



Australian Government

Department of Education, Employment and Workplace Relations

MSL935004A Maintain instruments and equipment

Revision Number: 1

MSL935004A Maintain instruments and equipment

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to check the serviceability and calibration of laboratory/field instruments and equipment and perform routine maintenance, such as cleaning and replacement of consumables and minor components. Personnel are also required to perform basic troubleshooting and repairs consistent with warranty and service agreements.
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Application of the Unit

Application of the unit	<p>This unit of competency is applicable to technical assistants, instrument operators and technical officers working in all industry sectors.</p> <p>Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These can be found at the end of this unit of competency under the section 'This competency in practice'.</p>
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Perform serviceability checks	1.1. Perform pre-/after-use checks in accordance with appropriate enterprise and manufacturer's procedures 1.2. Identify faulty or unsafe components and equipment 1.3. Troubleshoot basic faults or report the need for major maintenance and/or repairs 1.4. Complete instrument/equipment logbooks to enterprise requirements
2. Conduct routine maintenance safely	2.1. Identify maintenance procedures, records and safety requirements 2.2. Plan/adjust maintenance schedules in accordance with operational requirements 2.3. Identify and replace or repair damaged/worn/spent components or items 2.4. Clean equipment and instruments using recommended cleaning agents and techniques 2.5. Store equipment and instruments in accordance with enterprise/manufacturer's requirements 2.6. Update maintenance records in accordance with enterprise procedures 2.7. Arrange for reordering of consumable stocks and equipment components as necessary
3. Perform calibration/qualification checks	3.1. Operate equipment/instrument in accordance with enterprise/manufacturer's procedures 3.2. Check calibration/qualification using specified standards and/or procedures 3.3. Record all calibration/qualification data accurately and legibly 3.4. Document calibration status and report out of calibration equipment/instruments 3.5. Quarantine out of calibration items
4. Arrange instrument servicing where appropriate	4.1. Assess instrument repair status, and determine if local repair/maintenance is possible and economical 4.2. Contact and arrange repair/maintenance of equipment from accredited service agent or other appropriate personnel in accordance with enterprise procedures

Required Skills and Knowledge

Required skills

Required skills include:

- performing routine maintenance
- determining whether an item of equipment/instrument is in correct working order
- locating and rectifying basic faults
- recognising the need for specialist servicing and/or repairs
- conducting calibration status/qualification checks
- following all relevant occupational health and safety (OHS) requirements
- following enterprise recording and reporting procedures

Required knowledge

Required knowledge includes:

- operating principles for equipment/instruments used in routine work
- common sources of equipment/instrument faults and their repair
- common errors associated with equipment use
- role and importance of regular calibration checks
- equipment maintenance schedules and procedures
- OHS hazards and control measures
- enterprise communication and reporting procedures

Evidence Guide

EVIDENCE GUIDE	
<p>The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.</p>	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	<p>Assessors should ensure that candidates can:</p> <ul style="list-style-type: none"> • perform routine maintenance safely • determine whether an item of equipment/instrument is in correct working order • locate and rectify basic faults • recognise the need for specialist servicing and/or repairs • conduct calibration status/qualification checks • obtain instrument/equipment readings with the required accuracy and precision • follow all relevant OHS requirements • follow enterprise recording and reporting procedures.
Context of and specific resources for assessment	<p>This unit of competency is to be assessed in the workplace or simulated workplace environment.</p> <p>This unit of competency may be assessed with relevant:</p> <ul style="list-style-type: none"> • <i>relevant MSL974000 series units of competency</i> • <i>relevant MSL975000 series units of competency.</i> <p>Resources may include:</p> <ul style="list-style-type: none"> • laboratory equipped with appropriate equipment and calibration standards • SOPs, calibration and maintenance schedules and procedures.
Method of assessment	<p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> • review of maintenance records and equipment/instrument logbooks completed by the candidate • observation of the candidate performing serviceability and calibration/qualification checks and routine maintenance • feedback from peers and supervisors • oral or written questioning. <p>In all cases, practical assessment should be supported by</p>

