



Verifier's recognition kit – subclasses 5.3 – Anhydrous ammonia flowmetering systems

MSMSS00008 - Trade Measurement Verification (Complex
Measuring Instrument) – subclass 5.3 Anhydrous ammonia

Version 2.0 – June 2021

Complete this kit by typing directly into the document

Applicant's name:	
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Version changes

Version number	Main changes
V2.0	<ul style="list-style-type: none">• Added pre-completion checklist to establish readiness (inc. LLN)• Re-wording of some questions/instructions, including to aid clarity. Questions added, others removed.• Verification form task changed to require completion using the electronic version of the form.• Supervisor/mentor report now called third party report with comments required for each checkpoint.• Observation report includes space for comments against each checkpoint.• Kit should be completed electronically.

Introduction

This kit enables you to demonstrate your competence as a verifier of measuring instruments used for trade against the performance criteria and assessment requirements set out in the nationally recognised units of competency for the skill set:

MSMSS00008 - Trade Measurement Verification (Complex Measuring Instrument) – for subclass 5.3 - Anhydrous ammonia flowmetering systems.

- [MSMTMREF301 – Use and maintain reference standards.](#)
- [MSMTMVER501 – Verify complex measuring instruments.](#)

On successful completion of assessment, you will receive a statement of attainment.

Read these instructions carefully in combination with the [Recognition kit instructions](#) and [Instructions for observation assessments](#) documents. In addition, carefully read the instructions included at the start of each section.

Before you complete and submit your recognition kit, you should:

- read through the whole kit to understand what is required of you
- spend time in the field with an experienced verifier learning about the topics in the following checklist
- complete the checklist below, to self-assess your skills and knowledge.

Please contact the NMI Administrator if you have difficulties in understanding the requirements for compiling/submitting your kit.

Email: NMIadministrator@measurement.gov.au

Tel: 02 8467 3789

I have adequate skills and knowledge in the following to be able to complete this kit, and perform these tasks in the workplace, without direct assistance:

Yes No Not sure

Spoken English communication

Mathematics

English reading skills

Computer skills

The instruments I intend to verify

The techniques used in testing instruments, including planning and preparation

Storing, maintaining and handling reference standards/test equipment

Likely impacts of the environment on the function of instruments and/or the standards

Work health and safety considerations relevant to testing instruments

My organisation's and NMI requirements for recording and reporting details of verifications and other licensing matters

Any adjustments or corrections that may be needed during the verification process

Marking instruments for verification (what to mark and where to place the mark)

Communicating to the owner/user of the instrument and requesting any assistance

If you have checked 'no' or 'unsure' to any of the items in the table above, and are unsure what you need to do to be in a position to answer 'yes', please speak to your supervisor.

Check the LLN section of the [Participant's handbook](#) if you need to develop your mathematics or English skills (speaking or reading) before you attempt this assessment.

In addition, you should have personally tested instruments, ideally under supervision, using the relevant national instrument test procedures to develop your skills - either in the workplace or in a simulated workplace environment.

Assessment instructions

Completion of the kit

You should complete this kit by typing directly into the document or clicking on checkboxes, where appropriate.

Submit the whole document along with any additional scanned reports or documents.

DO NOT, print it out and scan it.

The kit comprises a number of components for you to complete/submit, relevant to the subclasses for which you are being assessed, including the following:

- **Your work history**
- **Written assessments**
- **A specific question** that asks you to complete a [verification form](#) (Form 6) using the information provided.
- **Test reports** – for subclass 5.3, a minimum of **one** report per test method
- **Third party report** – a report/s from the verifier/s who worked with you during your training, or a work colleague (where you have no access to a verifier).

In addition, you will be asked to **demonstrate your skills** by completing one or more simulated verifications, observed by your assessor or a skills observer.

MAKE SURE YOU COMPLETE ALL PARTS OF THE RECOGNITION KIT

Skills assessment requirements

In your workplace

This assessment requires that you **demonstrate** your practical skills, by completing one or more simulated **initial** verifications on instruments, in a real or simulated environment. During training within your organisation, you should have practised these skills, ideally under supervision of an experienced verifier/s, including completing the appropriate test report/s that you will submit as evidence (workplace documents). The experienced verifier/s that supervised you should complete a third party report/s and sign the test reports you will submit.

Wherever possible, include examples from instruments that did not meet the requirements for verification, to show your understanding of unacceptable instrument performance.

You should provide one report per test method you intend to use for verifications. Additional report/s will be submitted immediately following observation.

See the [Workplace test reports](#) section for more information.

NMI Observation

Your assessor will need to confirm you have the necessary practical and communication skills required when verifying anhydrous ammonia flowmetering systems. This includes demonstrating knowledge of, and implementing, safe work practices. This will be completed by **in-person observation** (your choice and arrangement of site).

The assessor, or an NMI-appointed skills observer, will observe you completing all the processes required for verification of an instrument, either at your work place or another suitable location (trader's site). You will liaise with the assessor or skills observer to organise this.

IMPORTANT – Please See separate [Instructions for observation assessment](#).

Third party reports

We would like a report from a person (or persons) who has worked directly with you, and can comment on your workplace performance over time. Ideally, this person is a verifier who has worked directly with you during your training AND who holds a statement of attainment relevant to this skillset. If you don't have access to a verifier during your training, but have a workplace supervisor or colleague who works with you, ask them to provide a report. **Note, you may be asked to complete additional observations if you cannot provide a third party report from a verifier.**

Ask the person/s completing the report/s to read the instructions for completing their report **before** you finalise this kit. **If more than one person can provide evidence to support your assessment, have each of them complete a separate copy of the report, for submission:**

- An existing verifier should complete the [Third party report \(experienced verifier\)](#).
- Any other work colleague, who isn't a verifier, should complete the [Third party report \(non-verifier\)](#).

If you have access to an existing verifier, ensure they observe you testing the instruments for which you will provide [workplace test report/s](#) for this kit. **They should sign each report you provide**, to confirm that you have correctly followed the relevant, current, national instrument test procedures for initial verification.

If you don't have access to anyone in your workplace who can provide either of the above third party report, please contact the NMI Administrator.

IMPORTANT - Submission of the kit and enrolment

Once you have completed all relevant components, complete the separate [Recognition kit checklist](#) and the checklist on the [Applicant's details form](#), to check that you are submitting **all** the components required for this assessment.

Save this document on your computer, and name the file by adding your name to the file name. For example, if your name is Joe Smith, the file name for your completed kit will be:

RK 5.3 AA V2.0 Joe Smith.

Scan each of the **additional** documents you have completed, and save them by the name of document and the kit e.g. scan and save the test reports you are submitting as:

RK 5.3 AA V2.0 Test report_1 Joe Smith

Email the kit and the other scanned documents to nmiadministrator@measurement.gov.au and keep your original kit and documents. Your assessor will ask questions about your kit when they speak to you, so you need to have it available.

Once we have received all parts of your kit, the NMI Administrator will contact you regarding enrolment.

Assessment

Your assessor uses a number of forms to record the results of each part of your assessment. The forms are included at the end of this kit for your information.

Following enrolment, you will be assigned an assessor, and an NMI-appointed skills observer (SO) for your observation (where applicable).

If a SO completes your observation, they will contact you to make arrangements. Following observation, they will provide their report to your assessor.

