



Australian Government

MSMTMINS501 Inspect a range of complex measuring instruments

Release: 2

MSMTMINS501 Inspect a range of complex measuring instruments

Modification History

Release 2. Adjustments to the Application, Performance Criteria, Range of Conditions, Adjustments to Performance Evidence, Assessment Conditions and minor corrections. Equivalent.

Release 1. Supersedes and is equivalent to MSATMINS501A Inspect a range of complex measuring instruments

Application

This unit of competency covers the ability to apply National Instrument Test Procedures to determine whether complex measuring instruments are suitable for trade use. It involves the ability to perform significant calculations to assess instrument performance and conduct tests that may require coordination of a range of resources over extended durations in hazardous environments. This unit also involves auditing the performance of verifiers who have previously tested and verified instruments for trade use.

This unit of competency is applicable to trade measurement inspectors appointed under national measurement legislation who may inspect a range of complex measuring instruments as part of their duties. Complex measuring instruments are used in a wide range of industrial environments. For example, automatic rail weighbridges, belt weighers, totalising hoppers, bulk fuel and liquid petroleum gas (LPG) flowmeters are used throughout the mining, road/rail freight and petroleum/gas industry sectors.

Inspections may be performed over extended durations up to five days in non-routine and hazardous environments. Inspectors must work safely which may include using correct manual handling techniques, applying basic first aid, identifying confined spaces, working with hazardous materials, working safely in hazardous environments, working with heavy machinery, use of appropriate workplace clearance forms, safety induction, risk assessment, working at heights and biosecurity issues.

While no specific licensing or certification requirements apply to this unit at the time of publication, all inspection activity is legislated under the *National Measurement Act 1960*.

Pre-requisite Unit

Nil

Competency Field

Trade measurement

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 for inspection	1.1	Identify and evaluate the type of instrument to be inspected
		1.2	Access and review any history of previous inspection outcomes for the trader and instrument
		1.3	Access and correctly interpret documentation required for the inspection
		1.4	Identify and access test equipment, products and consumables required for the inspection
		1.5	Ensure test equipment is fit for purpose in accordance with applicable legislation and organisational procedures
		1.6	Store and transport equipment in accordance with organisational procedures and industry best practice
		1.7	Identify workplace health and safety issues relevant to the inspection
		1.8	Develop an inspection strategy to maximise resources and minimise time required to complete the inspection
2	Liaise with the trader to schedule complex tests	2.1	Discuss inspection arrangements with site controller where applicable
		2.2	Identify relevant local workplace, health and safety issues and implement appropriate control strategies
		2.3	Discuss the inspection strategy with the trader to minimise its impact on the trader's normal operations
		2.4	Arrange site clearances and suitable scheduling for tests
		2.5	Negotiate access to trader's equipment, materials and support personnel required for testing to be available on site

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| | | 2.6 | Arrange for any equipment to be provided by the trader, if required. |
| 3 | Initiate inspection | 3.1 | Identify the site controller, explain/review the purpose of the inspection and, if required, produce formal identification |
| | | 3.2 | Review inspection strategy to ensure there is minimal disruption to the public and/or trader |
| | | 3.3 | Communicate inspection strategy to all personnel involved |
| | | 3.4 | Identify locations for product return or disposal if applicable |
| | | 3.5 | Evaluate the impacts of the operating environment on the instrument performance or test results and, where applicable, implement corrective actions |
| | | 3.6 | Identify operational factors impacting on instrument performance or test result and, where applicable, implement corrective actions |
| 4 | Evaluate complex measuring instrument performance | 4.1 | Identify the maximum permissible errors for the instrument from the legislative requirements |
| | | 4.2 | Manage and review resources to maintain inspection timelines |
| | | 4.3 | Provide effective communication to ensure relevant personnel are informed of variations to the inspection strategy and inspection progress |
| | | 4.4 | Check instrument for compliance with the appropriate Certificates of Approval |
| | | 4.5 | Inspect the instrument in accordance with relevant National Instrument Test Procedures and appropriate National Measurement Institute (NMI) policy |
| 5 | Analyse inspection | 5.1 | Perform specified calculations to determine a performance result for the instrument with appropriate |

	results		accuracy, precision and significant figures
		5.2	Use graphical and statistical analysis to analyse results as necessary
		5.3	Analyse inspection data for unacceptable performance trends
		5.4	Ensure results are consistent with reasonable expectations and estimations
		5.5	Evaluate results against prescribed performance criteria and determine if the instrument is suitable for trade use in accordance with legislative requirements
6	Evaluate verifier performance	6.1	Analyse verifiers' complex instrument test reports to identify potential verifier performance deficiencies
		6.2	Identify the scope of the verifier performance audit
		6.3	Identify the expected outcomes of the verifier performance audit
		6.4	Communicate the scope and process of the performance audit to the verifier
		6.5	Assess the verifier's performance against the expected outcome
		6.6	Analyse any variances from the expected outcomes to identify any isolated or systemic problems
		6.7	Clearly communicate the results of the performance audit to the verifier, including any rectification requirements, in accordance with legislative requirements and organisational policies and procedures
7	Report inspection results	7.1	If required, display the inspection result on the instrument in accordance with legislative requirements
		7.2	Use test reports to present inspection results in the required format
		7.3	Complete inspection documentation in accordance with legislative requirements and organisational procedures

