



Australian Government

Department of Education, Employment and Workplace Relations

MSATMINS402A Inspect a range of liquid measuring instruments using volume measures

Release: 1

MSATMINS402A Inspect a range of liquid measuring instruments using volume measures

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This unit of competency covers the ability to apply National Test Procedures to determine whether a liquid measuring instrument using volume measures is suitable for trade and then mark it accordingly. It also involves auditing the performance of verifiers who have previously tested and marked liquid measuring instruments for use.
------------------------	--

Application of the Unit

Application of the unit	This unit of competency is applicable to trade measurement inspectors appointed under national measurement legislation who may inspect a wide range of liquid measuring instruments tested using a volume measure as part of their allocated duties. Liquid measuring instruments are used in a very wide range of commerce. For example, petrol bowsers measure fuel at the point of sale and flowmeters are used to measure bulk commodities such as milk, chemicals and petroleum products during production and distribution. 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 are found at the end of this unit of competency under the section 'This competency in practice'.
--------------------------------	---

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.
-----------------------------	--

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.
---	--

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for inspection	1.1. Identify and evaluate the type of instrument to be inspected 1.2. Access and review any history of previous inspections at trader's premises 1.3. Access and correctly interpret appropriate documentation required for the inspection 1.4. Identify and access test equipment, products and consumables required for the inspection 1.5. Ensure specified test equipment is fit for purpose in accordance with applicable legislation and organisational procedures 1.6. Store and transport test equipment in accordance with organisational procedures and industry best practice 1.7. Identify workplace health and safety issues relevant to the inspection
2. Initiate inspection	2.1. Identify the site controller, explain the purpose of the inspection and produce formal identification, if required 2.2. Identify relevant site health and safety issues and implement appropriate control strategies 2.3. Conduct a preliminary evaluation of the site's trading practices and prioritise activities to maximise inspection outcomes 2.4. Identify trade measuring instruments and plan inspection to minimise disruption to the public and trader
3. Evaluate liquid measuring instrument performance	3.1. Evaluate whether the operating environment will impact on the instrument performance 3.2. Modify the operating environment or implement alternative arrangements to ensure reliable test conditions as necessary 3.3. Identify the maximum permissible errors for the instrument from the legislative requirements 3.4. Use test equipment safely in accordance with applicable legislation and organisational procedures 3.5. Check instrument for compliance with the appropriate Certificates of Approval 3.6. Inspect the instrument in accordance with relevant National Test Procedure and appropriate National Measurement Institute policy 3.7. Evaluate results against prescribed performance criteria and determine if the instrument is suitable for

ELEMENT	PERFORMANCE CRITERIA
	trade use in accordance with legislative requirements
4. Conduct a verifier performance audit	4.1. Identify the scope of the verifier audit 4.2. Identify the expected outcomes of the verifier audit 4.3. Assess the verifier's performance against the expected outcome 4.4. Analyse any variances from the expected outcomes to identify isolated or systemic problems
5. Analyse and report inspection results	5.1. Analyse inspection data for unacceptable performance trends 5.2. Display the inspection result on the instrument in accordance with legislative requirements 5.3. Use test reports to present inspection results in the required format 5.4. Complete inspection documentation in accordance with legislative requirements and organisational procedures 5.5. Communicate inspection results within the specified time and in accordance with organisational guidelines 5.6. Recommend follow-up actions as appropriate
6. Act on non-compliance	6.1. Select applicable enforcement action for the non-compliance in accordance with legislative requirements, organisational policy and procedures 6.2. Inform traders of non-compliances and consequences of failing to have them corrected 6.3. Implement enforcement action in accordance with legislative requirements, organisational policy and procedures 6.4. Maintain the rights of the trader at all times

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- accessing, interpreting and applying a range of documents for the inspection of liquid measuring instruments including:
 - national measurement legislation
 - intermediate National Test Procedures
 - Certificates of Approval
 - National Measurement Institute inspection policy
 - Australian Standards
 - industry codes of practice
 - correction tables for volume, density and pressure for a range of liquids
 - national and international design rules
 - pattern approval documents
- accessing and interpreting Certificates of Verification for a range of reference standards
- performing inspections over extended durations in non-routine and hazardous environments
- using advanced communication and negotiation skills to:
 - explain purpose of the verification
 - inform traders of non-compliances and consequences of failing to rectify
 - access external equipment and resources to complete the verification
 - explain verification procedures and outcomes to traders, verifiers and managers
- accessing, transporting, setting up, validating, using and maintaining a broad range of test equipment and reference standards
- identifying and evaluating environmental factors that may impact on performance of liquid measuring instruments
- organising large equipment to be dispatched ahead of verification visit
- conducting tests and recording results with close attention to detail and accuracy
- performing calculations involving:
 - fractions, decimals, ratios, proportions and percentages
 - evaluation of formulae containing powers, exponents and logarithms functions
 - use of scientific notation, correct units, correct number of significant figures
 - calculation of uncertainties
 - preparation and interpretation of linear, semi-log and log-log graphs
 - interpretation of statistical quantities, such as mean, median, mode, range, variance and standard deviation
 - determination of regression line equations, correlation coefficients