Once your assessor receives your submitted material, and any observation report, they will:

- assess the submitted material
- determine if any further evidence is required
- discuss your workplace skills with the person/s providing any third party report (if necessary)
- contact you to confirm arrangements for any skills observation (if they are completing the observation)
- contact you to arrange a mutually convenient time to call you, if required, to:
 - confirm your understanding
 - discuss the reports/documents you submitted
 - ask any other questions to confirm your competence.
- record your results and provide feedback on the assessment recording form
- return the kit to the NMI Administrator for processing and confirmation of the result of your assessment by email, and posting out your statement of attainment, when successful.

Applicant's work history and training

Details of current employment

Organisation:

Postal address:

Date employment started:

Date training related to these subclasses started:

Title of your current position:

Details of previous relevant employment

Organisation:

Postal address:

Period of employment: From:

To:

Title of your previous position:

Relevant work experience

Specify the length of time you have been testing anhydrous ammonia flowmetering systems and the approximate number of instruments you have tested (including under supervision and in simulated workplace situations)

Detail any relevant training courses you have attended (name and date) **including first aid** and attach copies of any relevant trade qualifications:

Assessment recording form (assessor)

Assessor to complete this section and sign it.

Applicant:

Assessor name:

Date kit received:

Summary of evidence used to assess this applicant:

Written assessments

Completed verification form task

Third party report/s

Conversation with applicant

Review of test reports

Skills observation/report

Other – specify:

To obtain the skill set MSMSS00008 – Trade Measurement Verification (Complex Weighing Instrument), applicants must demonstrate competence in both units of competency.

This applicant was assessed as:

Competent

Not yet competent

MSMTMVER501 Verify complex measuring instruments

MSMTMREF301 Use and maintain reference standards

Check whether they are satisfactory or not yet satisfactory for each test method requested:

5.3 - Anhydrous ammonia flowmetering systems

Satisfactory

Not yet satisfactory

Tested volumetrically using a master meter

Tested using a mass flowmeter

Tested gravimetrically

Applicant's ID checked at interview:

Assessor's name:

Date:

RTO Manager's signature:

Date:

Assessor's feedback form

Assessor: Please include feedback to the applicant here and add your name and date to the bottom of the form. Particularly where you have assessed the applicant as NYC, ensure you identify which assessment requirements the applicant has not yet demonstrated (e.g. Performance criteria (PC) 1.4 of the unit of competency (UoC) MSMTMVER501 – Verify complex measuring instruments, was not met as you were unable to correctly demonstrate that you had ensured your test equipment was fit for purpose).

Assessor's name:

Date:

Instructions for all written assessments

You must complete the 'all subclasses questions'

In addition, complete all questions relating to the specific subclasses you wish to verify.

For multiple choice questions, check the correct answer, or answers. If you make a mistake, you can simply uncheck the box/es and check the new correct box/es.

For free text questions, type in the text box provided below each question. Include any calculations you use. The text box shouldn't limit how much you can write, but the size of the box indicates the expected maximum length of your answer.

If you have any problems writing your calculations in the text box, write them on a separate page/document, clearly indicating the question they relate to (e.g. All subclasses Q29), then scan or photograph them and email along with your kit.

Name the added document **RK 6.5, 6.6, 6.9 & 18.2 F V3.0 Calculations Joe Smith**

Written assessment 'all subclasses'

If you are completing more than one recognition kit at the same time, you only need to answer these 'all subclasses' questions once.

1. In your own words, describe:

a) what a hazard is.

Correct

Incorrect

b) what a risk is.

Correct

Incorrect

2. List **four** basic duties you have under the safety legislation in your state or territory, as an employee or worker.

Satisfactory

Incomplete

Incorrect

3. List the main workplace health and safety **hazards** that you face when verifying measuring instruments or measures. Your answer should relate to the environments and method/s of verification for instruments/measures for which you are currently being assessed. Write your answer below. **Include at least 5 common hazards (add another 5 per additional kit you are completing at the same time).** In addition, identify the main controls you apply to ensure your safety, and list any specific workplace procedure that applies to the hazard.

Hazards	Controls	Workplace procedures
1.		
2.		
3.		
4.		
5.		
1.		
2.		
3.		
4.		
5.		
1.		
2.		
3.		
4.		
5.		

Satisfactory Incomplete Incorrect

4. Do you know what a SDS and a SWMS are?

a) Explain what a SDS is:

Correct Incorrect

b) Give an example of when you would use a SDS:

Correct Incorrect

c) Explain what a SWMS is:

Correct Incorrect

d) Give an example of when you would use a SWMS:

Correct Incorrect

5. As part of the licence conditions, a servicing licensee is required to maintain a quality management system. From the following list, select each item that is included in your quality management system manual. Check **all** that apply.

a) The requirement for all measuring instruments/measures to be of an approved pattern and comply with their certificate of approval.

b) Details of mandatory reverification periods for instruments/measures used for trade.

c) References to the national instrument test procedures relevant to the servicing licence.

d) Procedures relating to instruments/measures that cannot be verified.

Satisfactory Incomplete Incorrect

6. Which document, maintained by the servicing licensee, details the required format of the mark that verifiers, working under that servicing licence, must apply to show an instrument/measure has been verified? Choose the single correct answer.

a) The National Trade Measurement Regulations 2009.

b) The licensee's quality manual.

c) The National Instrument Test Procedures.

d) The licensee's servicing licence.

Correct Incorrect

7. You have just changed your home address. What are you required to do? Choose the single correct answer.

a) Nothing.

b) Notify my employer who will notify NMI within 2 months.

c) Notify my employer who will notify NMI within 14 days.

d) Call my local trade measurement inspector and leave a message.

Correct Incorrect

8. If you verify a measuring instrument/measure, how long do you have to submit notice of the verification to the National Measurement Institute on the approved form? Choose the single correct answer.
- a) 7 days
 - b) 14 days
 - c) 21 days
 - d) 1 month

Correct Incorrect

9. Select the actions you would take when you test a measuring instrument/measure in use for trade and you determine that you cannot verify it. Check **all** that apply.

- a) Replace the verification mark with one indicating the instrument/measure can no longer be used for trade.
- b) Remove any existing verification mark (where feasible).
- c) Notify the owner within 14 days.
- d) Notify the owner immediately.
- e) Notify NMI within 14 days
- f) Notify NMI immediately.

Satisfactory Incomplete Incorrect

10. What could be the consequence if you failed to provide the trader with a notice of non-verification when you have been unable to verify a measuring instrument/measure used for trade? Check **all** that apply.

- a) No consequence provided I told the trader they couldn't use the instrument/measure for trade.
- b) Customers could get incorrect measure.
- c) Nothing, it's the trader's responsibility to check the instrument/measure is correctly marked.
- d) I could be fined.
- e) I could be restricted from verifying instruments/measures.

Satisfactory Incomplete Incorrect

11. If you were unsure of the correct way to apply a verification mark to a measuring instrument/measure, or any other requirement relating to the verification process, what would you do? Write your answer below. Include at least **three** points.