		7.4	Communicate inspection results within the specified time and in accordance with organisational guidelines
		7.5	Recommend corrective actions as appropriate
8	Act on non-compliance	8.1	Select applicable enforcement action for the non-compliance in accordance with legislative requirements and organisational policy and procedures
		8.2	Inform traders of non-compliances and consequences of failing to have them corrected
		8.3	Implement enforcement action in accordance with legislative requirements and organisational policy and procedures
		8.4	Respect the rights of the trader at all times

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.

National Instrument Test Procedures include one or more of:

- measurement instrument test procedures
- any other test procedure prescribed by the NMI

Classes of complex measuring instruments include one or more of:

- non-automatic weighing machines >3 tonne
- LPG dispensers
- bulk LPG flowmetering systems
- bulk flowmetering systems for liquid hydrocarbons other than LPG
- bulk flowmetering systems for liquid products **other than** liquid hydrocarbons

	• dispensers and flowmetering systems for gaseous products (excluding utility meters) • automatic rail weighbridges • continuous totalising automatic weighing instruments (belt weighers) • discontinuous totalising hopper weighing instruments • any other complex measuring instrument prescribed by the NMI
Test equipment includes:	• reference standards of measurement • equipment, such as weighing instruments, pumping units, two-way communication, LPG cylinders, hoses, fittings, rail wagons, trains and tankers
Certificates of Approval include:	• any Certificate issued by the Chief Metrologist under Regulation 60 of the <i>National Measurement Regulations 1999</i> approving the pattern of a complex weighing instrument as being suitable for trade
Prescribed performance criteria for complex measuring instruments include:	• that the instrument is of an approved pattern • that the instrument operates within the appropriate limits of error permitted by legislation • that the instrument is used in accordance with any legislative requirements
Verification	Has the same meaning as Section 18GG of the <i>National Measurement Act 1960</i>
Verification marks	Verification marks for different instruments are defined in Regulations 2.28 and 2.29 of the <i>National Trade Measurement Regulations 2009</i>
Trading practices include one or more of:	• methods used for the sale of goods • using measuring instruments • position of measuring instruments • environmental factors • suitability of instrument • incorrect measurement

- Enforcement actions include one or more of:**
- formal warnings, infringement notices, undertakings, injunction and prosecutions
- Legislation includes:**
- national measurement legislation
 - applicable Commonwealth, state and territory work/occupational health and safety (WHS/OHS) legislation
- NMI policy includes:**
- test procedure variations between a verification, in-service or audit inspection
 - bulletins
 - instructions
 - determinations
- WHS/OHS and environmental management requirements include:**
- complying with WHS/OHS 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 material/product measured
 - applying any necessary hygiene controls

Unit Mapping Information

Release 2. Adjustments to the Application, Performance Criteria, Range of Conditions, Adjustments to Performance Evidence, Assessment Conditions and minor corrections. Equivalent.

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Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=d1287d36-dff4-4e9f-ad2c-9d6270054027>

Assessment Requirements for MSMTMINS501 Inspect a range of complex measuring instruments

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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:

- completing initial verification testing of one or more of the following complex weighing instruments:
 - non-automatic weighing machines >3 tonne
 - automatic rail weighbridges
 - continuous totalising automatic weighing instruments (belt weighers)
 - discontinuous totalising hopper weighing instruments
- completing initial verification testing of one or more of the following complex fuel instruments:
 - LPG dispensers
 - bulk flowmetering systems for liquid hydrocarbons other than LPG
 - bulk LPG flowmetering systems
 - bulk flowmetering systems for liquid products other than liquid hydrocarbons
 - dispensers and flowmetering systems for gaseous products (excluding utility meters)
 - any other complex measuring instrument prescribed by the NMI
- accessing and correctly interpreting documentation required for inspections, evaluation of instruments and verifier audits
- ensuring test equipment and reference standards are fit for purpose in accordance with applicable legislation and organisational procedures
- planning, scheduling, preparing for and safely conducting inspections to optimise use of resources, maximise outcomes and minimise disruption to the public and trader
- checking compliance and evaluating the performance of complex measuring instruments using appropriate Certificates of Approval, NMI policy and National Instrument Test Procedures, and adjusting for any impact of the operating environment
- using specified calculations, graphical and statistical analysis to determine a performance result for a complex measuring instrument
- reliably determining if complex measuring instruments are suitable for trade use in accordance with legislative requirements