REQUIRED SKILLS AND KNOWLEDGE

- preparation and interpretation of more complex control charts and frequency distribution plots
- analysing performance results over a broad range of operating conditions
- identifying non-compliances with national measurement legislation relating to instrument or verifier performance and initiate appropriate enforcement action including warning, infringement notice, undertaking, injunction and prosecution
- identifying potential trading practice non-compliance with national measurement legislation and initiating an appropriate inspection strategy
- planning complex tasks
- developing/implementing an efficient verification strategy that minimises disruption to traders, the public, technicians, employees, colleagues and suppliers
- demonstrating professionalism and maintaining the rights of the trader at all times
- solving unexpected problems and non-routine issues
- working safely which may include applying basic first aid, confined space entry, working with hazardous materials, working safely in hazardous environments, working with heavy machinery, Australian Institute of Petroleum (AIP) cold work clearance permit, safety induction and working at heights

Required knowledge

- general chemical and physical principles and concepts including:
 - physical states (solid, liquid gas), weight, mass, gravity and density
 - pressure, pressure differential, backpressure and head pressure
 - fluid flow
 - flashpoint, boiling point and ice point
 - viscosity
 - temperature effects and coefficients of expansion
- basic knowledge of the design, application and function of components used in liquid measuring instruments
- knowledge of the operating procedures across a range of environments including laboratories, retail, commercial, office, manufacturing, industrial, mining, construction, medical, chemical and petroleum
- knowledge of metrological terms and terminology specific to liquid measuring instruments such as:
 - maximum permissible errors, maximum permissible difference and maximum permissible variation
 - traceability
 - repeatability
 - uncertainty, error of measurement and error of indication
 - meter creep
 - hose dilation
 - temperature correction

REQUIRED SKILLS AND KNOWLEDGE

- linearisation
- gas elimination
- national measurement legislation applicable to liquid measuring instruments
- detailed knowledge of National Test Procedures and operating procedures for equipment and reference standards used in job role including:
 - purpose of test
 - test conditions and possible environmental impacts on performance of the instrument
 - key preparation/measurement steps in test method
 - calculation steps to give results in appropriate units and precision
 - maximum permissible errors for liquid measuring instruments under inspection
- procedures for completing inspection documentation
- organisational policy and procedures for inspecting instruments
- safety principles and procedures relevant to instruments
- basic first aid and site safety induction if required

Evidence Guide

EVIDENCE GUIDE

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.

Overview of assessment

Competency must be demonstrated in the ability to perform consistently at the required standard for any class of liquid measuring instrument listed in the Range Statement.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors should ensure that candidates can:

- identify, access and apply test procedures
- identify and use suitable reference standards
- evaluate and adjust the impact of the operating environment on the performance of the instrument
- analyse test results to determine the instrument's suitability for verification (trade use)
- identify the scope of a verifier performance audit and assess results with expected outcomes
- audit the performance of verifiers of liquid measuring instruments
- identify and implement additional inspection strategies for non-instrument related breaches of national measurement legislation
- recognise and act on non-compliance
- maintain the security and confidentiality of data in accordance with organisational and regulatory requirements
- report results in the required formats and expected timeframe.

Context of and specific resources for assessment

This unit of competency is to be assessed in the workplace or simulated workplace environment. This unit of competency may be assessed with:

- MSATMREF301A Use and maintain reference standards.