Satisfactory Incomplete Incorrect

12. How often must a measuring instrument/measure used for trade (excluding weighbridges used for public weighing) be re-verified? Choose the single correct answer.
- a) Every 3 years.
 - b) Every 5 years.
 - c) Whenever it has been adjusted/repared or every 2 years.
 - d) Whenever an adjustment or repair affects its metrological performance.
- Correct Incorrect
13. Can you verify a measuring instrument/measure where its certificate of approval states 'cancelled in respect of new instruments as from 1 January 2014'? Choose the single correct answer.
- a) No, never.
 - b) Yes, always.
 - c) Yes, if the instrument/measure was manufactured before 1 January 2014.
 - d) Yes, provided the instrument is new.
- Correct Incorrect
14. What markings would you apply to an instrument/measure you verified on 26 May 2020 if your servicing licensee code is DBA and you have the verifier number VR 01278? Choose the single correct answer.
- a) DBA 1278 B0
 - b) 1278 B 20
 - c) DBA 1278 E20
 - d) DBA 1278 E0
 - e) 1278 DBA B20
- Correct Incorrect
15. The following questions relate to the connection of auxiliary devices to measuring equipment.
- a) Which document specifies the requirements for the installation of auxiliary indicating or printing devices and POS systems installed prior to 1 August 2012? Choose the single correct answer.
 - i. S1/0/A
 - ii. S1/0B
 - iii. Supplementary certificate of approval for the device/system
 - iv. Measuring instrument approval

Correct Incorrect
 - b) Which document specifies the requirements for the installation of auxiliary indicating or printing devices installed after 1 August 2012, **excluding** POS or Control systems? Choose the single correct answer.
 - i. S1/0/A
 - ii. S1/0B
 - iii. Supplementary certificate of approval for the device/system
 - iv. Measuring instrument approval

Correct Incorrect

- c) Which document specifies the requirements for the installation of POS systems installed after 1 August 2012? Choose the single correct answer.
- i. S1/0/A
 - ii. S1/0B
 - iii. Supplementary certificate of approval for the device/system
 - iv. Measuring instrument approval

Correct Incorrect

- d) When verifying an instrument which has an auxiliary device (other than a POS or control system) connected to it, what are the requirements for verification marking? Choose the single correct answer.
- i. Apply a mark to the instrument only
 - ii. Apply a mark to the auxiliary device only
 - iii. Apply a mark to both the auxiliary device and the instrument

Correct Incorrect

16. Provide a couple of examples of how a trader's use of an instrument/measure may impact on its performance. (Give **two** examples per instrument type you are being assessed for at this time).

Satisfactory Incomplete Incorrect

17. In your organisation, how do you maintain records relating to verification? You should include at least 2 points.

Satisfactory Incomplete Incorrect

18. In order to verify instruments/measures, what are the principal legal requirements for the business and the individual completing a verification? Include at least 3 points in your answer.

Satisfactory Incomplete Incorrect

19. Who is responsible for determining whether a particular model of instrument can legally be used for trade in Australia?

Correct Incorrect

20. Where could you find the legal units of measurement for Australia? Choose any that apply.

- a) On the NMI internet pages.
- b) In the National Measurement Act 1960
- c) In the National Measurement Regulations 1999.
- d) In the licensee's quality manual

Correct Incorrect

21. MPEs for instruments/measures may be given in a number of different documents. If the instrument/measure you are to verify was first approved on the 20th January 2020, where would you find the correct MPE to use during testing?

Correct Incorrect

The questions listed below apply specifically to the knowledge requirements for the unit of competency MSMTMREF301 - Use and maintain reference standards.

22. List the **reference standards/test equipment** you use when verifying measuring instruments or measures. (Include capacity ranges, scale intervals and class/es, where appropriate) The answer you give should relate to **all** instrument subclasses for which you are being assessed. Write your answer below.

Satisfactory Incomplete Incorrect

23. How do you protect the integrity of the **reference standards and test equipment** you described in the previous question? Your answer should relate to storage, transportation and handling of reference standards and equipment. Write your answer below. Include **at least four** points.

Satisfactory Incomplete Incorrect

24. This question relates to the reference standards/test equipment you use, not the instrument/measure being tested.

What environmental factors could influence the integrity of the **reference standards and test equipment** that you use when verifying instruments/measures? The answer you give should relate to any instrument subclasses for which you are being assessed. Check **all** that apply.

- a) Temperature
- b) Humidity
- c) Electrical interference
- d) Wind/air movement
- e) Rain/water
- f) Gravity
- g) Dust/dirt
- h) Instrument level
- i) Pressure
- j) Vibration
- k) Other (detail):

Satisfactory Incomplete Incorrect

25. How do you control these factors when undertaking a verification? The answer you give should relate to the standards/equipment for all subclasses for which you are being assessed. Write your answer below. You should include **at least one control per item selected above.**

Satisfactory Incomplete Incorrect

26. You have damaged a reference standard used to verify measuring instruments/measures. What should you do with it? Choose the single correct answer.

- a) Fix the damage
- b) Quarantine it, until it has been repaired, tested and approved for use by the appropriate authority.
- c) Use it until it can be repaired.
- d) Quarantine it and then use it once repaired, if it is repairable.

Correct Incorrect

27. When using reference standards/test equipment, what signs/symptoms/measurement results might alert you to a possible problem/fault/damage with those standards/test equipment? Provide answers for each of the types of standards or equipment you use when verifying instruments/measures of the subclass/es you are being assessed for. Include **at least two** points per different type of reference standard/test equipment you use.

Satisfactory Incomplete Incorrect

28. You have verified and marked a measuring instrument/measure when you notice that a reference standard/test equipment used for the verification is damaged or faulty. What should you do with regards to the verified instrument/measure? Write your answer below. Include **at least two** points.

Satisfactory Incomplete Incorrect

29. What does your quality management system require your organisation to do when there is a change to the reference standards/test equipment you use, i.e. when you acquire new standards/test equipment, when your standards/test equipment are re-verified, when you dispose of standards/test equipment that are broken/excess to requirements? Check **all** that apply.

- a) Ensure that new standards/test equipment have the appropriate certification.
- b) Allocate a junior member of staff to clean the new standards/test equipment.
- c) Update the list of reference standards/test equipment.
- d) Supply a copy of the updated list of reference standards/test equipment to NMI within 30 days of the change.
- e) Supply a copy of the updated list of reference standards/test equipment to NMI within 14 days.

Satisfactory Incomplete Incorrect

30. What is the principal purpose of a certificate of verification (e.g. a Reg. 13 certificate)? Write your answer below

Satisfactory Incomplete Incorrect

31. What procedures does your business need in place for maintenance and calibration of your reference standards/test equipment? Refer to your quality manual. Write your answer below. Include **at least two** points.

Satisfactory Incomplete Incorrect

32. Can you identify any limitations of the reference standards/test equipment you use during verification related to the verification or the environment in which they are used? Address this question to all reference standards/test equipment you may use for the subclasses you are currently being assessed for, describing the limitations and how significant they might be.

Satisfactory Incomplete Incorrect

33. What are organisations who are authorised to verify reference standards called?

Correct Incorrect

Written assessment (Subclass 5.3 anhydrous ammonia flowmetering systems – general questions)

You must complete all these questions

- Which National Instrument Test Procedure applies to the verification of instruments for which there is no instrument-specific NITP (including anhydrous ammonia flowmetering systems)?

Correct Incorrect
- What instrument does the pattern approval number 10/2/8 relate to? Choose the single correct answer
 - Endress & Hauser Model m-Point DQ 600 Bulk Liquefied Gas Mass Flowmetering System
 - ISOIL Model SBM 75 LPG Flowmetering System
 - Compaq Model Laser L-CNGD15 Mass Compressed Gaseous Fuel Measuring System
 - Acme Flowmeter

Correct Incorrect
- What is the maximum flow rate that an instrument approved with the pattern approval number 10/2/8 may have? Choose the single correct answer.
 - 300 kg/min.
 - 1000 kg/min.
 - 1200 kg/min.
 - 3000 kg/min

Correct Incorrect
- In what physical state is anhydrous ammonia when it is stored and measured?