- conducting at least one (1) verifier performance audit, to assess the performance of verifiers who test and mark measuring instruments for trade use
- assessing verifier performance against expected outcomes and analysing any variances to identify isolated or systemic problems
- identifying potential non-compliance of trading practices (applicable to instruments) with national measurement legislation and initiating an efficient inspection strategy that has a limited impact on others
- recognising and acting on non-compliance of complex measuring instrument or verifier performance and/or trading practices with national measurement legislation and initiating appropriate enforcement action
- demonstrating professionalism and respecting the rights of the trader at all times
- using advanced communication and negotiation skills to:
 - explain the purpose of inspection
 - arrange site clearances, gain cooperation of site controllers and schedule complex tests
 - access trader's equipment and equipment, materials and support personnel to complete the inspection, when necessary
 - inform traders of non-compliances and consequences of failing to rectify them
 - explain inspection procedures and outcomes to traders, verifiers and managers
 - organise large equipment to be dispatched ahead of inspection visit, when necessary
- performing specified calculations involving:
 - fractions, decimals, ratios, proportions and percentages
 - scientific notation, correct units and the correct number of significant figures, calculation of uncertainties
 - evaluation of formulae containing powers, exponents and logarithms functions
 - preparation and interpretation of linear graphs
- maintaining the security and confidentiality of data in accordance with organisational and regulatory requirements
- reporting results in the required formats and expected timeframe
- working safely.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- general science principles and concepts, including:
 - physical states (solid, liquid and gas), weight, mass, gravity and density
 - pressure, pressure differential, backpressure and head pressure, fluid flow and viscosity
 - temperature effects and coefficients of expansion, flashpoint, boiling point and ice point
- metrological terms and terminology of specific 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, linearization and gas elimination

- details of the design and applications for one (1) complex measuring instrument in each class, the major instrument components and their function
- national measurement legislation applicable to complex measuring instruments
- safe work method statements (SWMS) for a range of trading environments, such as laboratories, retail, commercial, office, manufacturing, industrial, mining, construction, medical, chemical and petroleum
- NMI policy requirements, including test procedure variations between a verification, in-service or audit inspection, bulletins, instructions and determinations
- National Instrument Test Procedures and operating procedures for equipment and reference standards used in job role, including:
 - 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 instruments being inspected
 - safety principles and procedures relevant to instruments
 - organisational policy and procedures for inspecting complex measuring instruments including completing inspection documentation
 - organisational safety procedures and requirements of applicable Commonwealth, state and territory WHS/OHS legislation
- basic first aid and site safety induction, if required.

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 should 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:
 - *MSMTMREF301 Use and maintain reference standards*
- Holistic assessment methods include:
 - review of test results, inspection reports and verifier performance reports prepared by the candidate

- feedback from supervisors and peers regarding the candidate's ability to conduct inspections, evaluate the performance of complex measuring instruments and audit verifier's performance in accordance with legislative and organisational procedures
- questions to assess understanding of relevant procedures, licensing requirements, trader obligations and remedial actions
- review of candidate's responses to inspection scenarios, such as: potential/actual non-compliances and appropriate actions, common issues and problems
- observation of the candidate conducting an inspection.
- Access is required to instruments, equipment, materials, workplace documentation, procedures, and specifications associated with this unit including, but not limited to:
 - latest versions of appropriate documentation, such as Certificates of Verification and Approval, NMI policy, National Instrument Test Procedures for verifying complex measuring instruments and relevant legislation
 - equipment manuals, safety data sheets (SDS), safety procedures and safety equipment
 - records, such as test reports; audit reports; instrument history and test results; and correction tables for volume, density and pressure for a range of liquids
 - complex measuring instruments, test equipment and reference standards
 - computer and relevant software and/or organisation information management system.
- 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 competency and currency.
- Technical competence can be demonstrated through:
 - relevant VET or other qualification/Statement of Attainment AND/OR
 - relevant workplace experience in trade measurement at least to the level being assessed and broad industry knowledge (such as a relevant industry qualification).
- Currency can be demonstrated through:
 - performing the competency being assessed as part of current employment in trade measurement OR
 - having consulted with trade measurement inspectors and/or verifiers performing the competency being assessed within the last twelve months.

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