EVIDENCE GUIDE	
	<p>questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly.</p> <p>Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.</p> <p>Access must be provided to appropriate learning and/or assessment support when required.</p> <p>The language, literacy and numeracy demands of assessment should not be greater than those required to undertake the unit of competency in a work like environment.</p>
This competency in practice	<p>Industry representatives have provided the case studies below to illustrate the practical application of this unit of competency and to show their relevance in a workplace setting.</p> <p>Manufacturing</p> <p>Starting materials used in manufacturing are often white powders. Infrared spectroscopy is used to positively identify many materials. Two compounds are one and the same if their spectra match in all respects (the position and relative intensity of the absorption bands). For example, if the spectra of a white powder matches the spectra of caffeine, the technician can be sure that the white powder is caffeine, provided that the spectrometer has been correctly maintained and calibrated. The technician routinely checks this using a standard polystyrene film.</p> <p>Food processing</p> <p>Technicians in a NATA certified laboratory must do regular checks to ensure that laboratory equipment, such as balances, refractometers and spectrometers are calibrated and in working order. Balances are routinely checked using calibrated masses and appropriate documented methods to ensure that they are weighing within the correct tolerances. If the balance is out of specification, the technician follows appropriate procedures to correct this and/or notifies the manufacturer to arrange for the balance to be serviced.</p> <p>Food processing</p>

EVIDENCE GUIDE

A technical assistant in the quality control laboratory of a fruit canning company is required to maintain and operate a range of equipment, including a pH meter. Canned pears, for example, are routinely checked for pH to ensure safe heat processing. While checking the calibration of the pH meter with the standard buffer solutions, the assistant identified that stable pH readings could not be obtained. On closer inspection, they found that the pH probe was damaged and reported the problem to the supervisor. The probe was replaced and the meter was re-checked in readiness for routine testing.

Biomedical

Technical assistants are quite often involved in routine collections and culturing of cells. Bacterial cells are often cultured and grown to large populations in order to provide material from which to extract biological materials. A quick method of determining when the cell growth has yielded enough cells is to determine the absorbance of the cell culture by measuring absorbance at 600 nm. An absorbance of 1 to 1.5 will give a good cell harvest. This method relies on the assistant being able to perform calibration checks on an ultraviolet-visible (UV-VIS) spectrometer.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Codes of practice

Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used

Standards, codes, procedures and/or enterprise requirements

Standards, codes, procedures and/or enterprise requirements may include:

- Australian and international standards such as:
 - AS 1678 Emergency procedure guide - Transport
 - AS 2252 Biological safety cabinets
 - AS ISO 17025-2005 General requirements for the competence of testing and calibration laboratories
- AS/NZS 2243 Set:2006 Safety in laboratories set
 - AS/NZS 2982.1:1997 Laboratory design and construction - General requirements
 - AS/NZS 4187:2003 Cleaning, disinfecting and sterilising reusable medical and surgical instruments and equipment, and maintenance of associated environments in health care facilities
- AS/NZS 4501 Set:2008 Occupational clothing set
 - AS/NZS ISO 14000 Set:2005 Environmental management standards set
- Australian code of good manufacturing practice for medicinal products (GMP)
- Australian Dangerous Goods Code
- Australian Quarantine and Inspection Service (AQIS) Export Control (Orders) Regulations 1982
- Australian Quarantine and Inspection Service

