



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **MSATMVER402A Verify a liquid measuring instrument using volume measures**

**Revision Number: 1**

## MSATMVER402A Verify a liquid measuring instrument using volume measures

### Modification History

Not applicable.

### Unit Descriptor

<b>Unit descriptor</b>	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 the installation and/or repair of liquid measuring instruments.
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### Application of the Unit

<b>Application of the unit</b>	<p>This unit of competency is applicable to verifiers who operate under a licence to test and mark specific classes of liquid measuring instruments tested using a volume measure only. They may also undertake sales, installation and/or repair of liquid measuring instruments. 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.</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 are 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

<b>Prerequisite units</b>		

## Employability Skills Information

<b>Employability skills</b>	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. Install and repair liquid measuring instruments	1.1. Access and correctly interpret information for installing or repairing instruments 1.2. Select required components, tools and equipment in accordance with manufacturer/component supplier specifications 1.3. Perform installation or repair in accordance with legislation, industry codes of practice and organisational guidelines 1.4. Avoid instrument damage during installation or repair
2. Prepare for verification	2.1. Identify and evaluate the type of instrument to be verified 2.2. Access and correctly interpret documentation required for the verification 2.3. Identify and access test equipment, products and consumables required for the verification 2.4. Liaise with the trader to provide the items required on site 2.5. Ensure specified test equipment is fit for purpose in accordance with applicable legislation and organisational procedures 2.6. Store and transport test equipment in accordance with organisational procedures and industry best practice 2.7. Identify relevant local workplace health and safety issues and implement appropriate control strategies
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 trade use in accordance with legislative requirements

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
4. Report verification results	<ul style="list-style-type: none"><li>4.1. Display the verification result on the instrument in accordance with legislative requirements</li><li>4.2. Use test reports to present verification results in the required format</li><li>4.3. Complete verification documentation in accordance with legislative requirements and organisational procedures</li><li>4.4. Communicate results within the specified time and in accordance with organisational guidelines</li></ul>
5. Model and encourage compliance with statutory requirements	<ul style="list-style-type: none"><li>5.1. Apply organisation's procedures and practices to meet licensing authority's requirements</li><li>5.2. Clarify any issues about licensing requirements with the licensing authority as they arise</li><li>5.3. Review work and seek feedback from others to confirm continuing compliance with licensing requirements</li><li>5.4. Identify implications of non-compliance with licensing requirements</li><li>5.5. Identify inadequacies in trader's procedures and practices which may contribute to non-compliance with licensing requirements and/or national measurement legislation</li><li>5.6. Explain inadequacies and possible remedial actions to trader</li></ul>
6. Maintain statutory records	<ul style="list-style-type: none"><li>6.1. Keep accurate and complete records in accordance with licensing requirements</li><li>6.2. Ensure authorisation, training and relevant licences are current in accordance with organisational and licensing requirements</li><li>6.3. Inform the licensing administering authority of changes to personal information as required by statute</li></ul>

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

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

#### Required skills

- diagnosing faults in liquid measuring instruments
- installing and repairing liquid measuring instruments with a basic design
- accessing, interpreting and applying a range of documents for the verification 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
- performing verification tests over extended durations in non-routine and hazardous environments
- accessing and interpreting Certificates of Verification for a range of reference standards
- 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 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 and 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,

## REQUIRED SKILLS AND KNOWLEDGE

- variance and standard deviation
- determination of regression line equations and correlation coefficients
- preparation and interpretation of more complex control charts and frequency distribution plots
- 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

- design, major components and functions of liquid measuring instruments
- licensing requirements for a verifier including:
  - quality management system
  - licence conditions
  - maintenance of statutory records
- 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
- 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

**REQUIRED SKILLS AND KNOWLEDGE**

- temperature correction
- 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 verification documentation
- organisational policy and procedures for verifying instruments
- safety principles and procedures relevant to instruments
- basic first aid and site safety induction if required

## Evidence Guide

<b>EVIDENCE GUIDE</b>	
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.	
<b>Overview of assessment</b>	Competency must be demonstrated in the ability to perform consistently at the required standard for one class of liquid measuring instrument listed in the Range Statement.
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>Assessors should ensure that candidates can:</p> <ul style="list-style-type: none"> <li>• identify, access and apply test procedures</li> <li>• identify and use suitable reference standards</li> <li>• install and repair liquid measuring instruments to meet statutory requirements</li> <li>• evaluate and adjust the impact of the operating environment on the performance of the instrument</li> <li>• analyse test results to determine the instrument's suitability for verification (trade use)</li> <li>• maintain the security and confidentiality of data in accordance with organisational and regulatory requirements</li> <li>• report results in the required formats and expected timeframe.</li> </ul>
<b>Context of and specific resources for assessment</b>	<p>This unit of competency is to be assessed in the workplace or simulated workplace environment. This unit of competency may be assessed with:</p> <ul style="list-style-type: none"> <li>• MSATMREF301A Use and maintain reference standards.</li> </ul> <p>Resources may include:</p> <ul style="list-style-type: none"> <li>• liquid measuring instruments using volume measures, test equipment and reference standards</li> <li>• computer and relevant software and/or organisation information management system</li> <li>• Certificates of Approval for instruments</li> <li>• relevant legislative and organisational procedures.</li> </ul>
<b>Method of assessment</b>	<p>The following assessment methods are suggested:</p> <ul style="list-style-type: none"> <li>• questions to assess understanding of relevant procedures and remedial actions</li> <li>• review of verification reports prepared by the</li> </ul>

