product certification. They require a substantial, in-depth technical knowledge across a broad spectrum of advanced calibration practices and technologies, including a thorough understanding of equipment specifications and proprietary software writing skills. They are authorised by their laboratory to create or modify calibration procedures. They work with limited guidance and results of their work are checked by the laboratory manager, 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

MSL904001 Perform standard calibrations

MSL905001 Perform non-standard calibrations

MSL905002 Create or modify calibration procedures

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	Assess the suitability of available automated procedures	1.1	Determine the technical and quality deficiencies of the current automated calibration procedure
		1.2	Research alternative established procedures, if available
		1.3	Establish whether an available procedure can be customised or if a new procedure is needed
		1.4	Obtain internal approval to develop an automation plan and strategy
		1.5	Identify the resources required for automation and verify they meet necessary quality, laboratory and technical requirements
		1.6	Confirm that the automated procedure will meet the needs of the client, if applicable
2	Create or edit automated procedure	2.1	Identify and document all relevant calibration data to be collected, including parameters and ranges to be tested
		2.2	Check that instructions are adequately documented to ensure repeatability of test
		2.3	Document hazards and safety measures to be observed
		2.4	List the requirements for calibration approval and rejection
		2.5	Specify data to be recorded and produce a results template, if required
		2.6	Edit or compile the procedure using appropriate software
		2.7	Confirm that all calibration requirements can be fulfilled by using the procedure
		2.8	Test run the program, check errors and debug as necessary

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| 3 | Configure instruments/equipment | 3.1 | Use the appropriate personal protective equipment (PPE), safety equipment and procedures |
| | | 3.2 | Configure workstation, reference standards, instruments and equipment |
| | | 3.3 | Verify performance of reference standards, instruments and equipment prior to use and adjust or calibrate as necessary |
| | | 3.4 | Identify and minimise potential sources of measurement error |
| 4 | Refine the automated procedure | 4.1 | Run automated procedure to confirm functionality of all steps |
| | | 4.2 | Recognise non-conforming results or data and amend the program or troubleshoot procedure/equipment as necessary |
| | | 4.3 | Verify all data are the result of valid measurements and all calculations are correct |
| | | 4.4 | Confirm the integrity of procedure at each step to ensure repeatability of measurement |
| 5 | Verify automated procedure is fit for purpose | 5.1 | Generate a calibration report and compare results achieved with other methods |
| | | 5.2 | Systematically analyse all measurement and environmental factors that may influence results and take corrective action |
| | | 5.3 | Quantify the uncertainties of results by analysing equipment specifications and test methodology |
| | | 5.4 | Arrange for internal peer checking of procedure, data and results and incorporate feedback |
| | | 5.5 | Review feedback from other laboratories to assess acceptance of procedure, if applicable |
| | | 5.6 | Confirm the procedure is fit for purpose and relevant to |

the client's needs and document as required

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| 6 | Document and review automated procedure | 6.1 | Ensure that the procedure is written in accordance with workplace procedures or statutory and regulatory requirements |
| | | 6.2 | Ensure that the procedure has been reviewed in accordance with workplace procedures |
| | | 6.3 | Report and present the procedure to appropriate personnel for validation before use |

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 requirements 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, 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 calibration software and programs, manufacturer's proprietary software
- laboratory layout, work flows and schedules

Editing or creating automated procedures

Editing or creating automated procedures involves, but is not limited to, using, testing and/or calibrating one or more of the following:

- common 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, workplace procedures and regulations
- regular cleaning of equipment and work areas

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 MSL905003A Create or modify automated calibration procedures

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 MSL905003 Create or modify automated calibration procedures

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Performance Evidence

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

- creating, editing, testing and documenting at least one (1) computer controlled calibration procedure
- following all relevant safety procedures
- assessing the suitability of software controlled calibration procedures
- researching current, alternative calibration methods and equipment
- developing or modifying calibration procedures to automate processes
- writing efficient calibration procedures using an unambiguous, logical sequence of instructions that meet statutory and regulatory requirements
- writing or editing efficient software programs for at least three (3) calibration applications and assessing their integrity under test
- applying specialised technical knowledge to critically analyse and resolve complex problems associated with measurement non-conformances where solutions are not obvious or readily available
- explaining automated calibration procedures to clients and clarifying their requirements
- conducting reliable calibration/testing trials to ensure a high degree of reproducibility
- liaising with peers and technical staff from other laboratories to clarify and validate automated procedures
- estimating measurement uncertainty and applying statistical techniques for analysing test and/or calibration data
- critically examining each calibration step to ensure repeatability and validity of data
- preparing all test documentation accurately, concisely and in accordance with requirements
- recognising and reporting opportunities for improvements.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- requirements for the competence of testing and calibration laboratories (e.g. AS ISO/IEC 17025) as they affect job role and responsibilities
- limits of authority and procedures for creating or modifying automated calibration procedures

- structure and terminology used in standard calibration methods, procedures, requests and instructions
- current automated calibration methods, procedures and technology applications used in laboratory
- computer operation/automation using graphical user interfaces
- equipment specifications and limitations and the implications of equipment substitution
- equipment and testing method troubleshooting procedures
- the hierarchy of reference materials
- handling, transport, storage and operation of reference and working standards
- calculation procedures to give results in appropriate accuracy, precision and units
- methods for statistical analysis (means, ranges and standard deviations) and estimation of uncertainty of measurement (may include the use of software)
- workplace procedures and legislative requirements for documenting calibration procedures
- workplace and/or legal traceability requirements
- 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 testing.

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 or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept in each case).
- This unit of competency may be assessed with:
 - MSL925001 Analyse data and report results
 - MSL925002 Analyse measurements and estimate uncertainties.
- Holistic assessment methods include:
 - review of documented automated procedures modified or developed by the candidate and associated validation data
 - feedback from supervisors and/or customers regarding quality of automated procedures developed or modified by the candidate
 - observation of the candidate trialling automated procedures as part of their development
 - oral or written questioning to check required knowledge of automated procedures, calibration software and programming techniques used in the laboratory.
- 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 materials and laboratory facilities
 - access to a library of calibration methods, procedures and equipment specifications
 - laboratory calibration software and programs and manufacturer's proprietary software
 - 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.

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