Correct Incorrect
- Given a density of 617.5 kg/m^3 and the masses shown below, determine the volume (assuming product density was determined at the same temperature). Give your result rounded to **whole** litres. Show your calculations in the text box below the table:

Mass (kg)	Volume (L)
18765	
543	
1450	

Satisfactory Incomplete Incorrect

6. How does a turbine flowmeter measure anhydrous ammonia? Provide basic details of its operation.

Satisfactory Incomplete Incorrect

7. How does a coriolis flowmeter measure anhydrous ammonia? Provide basic details of its operation.

Satisfactory Incomplete Incorrect

8. What is a differential flow control valve used for and where is it positioned in the flowmetering system?

Satisfactory Incomplete Incorrect

9. Complete the table below with the MPEs for the listed tests:

Test	Value of MPE		
Temperature conversion device (where applicable)			
Temperature setting accuracy (where applicable)			
		Satisfactory	Incomplete Incorrect

10. From the calibration table shown below, what is the true temperature for the thermometer if it reads 28°C? Choose the single correct answer. Show any calculation/s you used in the text box below the table.

- a) 28.06 °C
- b) 28.24 °C
- c) 28.12 °C
- d) 28.00 °C

Denomination	True Value	Correction
0°C	0.4°C	0.4°C
5°C	5.4°C	0.4°C
10°C	10.4°C	0.4°C
15°C	15.6°C	0.6°C
20°C	20.6°C	0.6°C
25°C	25.3°C	0.3°C
30°C	30.0°C	0.0°C
35°C	35.4°C	0.0°C
40°C	39.8°C	-0.2°C
45°C	44.7°C	-0.3°C
50°C	50.1°C	0.1°C

Correct Incorrect

11. Where a single indicator is used for two or more anhydrous ammonia flowmetering systems, how would you check that anhydrous ammonia cannot be delivered from the system under test without the measurement being shown on the indicator? **Include at least 3 steps.**

Satisfactory Incomplete Incorrect

12. What is the purpose of a non-return valve test? Choose the single correct answer.

- a) To ensure anhydrous ammonia doesn't leak from the transfer device when it is closed.
- b) To prevent an explosion from leaking anhydrous ammonia
- c) To ensure anhydrous ammonia does not flow backwards after the pump has stopped, leading to double measurement of anhydrous ammonia on the subsequent delivery.
- d) To prevent anhydrous ammonia being delivered through another delivery point without being metered.

Correct Incorrect

13. Describe in your own words the steps you would take to complete a meter creep test. Assume you have already completed accuracy tests. **Include at least 4 steps.**

Satisfactory Incomplete Incorrect

14. For what instruments would you need to complete this test?

Correct Incorrect

15. Describe in your own words the steps you would take to check the pre-set accuracy of a flowmetering system fitted with a pre-set facility. **Include at least 4 steps.**

Satisfactory Incomplete Incorrect

16. You are carrying out an annual accuracy check on a vehicle-mounted anhydrous ammonia flowmetering system when you find the verification label is no longer present, just a small indication of where it was originally placed. You establish that the label had become worn during cleaning, and the driver had simply removed it. What would you do? Select the single best answer.

- a) Nothing, you are only responsible for carrying out accuracy checks
- b) Affix a new verification mark, using today's date, and tell the driver to be more careful when cleaning.
- c) Re-verify the flowmeter, charging an additional extra fee, applying the new mark in the same position. Leave a notice of non-compliance regarding removal of the mark.
- d) Advise the site manager that without a legible mark, the meter is unverified and the company could be fined; discuss the need to re-verify the flowmeter. Discuss options for positioning/securing any new verification mark and ways to protect the mark when it is being washed.

Satisfactory Incomplete Incorrect

17. Which of the following repairs would require you to re-verify an anhydrous ammonia flowmetering system? Check all that apply.

- a) Replacement of the pump.
- b) Adjustment of the calibration settings
- c) Changes to the software version in the calculator/indicator.
- d) Replacement of worn data plate.
- e) Repair of a faulty non-return valve.
- f) All of the above.

Satisfactory Incomplete Incorrect

18. What problems can you identify with the following scenario?

A verifier is asked to look into a problem with a faulty LCD display of an anhydrous ammonia flowmetering system on a tanker at the client's depot. The verifier identified that some of the digits were no longer displaying clearly. A new LCD display was required, which the licensee didn't have in stock, so the verifier told the tanker driver that he would need to order parts and he would call the driver when the parts had come in. He did not remove the faulty display, or carry out any work on the meter. He left the premises. Give your answer as dot points. Include at least three points

Satisfactory Incomplete Incorrect

19. Your reference standards/equipment have just been re-verified. You are conducting planned annual verifications on the flowmetering systems for a fleet of anhydrous ammonia delivery tankers. You notice that every system you test seems to be giving away product. Describe a possible reason for this, **relating to your test equipment**, and list **at least 4 things** that you should do?

Satisfactory Incomplete Incorrect

20. The ticket shown below was produced from a printer from an anhydrous ammonia flowmetering system NMI 10/2/6, incorporating a calculator/indicator of approval number S170B. Is the ticket acceptable for verification? Explain your reasoning. You should include **at least 2 points**

Fortuna Fertilisers Pty Ltd		
42 Hope St		
Launceston		
7250		
Tel 5550 9381		
14 January 2021	14:13	458765
Order No: 4214		
Driver: Jeff		
Anhydrous Ammonia:		4350.7 L
Density:		0.6168 kg/L

Satisfactory Incomplete Incorrect

Written assessment subclass 5.3 specific questions

Master meter test method questions

Complete these questions **ONLY** if you intend to verify instruments using a master meter. (Other test method options follow – complete questions for all test methods you may use in future)

1. You are testing an anhydrous ammonia flowmetering system - NMI 10/2/6A, Minimum Measured Quantity 100 L, Qmax 500 L/min, Qmin 100 L/min, maximum achievable flow rate 338 L/min - what is the minimum delivery you should use for the accuracy test - based on this information alone? Choose the single best answer.
- a) 500 L
 - b) 200 L
 - c) 338 L
 - d) 100 L
- Correct Incorrect
2. The following questions relate to the Regulation 13 certificate of verification provided on the following pages. In each case choose the single correct answer.
- a) What is the permanent distinguishing mark or serial number?
- i. Serial No: GU1661
 - ii. EMH600
 - iii. RN091428
 - iv. Serial No: 0510R055
- Correct Incorrect
- b) What is the maximum nominal flowrate for which this master meter has been verified?
- i. 62.7241 pulses/L
 - ii. 141.124 pulses/L
 - iii. 360 L/min
 - iv. 359.9 L/min
- Correct Incorrect
- c) What is the meter factor at a nominal flowrate of 200 L/min?
- i. 199.9
 - ii. 0.10
 - iii. 1.0005
 - iv. 2.1
- Correct Incorrect
- d) What meter factor would you use if the flowrate was 180 L/min? Show any calculations used in the text box below.
- i. 1.0005
 - ii. 1.0007
 - iii. 1.0010
 - iv. 2.1
- Correct Incorrect

- e) Would this master meter be suitable for testing an instrument with a minimum flow rate of 20 L/min and maximum flow rate of 100 L/min? Explain your answer.

Correct

Incorrect



Australian Government

**National Measurement
Institute**

**CERTIFICATE OF VERIFICATION OF A REFERENCE STANDARD OF
MEASUREMENT IN ACCORDANCE WITH REGULATION 13 OF THE NATIONAL
MEASUREMENT REGULATIONS 1999 (Cth) IN ACCORDANCE WITH THE
NATIONAL MEASUREMENT ACT 1960 (Cth)**

Description of standard of measurement: Schlumberger 4MT flowmeter (serial number GU1661) connected to an Liquip EMH600 calculator/indicator, (serial number 0510R055)

Permanent distinguishing marks: Serial No: GU1661

Date of verification: 21 January 2010

Date of expiry of certificate: 21 January 2011

Value(s) of standard of measurement: As stated in Report RN091428 of the National Measurement Institute.