RANGE STATEMENT	
	<p>(AQIS) Import Guidelines</p> <ul style="list-style-type: none"> • Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Codes of Practice • calibration and maintenance schedules • enterprise recording and reporting procedures • equipment manuals and warranties, supplier catalogues and handbooks • equipment startup, operation and shutdown procedures • gene technology regulations • guide to physical containment levels and facility types • material safety data sheets (MSDS) • material, production and product specifications • National Code of Practice for the labelling of workplace substances (NOHSC:2012 (1994)) • national environment protection measures • National Health and Medical Research Council (NHMRC) Guidelines • national measurement regulations and guidelines • OHS national standards and codes of practice • principles of good laboratory practice (GLP) • production and laboratory schedules • quality manuals • standard operating procedures (SOPs) • Therapeutic Goods Regulations 1009
Laboratory equipment and instruments	<p>Laboratory equipment and instruments may include:</p> <ul style="list-style-type: none"> • balances • density bottles, pipettes, burettes and volumetric glassware • thermometers, melting point apparatus, water baths and incubators • optical microscopes, refractometers and polarimeters • conductivity meters and pH meters • ion selective electrodes • autoclaves

RANGE STATEMENT	
	<ul style="list-style-type: none"> • mixing and separating equipment, such as centrifuges, riffers and splitters and mixers • noise meters and blast meters • pressure gauges, torque testers, load cells, strain gauges and tensiometers • disintegration apparatus, penetrometers, hardness testing equipment, viscometers, soil compaction and classification equipment • colorimeters and spectrometers • chromatographic equipment and electrochemical equipment • cell analysers and cell counters • motors, pumps and generators
Basic repairs	<p>Basic repairs may include:</p> <ul style="list-style-type: none"> • replacement of fuses and reagents and consumables • cleaning and/or replacement of cells, torches and burners • installation, conditioning and removal of columns for gas chromatographs (packed and capillary) and liquid chromatographs (columns and guard columns) • changing injection port ferrules • connecting gas supplies • maintaining syringes/injection equipment • cleaning detectors • appropriate storage of columns and other equipment not currently in use • changing detectors (for gas liquid and liquid chromatographs) • optimising nebulisers • replacement of lamps • realignment of components • replacement of hoses and belts • replacement or top up of oils, lubricants or coolants • basic electrical checks involving simple digital multimeters
Calibration status/qualification checks	<p>Calibration status/qualification checks may include:</p> <ul style="list-style-type: none"> • matching cells (for dual beam instruments)

RANGE STATEMENT	
	<ul style="list-style-type: none"> • checks for monochromator wavelength and photometric accuracy • checks for baseline flatness and stray light • checks on electrode performance • checking sensitivity • injection/use of standard mixtures • comparison with manufacturer's specifications/ chromatogram • use of standard masses and solutions • use of calibrated thermometers and glassware to assess instrument/component performance
Hazards	<p>Hazards may include:</p> <ul style="list-style-type: none"> • electric shock • chemicals, such as acids and cleaning agents • fluids under pressure, such as steam and industrial gases • sharps, such as broken glassware • sources of heat, such as burners, ovens and furnaces • manual handling of heavy equipment • crushing, entanglement and cuts associated with moving machinery
Safety procedures	<p>Safety procedures may include:</p> <ul style="list-style-type: none"> • use of personal protective equipment, such as hearing protection, gloves, safety glasses, coveralls and safety boots • ensuring access to service shut-off points • handling and storing hazardous materials and equipment in accordance with labels, MSDS, manufacturer's instructions, enterprise procedures and regulations • following appropriate manual handling procedures • regular cleaning of equipment and work areas • machinery guards • signage, barriers and service isolation tags • lockout and tag-out procedures
Occupational health and safety (OHS) and environmental management requirements	<p>OHS and environmental management requirements:</p> <ul style="list-style-type: none"> • all operations must comply with enterprise

RANGE STATEMENT

	<p>OHS and environmental management requirements, which may be imposed through state/territory or federal legislation - these requirements must not be compromised at any time</p> <ul style="list-style-type: none"> • all operations assume the potentially hazardous nature of samples and require standard precautions to be applied • where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council (NHMRC) and State and Territory Departments of Health
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Unit Sector(s)

Unit sector	Maintenance
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		