Resources may include:

- liquid measuring instruments using volume measures, test equipment and reference standards
- safety equipment
- computer and relevant software and/or organisation information management system

EVIDENCE GUIDE	
	• Certificates of Approval for instruments • relevant legislative and organisational procedures.
Method of assessment	The following assessment methods are suggested: • questions to assess understanding of relevant procedures, licensing requirements, trader obligations and remedial actions • review of inspection reports and verifier performance audit reports prepared by the candidate • feedback from supervisors and peers regarding the candidate's ability to verify the performance of instruments in accordance with legislative and organisational procedures • observation of the candidate conducting an inspection. In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.
This competency in practice	Industry representatives have provided the case studies below to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. An inspector arrives unannounced at a medium size service station to check the performance of a number of fuel dispensers. After introducing him/herself to the site manager, the inspector explains the purpose of the visit and asks for the location of the fuel return points. The inspector performs a safety check, completes an AIP form, places safety barriers around the work area and then prepares the test equipment and reference standards. There are seven fuel dispensers with a total of 38 hoses. The inspector tests a selection of dispensers visually. The National Test Procedure requires the inspector to dispense fuel into 15L reference measures and then return the fuel to storage. Approximately 90 litres are dispensed per hose. The inspector finds a number of non-compliances on site. Two hoses are dispensing fuel outside the allowable maximum permissible error, one dispenser has a faulty segment in its display and the lights are not working, the diesel dispenser failed the air elimination test and three hoses are badly worn. The

EVIDENCE GUIDE

inspector removes the verification mark from all non-compliant dispensers.

While testing the fuel dispenser, the inspector notices a number of items displayed for sale outside the office. On closer inspection, some of the pre-packaged items are found not to be marked with a measurement statement.

The inspector meets with the site manager to inform him of the non-compliant dispensers. He/she advises the manager not to use any unmarked dispensers, explains how they can be rectified and issues non-compliance notices. They also discuss the non-compliant pre-packaged articles. The inspector takes details for further action, completes the AIP form and fuel usage report and then departs.

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.	
Prescribed performance criteria for instruments	Prescribed performance criteria for instruments may include: • design is in accordance with the appropriate Certificates of Approval • performance meets the criteria described in the Certificates of Approval, National Test Procedure and legislation
Appropriate documentation	Where reference is made to documentation, it is expected the latest version will be used. Appropriate documentation may include: • reference standards • Certificates of Verification • Certificates of Approval for liquid measuring instruments • test procedures for verifying liquid measuring instruments • organisational test reports • organisational procedures e.g. company quality assurance manual • National Measurement Act • occupational health and safety (OHS) regulations, guidelines and procedures and material safety data sheets (MSDS) • equipment manuals and warranty, supplier catalogues and handbooks
Certificates of Approval	Certificates of Approval may include: • any Certificate issued by the Chief Metrologist under Regulation 60 of the National Measurement Regulations approving the pattern of a liquid measuring instrument as being suitable for trade
Enforcement action	Enforcement action may include:

RANGE STATEMENT	
	• formal warnings • infringement notice • formal undertaking • injunction • prosecution

RANGE STATEMENT	
Test equipment	Test equipment may include: • reference standards of measurement • equipment other than reference standards of measurement such as pumps, funnels and hoses
Legislation	Legislation may include • national measurement legislation • applicable Commonwealth, state and territory OHS legislation
National Measurement Institute policy	National Measurement Institute policy may include: • test procedure variations between a verification, in-service or audit inspection • bulletin • instruction • determination
National Test Procedures for liquid measuring instruments	National Test Procedures for liquid measuring instruments may include: • fuel dispensers other than LPG dispensers • bulk flowmetering systems for liquid hydrocarbons other than LPG tested using a volume measure • milk flowmeters tested using a volume measure • any other test procedure prescribed by the National Measurement Institute
OHS and environmental management requirements	OHS and environmental management requirements refer to: • all operations must comply with enterprise OHS and environmental management requirements, which may be imposed through state/territory or Federal legislation. These requirements must not be compromised at any time • 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

RANGE STATEMENT	
	Medical Research Council and State and Territory Departments of Health
Operating environmental impacts	Operating environmental impacts may include: • vibration • wind • heat • dust • electromagnetic interference • out of level
Records	Records may include: • test reports • AIP form • safety procedures • a history of equipment calibration and test results
Liquid measuring instruments	Inspectors may be required to test and mark any of the classes of instruments from the following list. Liquid measuring instruments may include: • fuel dispensers other than LPG dispensers • bulk flowmetering systems for liquid hydrocarbons other than LPG tested using a volume measure • milk flowmeters tested using a volume measure • or any other liquid measuring instrument prescribed by the National Measurement Institute

Unit Sector(s)

Unit sector	Trade Measurement
--------------------	-------------------

Competency field

Competency field	
------------------	--

Co-requisite units

Co-requisite units		