Uncertainty of value(s): As stated in Report RN091428 of the National Measurement Institute.

This uncertainty is calculated in accordance with the principles of the ISO Guide to the Expression of Uncertainty in Measurement (1995), with an interval estimated to have a level of confidence of 95% at the time of verification.

Values, and uncertainties, of relevant influence factors:
As stated in Report RN091428 of the National Measurement Institute.

Signature:  **Date:** 1/2/2010

Name of signatory: Dr Mark Ballico

Being a person with powers delegated by the Chief Metrologist acting under Section 18D of the *National Measurement Act 1960 (Cth)* in respect of Regulation 13 of the *National Measurement Regulations 1999 (Cth)*, I hereby certify that the above standard is verified as a reference standard of measurement in accordance with the Regulations.

Note: Report RN091428 of the National Measurement Institute forms part of this Certificate.



Australian Government
National Measurement
Institute

MEASUREMENT REPORT ON

LPG Flowmeter, Schlumberger model 4MT
serial number: GU1661

The National Measurement Institute is responsible for Australia's units and standards of measurement.
The measurement results presented in this report are traceable to Australia's primary standards.

Bradfield Road	PO Box 264	Telephone: +61 2 8467 3600
West Lindfield NSW 2070	Lindfield NSW 2070	Facsimile: +61 2 8467 3610
Australia	Australia	

For Further information contact: Simon Dignan Phone: +612 8467 3514

Ref: RN091428 File: CB/10/0019 Checked: *SD* Date: 27 January 2010

This report may not be published except in full unless permission for the publication of an approved extract has been obtained in writing from the Chief Metrologist, National Measurement Institute.

Results:

Table 1: K0 factor stored in the indicator (see note 5)

As received	62.7241 pulses/L
New value determined by this calibration, $K_{\text{indicator}}$	141.124 pulses/L

Table 2: Measured Meter-Factor

Nominal flow rate L/min	Indicated flow rate L/min	Meter Factor $MF = K0 / K$ (see Note 5)	Expanded Uncertainty %	k
90	89.7	1.0034	0.15	2.2
100	99.7	1.0028	0.14	2.2
150	149.9	1.0010	0.13	2.1
200	199.9	1.0005	0.10	2.1
250	249.9	1.0004	0.11	2.1
300	299.9	1.0004	0.10	2.1
350	349.9	1.0003	0.10	2.1
360	359.9	1.0002	0.09	2.1

Table 3: Test conditions

Meter Pressure	1162 to 1299 kPa
Meter Temperature	25.5 to 31.2 °C
Meter Pressure – Storage Pressure	193 to 209 kPa
Fluid Density at 15°C	511 kg/m ³

Back Pressure Test:

At a nominal flow rate of 150L/minute, the pressure at the meter was increased to approximately 425 kPa greater than the EVP and the change in MF was within the repeatability of the meter.

Indicator/Calculator check:

At a nominal flow rate of 200L/minute, the indicator recorded correctly within less than 3 pulses of the nominally 25000 pulses provided by the meter, an error of less than 0.01%

Ref: RN091428

File: CB/10/0019

Checked: *SD*

Date: 27 January 2010

For: Liquip International Pty Ltd, Sydney
13 Hume Road
SMITHFIELD NSW 2164

Reference: Quotation number Q091428.

Description: The instrument is a Schlumberger 4MT flowmeter, (serial number GU1661) connected to a Liquip EMH600 calculator/indicator, (serial number 0510R055). The meter is part of an assembly with provision made for a thermometer and pressure gauge to be used for the conversion of the flowmeter indicated volume to reference conditions

Maker: Liquip

Serial Number: GU1661

Date(s) of Test: 21 January 2010

Tests:

- 1) The as-received K-factor in the indicator was recorded.
- 2) The K-factor (pulses per litre) of the meter was determined volumetrically against a piston prover using Propane test fluid at the specified flow rates. The measured flow rate at both the Piston-Prover and Meter-Under-Test were both corrected to reference conditions using NMI's reference temperature and pressure sensors. The meter-under-test temperature and pressure were measured at the thermowell and line-pressure valve attached to the meter. During the tests the pressure at the meter was controlled to be approximately 225 kPa higher than the current equilibrium vapour pressure (EVP) of the fluid.
- 3) Based on this data, a suitable K-factor, $K_{\text{indicator}}$ was determined and entered into the indicator.
- 4) A meter factor $MF = K_{\text{indicator}}/K$ was calculated for each of the flow conditions.
- 5) A back pressure test was performed.
- 6) The indicator system was checked at a nominal flow rate of 200 L/min by confirming that the indicator/calculator read the correct number of pulses from the turbine meter and converted it to an equivalent metered volume using the entered K-value.

Ref: RN091428

File: CB/10/0019

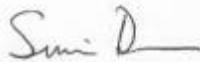
Checked: 

Date: 27 January 2010

Notes

1. The delivered-volume indicated by the calculator/indicator attached to the meter should be multiplied by the meter factors given in table 2 to obtain the true delivered volume.
2. The uncertainty stated in this report has been calculated in accordance with principles in the ISO Guide to the Expression of Uncertainty in Measurement, and gives an interval estimated to have a level of confidence of 95% using the specified coverage factor. The uncertainty applies at the time of measurement only and takes no account of any drift or other effects that may apply afterwards. When estimating the uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specifications.
3. The calibration was performed based on the methods described in CB/10/0019.
4. The quoted uncertainty is dominated by the Meter Under Test (MUT) repeatability and/or MUT deviation from a fitted curve.
5. For this instrument, the parameter in the EMH600 indicator that relates pulses to Litres is called 'K0'. Based on several experiments it was found that $K0 = K_{\text{indicator}} \times 6$. When K0 is set to 141.124, the correct $K_{\text{indicator}}$ value of 23.52 pul/L is applied within the EMH600 to the pulse output of the MUT. The MF in table 1 is applied (ie., multiplied) to the indicated value to give the corrected indicated value.

oooo0oooo



Mr Simon Dignan
for Dr L M Besley
Chief Metrologist

Ref: RN091428

File: CB/10/0019

Checked: *SD*

Date: 27 January 2010

Mass flowmeter test method questions

Complete these questions ONLY if you intend to verify instruments using a mass flowmeter. (Other test method options follow)

1. Consider the Regulation 13 Certificate of Verification given on the following pages and answer the following questions that relate to it.

a) What is the permanent distinguishing mark? Choose the single correct answer

- i) Serial No: 482211 2003 (flow tube) and 3703154 (transmitter)
- ii) 2700R
- iii) RN150645
- iv) Q150645

Correct

Incorrect

b) What is the maximum nominal flowrate for which this mass flowmeter has been verified? Choose the single correct answer

- i) 388.6 Hz
- ii) 97 L/min
- iii) 240.360 Pul/L
- iv) 7.5 L/min

Correct

Incorrect

c) What is the measured meter factor at a nominal flowrate of 30 L/min? Choose the single correct answer

- i) 240.260
- ii) 0.9985
- iii) 0.9989
- iv) 2.0

Correct

Incorrect

d) What meter factor would you use if the flowrate was 15 L/min? Choose the single correct answer. Show any calculations used in the text box below.