**EVIDENCE GUIDE**

	<p>candidate</p> <ul style="list-style-type: none"> <li>• feedback from supervisors and peers regarding the candidate's ability to verify the performance of instruments in accordance with legislative and organisational procedures.</li> </ul> <p>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.</p>
<b>This competency in practice</b>	<p>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.</p> <p>A service station operator of a large company owned site requests a servicing company to visit their site as he has noticed that one fuel dispenser has a faulty display and the service station appears to have inconsistent dip reading. The verifier arrives and introduces himself and informs the owner that under their contract all fuel dispensers are due for checking. The verifier completes a safety check, AIP clearance form and asks about the location of the fuel return points. The verifier then blocks the lane next to the fuel dispenser, puts safety signs, barricades and test measures in place and ensures that the work area is safe. The verifier repairs the faulty display and proceeds to test the fuel dispenser. He visually checks the fuel dispenser against the Certificate of Approval and checks for any leaks noting any discrepancies on a verification report form. He then tests the fuel dispenser as per the National Test Procedures noting results on the test report and returning dispensed fuel to the storage tanks in a safe manner. The verifier finds the fuel dispenser is outside the maximum permissible error and adjusts the dispenser. After repeating the National Test Procedure, he finds the dispenser is within the maximum permissible error and then seals and marks the dispenser with his mark. The verifier then tests the other fuel dispensers on-site. Some require adjustment before being verified and marked. Another dispenser is within the maximum permissible error and does not require adjustment. One dispenser cannot be adjusted within the maximum permissible error and the verifier removes the mark.</p>

**EVIDENCE GUIDE**

After all dispensers are tested, the verifier completes the verification forms, fuel usage form and AIP form. The verifier informs the site manager that one dispenser cannot be used as it is non-compliant and issues a non-compliance form. The site manager locks the dispenser until repairs can be made. The remaining forms are given to the site manager and the verifier 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

#### Test equipment

Test equipment may include:

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"><li>• reference standards of measurement</li><li>• equipment other than reference standards of measurement such as pumps, funnels and hoses</li></ul>

<b>RANGE STATEMENT</b>	
<b>Legislation</b>	<p>Legislation may include:</p> <ul style="list-style-type: none"> <li>• national measurement legislation</li> <li>• applicable Commonwealth, state and territory OHS legislation</li> </ul>
<b>National Measurement Institute policy</b>	<p>National Measurement Institute policy may include:</p> <ul style="list-style-type: none"> <li>• accepted test procedure variations</li> <li>• bulletin</li> <li>• instruction</li> <li>• determination</li> </ul>
<b>National Test Procedures for liquid measuring instruments</b>	<p>National Test Procedures for liquid measuring instruments may include:</p> <ul style="list-style-type: none"> <li>• fuel dispensers other than LPG dispensers</li> <li>• bulk flowmetering systems for liquid hydrocarbons other than LPG tested using a volume measure</li> <li>• milk flowmeters tested using a volume measure</li> <li>• any other test procedure prescribed by the National Measurement Institute</li> </ul>
<b>OHS and environmental management requirements</b>	<p>OHS and environmental management requirements refer to:</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• all operations assume the potentially hazardous nature of samples and require standard precautions to be applied</li> <li>• where relevant, users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health</li> </ul>
<b>Operating environmental impacts</b>	<p>Operating environmental impacts may include:</p> <ul style="list-style-type: none"> <li>• vibration</li> <li>• wind</li> </ul>

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>• heat</li> <li>• dust</li> <li>• electromagnetic interference</li> <li>• out of level</li> </ul>
<b>Records</b>	Records may include: <ul style="list-style-type: none"> <li>• test reports</li> <li>• safety procedures</li> <li>• a history of equipment calibration and test results</li> </ul>
<b>Liquid measuring instruments may include:</b>	Verifiers may be licensed to test and mark specific classes of instruments from the following list. Liquid measuring instruments may include: <ul style="list-style-type: none"> <li>• fuel dispensers other than LPG dispensers</li> <li>• bulk flowmetering systems for liquid hydrocarbons other than LPG tested using a volume measure</li> <li>• milk flowmeters tested using a volume measure</li> <li>• any other liquid measuring instrument prescribed by the National Measurement Institute</li> </ul>

## Unit Sector(s)

<b>Unit sector</b>	Trade Measurement
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## Competency field

<b>Competency field</b>	
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## Co-requisite units

<b>Co-requisite units</b>		

<b>Co-requisite units</b>		