- i) 0.99910
- ii) 0.99890
- iii) 0.99903
- iv) 0.99900

Correct

Incorrect



Australian Government
Department of Industry,
Innovation and Science

National Measurement Institute

Certificate of Verification of a Reference Standard of Measurement in accordance with Regulation 13 of the *National Measurement Regulations 1999 (Cth)* in accordance with the *National Measurement Act 1960 (Cth)*

Certificate Number: RN 150645

Description of standard of measurement:	LPG Flowmeter, Micromotion model CMF050
Permanent distinguishing marks:	Serial No: 482211 2003 (flow tube) 3703154 (transmitter)
Date of verification:	25 March 2015
Period of certificate:	From date of verification until 25 March 2016
Value(s) of standard of measurement:	As stated in Report RN150645 of the National Measurement Institute
Accuracy of verification:	Uncertainty of value(s) as stated in Report RN150645 of the national Measurement Institute
Values and uncertainties of relevant influence factors:	As stated in Report RN150645 of the National Measurement Institute

Signature: _____ **Date:**

Name of Signatory: Dr John Man

Being a person with powers delegated by the Chief Metrologist acting under section 18D of the *National Measurement Act 1960 (Cth)* in respect of regulation 13 of the *National Measurement Regulations 1999 (Cth)*, I hereby certify that the above standard is verified as a reference standard of measurement in accordance with the regulations.

Note: Report RN 150645 of the National Measurement Institute forms part of this Certificate.

MEASUREMENT REPORT ON

**LPG Flowmeter, Micromotion model CMF050 flow tube with 2700R transmitter
serial number: 482211 2003 (flow tube), 3703154 (transmitter)**

TRAINING USE ONLY

For: National Measurement Institute,
Trade Measurement, Adelaide
8 West Thebarton Road
THEBARTON SA 5031

Reference: Quotation number Q150645.

Description: The instrument is an Micromotion model CMF050 flowmeter connected to an Micromotion model 2700R transmitter, serial number 3703154. The meter is part of an assembly with provision made for a thermometer and pressure gauge to be used for the conversion of the flowmeter indicated volume to reference conditions.

Maker: Micromotion

Serial Number: 482211 2003 (flow tube), 3703154 (transmitter)

Date(s) of Test: 24 March 2015 to 25 March 2015

Tests:

- 1) The K-factor, K, (pulses per litre) of the meter was determined volumetrically against a piston prover at 20 flow rates using Propane where the number of flow rates is sufficient to characterise the performance curve for the meter over the specified range. Each flow rate is the average of 5 runs with each run equal to one pass of the of the piston in the 40 L prover. The measured flow rate at both the Piston-Prover and Meter-Under-Test were both corrected to reference conditions using NMI's reference temperature and pressure sensors. The meter-under-test temperature and pressure were measured at the thermowell and line-pressure valve attached to the meter. During the tests the pressure at the meter was controlled to be approximately 225 kPa higher than the current equilibrium vapour pressure (EVP) of the fluid.
- 2) Based on this data, a suitable K-factor, $K_{\text{indicator}}$ was determined and entered into the indicator where the indicator is configured for single point k factor correction, refer table 1
- 3) A curve was fitted to the data for the meter and a meter factor $MF = K_{\text{indicator}}/K$ was calculated for each of the flow conditions (refer table 2) under conditions in table 3.
- 4) A back pressure test was performed.

- 5) The indicator system was checked at a nominal flow rate of 60 L/min by confirming that the indicator/calculator read the correct number of pulses from the meter and converted it to an equivalent metered volume using the entered K-factor.
- 6) The as-received K-factor(s) in the indicator and indicator correction mode was recorded, refer table 1.

Results:

Table 1: K-factor(s) stored in the indicator

	Indicator K-factor correction Mode	$K_{\text{indicator}}$
As received	Single point	240.000 pulses/L
New value determined by this calibration and entered into indicator	Single point	240.000 pulses/L

Table 2: Measured Meter-Factor

Nominal flow rate, (L/min)	Pulse Frequency (Hz)	Measured Pulses, K (Pul / L)	Uncertainty (%)	Coverage factor k	Indicated flow rate, I, (L/min) [see Note 1]	Meter Factor MF = $K_{\text{indicator}} / K$ [see Note 1]
97	388.6	240.360	0.09	2.0	97.1	0.9985
70	280.4	240.320	0.09	2.0	70.1	0.9987
30	120.1	240.260	0.09	2.0	30.0	0.9989
7.5	30.0	240.225	0.09	2.0	7.5	0.9991

Table 3: Test conditions

Meter Pressure	740 kPa to 816 kPa
Meter Temperature	11.5 °C to 15.3 °C
Meter Pressure – Storage Pressure	214 kPa to 248 kPa
Fluid Density at 15°C	522 kg/m ³

Back Pressure Test:

At a nominal flow rate of 97 L/minute, the pressure at the meter was increased to approximately 365 kPa greater than the EVP and the change in K was within the repeatability of the meter.

Indicator/Calculator check:

At a nominal flow rate of 60L/minute, the indicator recorded correctly within 2 pulses of the nominally 100000 pulses provided by the meter, an error less than 0.002%.

Notes

1. The delivered-volume indicated by the calculator/indicator at the flow rate (I) attached to the meter should be multiplied by the meter factors (MF) given in table 2 to obtain the true delivered volume. This applies where K-factor linearisation are not applied and temperature and pressure compensation are not applied in the indicator.
2. The uncertainty stated in this Report has been calculated in accordance with the principles in *JCGM 100:2008 – Evaluation of measurement data - Guide to the expression of uncertainty in measurement*, and gives an interval estimated to have a level of confidence of 95%. The uncertainty applies at the time of measurement only and takes no account of any drift or other effects that may apply afterwards. When estimating the uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specifications.
3. The stated uncertainty of calibration includes the effect of linear interpolation within the flow rate range covered in table 2.
4. The calibration was performed based on the methods described in POM-LFF-8.1.1.
5. The quoted uncertainty is dominated by the Meter Under Test (MUT) repeatability and/or MUT deviation from a fitted curve.
6. The indicator linearisation and compensation functions were not tested.
7. The tests were conducted using the supplied pipework.
8. The calibration was conducted at the NMI Londonderry Flow facility, 919 Londonderry Road, Londonderry NSW 2573.

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Mr Simon Dignan
for Dr P T H Fisk
Chief Metrologist

2.

- a) Is it acceptable to use a mass flow meter which has been verified with a maximum nominal flowrate of 800 kg/min to verify an anhydrous ammonia flowmetering system with a maximum achievable flowrate of 820 kg/min?

Correct Incorrect

- b) Explain your reasoning

Satisfactory Incomplete Incorrect

3. The following test results were observed during testing of an instrument that utilises a mass flowmeter and is tested using a reference mass flowmeter. It has a Max flowrate of 20 000 kg/h, Min flowrate 450 kg/h, and minimum quantity of 10 kg. Determine the errors in the instrument, **rounded to 2 decimal places**, and state whether the instrument passes or fails the accuracy tests, **and why**. (Show your calculations in the text box below the table).

	Q _{max} (kg)			Q _{min} (kg)
	Run 1	Run 2	Run 3	
M _{ref}	348.2	346.5	346.8	352.2
M _{FS}	350.0	350.0	350.0	350.0
E _{FS} = [(M _{FS} - M _{ref}) / M _{ref} X 100] %				
	E _{AV} =			

Satisfactory Incomplete Incorrect

Gravimetric (weighing) test method questions

Complete these questions ONLY if you intend to verify instruments using the gravimetric test method.

1. Consider the Regulation 13 certificate of verification on the following pages and answer the following questions. For each question, choose the single correct answer.

a) What is the uncertainty for the 2 kg reference standard?

- i. ± 0.6 g
- ii. 0.0006 g
- iii. $- 0.006$ g
- iv. ± 0.006 g

Correct Incorrect

b) What is the certificate reference number?

- i. RN111555
- ii. RN111525
- iii. RN115556
- iv. RN115556

Correct Incorrect

c) What verification method was used for these reference standards?

Satisfactory Incomplete Incorrect

d) What are the identifying marks for the reference standards to which this certificate of verification relates?

- i. Serial no. box 23607 for 2 kg weight and box G07 05755 for 1 mg to 500 g weights.
- ii. Box no. 23607b and G07 0577.
- iii. No. RN111525 File CB/11/1079.
- iv. Serial no. box G07 05755 for 2 kg weight and box 23607 for 1 mg to 500 g weights.

Correct Incorrect



Australian Government
**National Measurement
Institute**

**CERTIFICATE OF VERIFICATION OF A REFERENCE STANDARD OF
MEASUREMENT IN ACCORDANCE WITH REGULATION 13 OF THE NATIONAL
MEASUREMENT REGULATIONS 1999 (CTH) IN ACCORDANCE WITH THE
NATIONAL MEASUREMENT ACT (1960) (CTH)**

Certificate Number RN111525

Description of standard of measurement: Set of weights, 2 kg and 500 g to 1 mg,
25-pieces

Permanent distinguishing marks: Serial No: Box 23607 and Box G07 05755
respectively

Date of verification: 28 June 2011

This certificate is given for a period until: 28 June 2016

Value(s) of standard of measurement: As stated in Report RN111525 of the National
Measurement Institute

Uncertainty of value(s): As stated in Report RN111525 of the National
Measurement Institute

Values and uncertainties of relevant influence factors:
As stated in Report RN111525 of the National
Measurement Institute

Signature:

Date:

28 June 2011

Name of Signatory: Mr John Gamble

Being a person with powers delegated by the Chief Metrologist acting under section 18D of the National Measurement Act 1960 (Cth) in respect of Regulation 13 of the National Measurement Regulations 1999 (Cth), I hereby certify that the above standard is verified as a reference standard of measurement in accordance with the Regulations.

Note: Report RN111525 of the National Measurement Institute forms part of this Certificate.



Australian Government
**National Measurement
Institute**

MEASUREMENT REPORT ON

**Set of weights, 2 kg and 500 g to 1 mg, 25-pieces
Serial number: Box 23607 and Box G07 05755 respectively**



This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.
Accreditation Number 1.


The National Measurement Institute is responsible for Australia's units and standards of measurement.
The measurement results presented in this report are traceable to Australia's primary standards.

Trade Measurement Laboratory, Brisbane:
33 Kingtel Place
Geebung QLD 4034
Australia

Telephone: +61 7 3613 6102
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Headquarters:
PO Box 264
Lindfield NSW 2070
Australia
Telephone: +61 2 8467 3600

For Further information contact: Peter Hopcraft Phone: +61 7 3613 6102

Ref: RN111525 File: CB/11/1079 Checked:  Date: 28 June 2011

This report may not be published except in full unless permission for the publication of an approved extract has been obtained in writing from the Chief Metrologist, National Measurement Institute.

For: Laboratory Scientific Engineering
Unit 3, 8 Combarton Street
BRENDALE QLD 4109

Reference: Quotation number Q111525

Description: Set of weights, 2 kg and 500 g to 1 mg, 25-pieces

Maker: Masscal and Kern & Sohn GmbH respectively

Serial Number: Box 23607 and Box G07 05755 respectively

Previous Examination: ML5530 for Box G07 05755
Dated: 19 February 2008

Date(s) of Test: 24 June 2011 to 28 June 2011

Nominal Value	Description	Identifying Mark(s)	Value (g)	Uncertainty (±) (g)
2 kg	stainless steel cylindrical weight	Box ' 23607 '	2000.004	0.006
500 g	stainless steel cylindrical weight	Box ' G07 05755 '	500.000 0	0.001 5
200 g	stainless steel cylindrical weight	Box ' G07 05755 '	199.999 9	0.000 5
200 g*	stainless steel cylindrical weight	Box ' G07 05755 '	200.000 0	0.000 5
100 g	stainless steel cylindrical weight	Box ' G07 05755 '	100.000 00	0.000 25
50 g	stainless steel cylindrical weight	Box ' G07 05755 '	49.999 98	0.000 20
20 g	stainless steel cylindrical weight	Box ' G07 05755 '	20.000 00	0.000 10
20 g*	stainless steel cylindrical weight	Box ' G07 05755 '	20.000 00	0.000 10
10 g	stainless steel cylindrical weight	Box ' G07 05755 '	10.000 00	0.000 07
5 g	stainless steel cylindrical weight	Box ' G07 05755 '	5.000 01	0.000 06
2 g	stainless steel cylindrical weight	Box ' G07 05755 '	2.000 01	0.000 05
2 g*	stainless steel cylindrical weight	Box ' G07 05755 '	2.000 00	0.000 05
1 g	stainless steel cylindrical weight	Box ' G07 05755 '	1.000 007	0.000 040

Ref: RN111525

File: CB/11/1079

Checked: 

Date: 28 June 2011


Nominal Value	Description	Identifying Mark(s)	Value (g)	Uncertainty (±) (g)
500 mg	german silver pentagonal sheet weight	Box ' G07 05755 '	0.500 001	0.000 030
200 mg	german silver rectangular sheet weight	Box ' G07 05755 '	0.199 989	0.000 020
200 mg*	german silver rectangular sheet weight	Box ' G07 05755 '	0.199 992	0.000 020
100 mg	german silver triangular sheet weight	Box ' G07 05755 '	0.099 996	0.000 020
50 mg	german silver pentagonal sheet weight	Box ' G07 05755 '	0.050 000	0.000 015
20 mg	german silver rectangular sheet weight	Box ' G07 05755 '	0.020 000	0.000 010
20 mg*	german silver rectangular sheet weight	Box ' G07 05755 '	0.019 995	0.000 010
10 mg	german silver triangular sheet weight	Box ' G07 05755 '	0.009 996	0.000 010
5 mg	stainless steel pentagonal sheet weight	Box ' G07 05755 '	0.005 009	0.000 010
2 mg	stainless steel rectangular sheet weight	Box ' G07 05755 '	0.002 002	0.000 010
2 mg*	stainless steel rectangular sheet weight	Box ' G07 05755 '	0.001 996	0.000 010
1 mg	stainless steel triangular sheet weight	Box ' G07 05755 '	0.001 004	0.000 010

Notes

1. The uncertainty stated in this Report has been calculated in accordance with principles in the ISO Guide to the Expression of Uncertainty in Measurement, and gives an interval estimated to have a level of confidence of 95%. A coverage factor of 2.0 has been used. The uncertainty applies at the time of measurement only and takes no account of any drift or other effects that may apply afterwards. When estimating the uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specification.
2. The weights were verified using the "Double Substitution" method as specified in "The Calibration of Weights and Balances", Morris & Fen - 3rd edition, March 2007.
3. The weights have been verified in the laboratory on the basis of weighings made in air against a standard of known mass. The value given in the column headed "Value" in this Report represents, within the uncertainty given in the column headed "Uncertainty", the mass of a hypothetical object of density 8000 kg/m³ which, in air of density 1.2 kg/m³ would balance the corresponding mass identified in the columns headed "Nominal Value", "Description" & "Identifying Mark(s)".
4. The weights require careful handling to retain the value given in the report.

Ref: RN111525

File: CB/11/1079

Checked: 

Date: 28 June 2011

5. The weights have been verified against the following reference standard(s):
20kg - 1mg state secondary mass set ' G '. Certificate Number RN110001 Expiry
Date - 13/01/2012
6. The verification was conducted at Trade Measurement Laboratory, Brisbane, 33
Kingtel Place, Geebung QLD 4034.

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
Mr John Gamble
for Dr L M Besley
Chief Metrologist



Mr Rolf Grubwinkler
NATA approved signatory

Ref: RN111525

File: CB/11/1079

Checked: 

Date: 28 June 2011

2. The following test results were observed during testing of an instrument that comprises a mass flowmeter and is tested gravimetrically. It has a Max flowrate of 20 000 kg/h, Min flowrate 450 kg/h and minimum quantity 10 kg. Determine the errors in the instrument, rounded to 2 decimal places, and state whether the instrument passes or fails the accuracy tests, **and why**. (Show your calculations in the text box below the table).

	Q _{max} (kg)			Q _{min} (kg)
	Run 1	Run 2	Run 3	
M _{ref}	351.2	350.9	351.1	348.9
M _{FS}	350.0	350.0	350.0	350.0
E _{FS} = [(M _{FS} - M _{ref}) / M _{ref} X 100] %				
	E _{AV} =			

Satisfactory Incomplete Incorrect

3. What equipment is required for verification by the gravimetric method? Choose **all** that apply.
- A weighing instrument with a suitable capacity and verification scale interval.
 - Reference standard hydrometer pressure vessel
 - Reference standard volume measure sufficient to hold at least 1 minute of flow at maximum flow rate.
 - Reference standard thermometer.
 - A receiving vessel of sufficient capacity containing an appropriate flow control valve
 - Reference standard pressure gauge
 - Sufficient suitable reference standard weights to test the weighing instrument.

Satisfactory Incomplete Incorrect

4. Would your answer to question 3 be any different if the instrument you are testing is approved under NMI 10/2/6A? Explain any differences below and why. Include **at least 3** points in your answer.

Satisfactory Incomplete Incorrect

5. You are testing an anhydrous ammonia flowmetering system measuring in L, with a maximum approved flowrate of 500 L/min. For anhydrous ammonia with a density @ 15 °C of 618 kg/m³. You are planning to use a tank fixed onto a platform weighing instrument to determine the weight of the anhydrous ammonia delivered by the system. The tank is tared off before receiving the deliveries. The tank can hold up to 5 800 L of anhydrous ammonia. Each delivery run will deliver around 500 L and anticipate completing 8-9 runs. You have sufficient class 2 inspectors' reference standard change point weights in order to determine the weight on the weighbridge to 0.1 of a scale interval. The platform scale will be tested without using substitution using suitable reference weights.

a) Which of the following weighing instruments would be suitable to use in the testing? Choose the single correct answer.

- i. A 60 t weighing instrument with a 50 kg scale interval
- ii. A 40 t weighing instrument with a 20 kg scale interval
- iii. A 30 t weighing instrument with a 10 kg scale interval
- iv. All of the above
- i. None of the above

Correct Incorrect

b) What changes to the testing could you make to enable you to use one of the weighing instruments detailed above? Include **at least 2** options.

Satisfactory Incomplete Incorrect

c) What are the requirements for the weights used to test the weighing instrument? Check **all** that apply.

- i. All weights must have a current Regulation 13 certificate
- ii. Combined uncertainties and variations of weights used must be no more than 1/3 of the MPE of the weighing instrument at the load
- iii. All weights used must be inspectors' class 3 standard or better
- iv. Reference weights used must meet the requirements of NITP 6.1-6.4

Satisfactory Incomplete Incorrect

d) When should the weighing instrument be tested? Choose the single correct answer.

- i. Provided it is a verified instrument, it is irrelevant when it was tested
- ii. Immediately before using the instrument to test the flowmetering system
- iii. Within the 24 hours prior to testing of the flowmetering system
- iv. Within the 7 days prior to testing of the flowmetering system

Correct Incorrect

e) How would you test the weighing instrument? Choose the single correct answer.

- i. Complete all tests in NITP 6.1-6.4 up to the capacity of the instrument
- ii. Apply weights to the instrument at loads equivalent to the weights of the empty receiving vessel and the loaded receiving vessel and determine the exact error at each point.
- iii. Testing not required provided weighing instrument has been verified by a competent verifier.
- iv. Complete sufficient tests to ensure the instrument will enable determination of the weight of the quantities of anhydrous ammonia delivered to an accuracy of at least 1/3 of the MPE for the volume to be delivered.

Correct

Incorrect

Verification form task

Download a 'Certificate of verification or notice of non-verification of a measuring instrument' form ([Form 6](#)) from the [verifying measuring instruments](#) page of the industry.gov.au website **for each task**.

DO NOT print the form out.

Complete **all required fields** into the **electronic** form using the information given below, including the appropriate instrument performance code.

Once you have completed the form, save it, named as described in the [instructions](#), and include with your submitted recognition kit.

For subclass 5.3

- Verification carried out at R&J Fertilizers, 28 Suburban Rd, Northam, 6401. ABN424256567878
- Verification carried out on the 24/5/21 by Richard Yates Verifier number VR-00857.
- Licensee is R&J Fertilisers Pty Ltd SL-0535, Licensee's Mark is RJF. Licensee's ABN is 466446645789
- Instrument Verified is an Endress & Hauser Model M-Point DQ 600 Bulk Liquified gas mass flowmetering system, approval number 10/2/8, serial number E654987, Q_{max} 300 kg/min, Q_{min} 30 kg/min, min quantity 30 kg.
- Verification was completed following replacement of the indicator.

Satisfactory Incomplete Incorrect

Workplace test reports

In your workplace, you need to develop your skills by testing instruments in accordance with the national instrument test procedures, ideally under the supervision of an experienced, competent verifier. When completing tests, record all your results, the details of the instruments tested, **and the reference test equipment used**, in test reports as used in your workplace. Show any calculations you use during the process. You must provide one (1) report **per test method** in advance of the observation.

Wherever possible, include a report for a non-compliant instrument, to demonstrate your knowledge of the requirements.

If you have access to an experienced verifier, ask them to sign the test report (and any printed documents) to indicate they have observed you test the instrument, in accordance with the relevant NITP , before scanning the report you submit.

Scan the test report and any printed documents and include them with your completed recognition kit, identified as described in the [instructions](#).

Once you have completed all your written assessments and test report/s, ask the relevant person/s to complete one or more of the following third party report forms before emailing your whole kit and additional documents to the NMI Administrator.

Third party report (experienced verifier)

Applicant:

Use this report **ONLY** if you hold the relevant statement of attainment for this skill set and the test method/s being assessed.

Persons providing a report must have directly supervised the applicant during training and completion of the simulated verification/s for which the applicant is providing test reports. If other verifiers have also supervised the applicant, ask each of them to complete an additional report.

You must complete all pages of this report; in particular, you must include written comments to support your responses in the checklist (other than where N/A). It is essential that you detail your observations of how the applicant ensured safety for self and others and how clearly and effectively the applicant communicated with clients/colleagues.

We thank you for your contribution. The applicant's assessor may need to contact you to clarify your responses, or to gain additional information.

Are you a verifier, or inspector of trade measurement? Yes No

Verifier/inspector number:

What subclass/es of instrument are indicated on the statement/s of attainment you hold (e.g. 5.3, 10.1)?

Have you verified instruments of these subclasses within the last 18 months? Yes No

State approximate numbers verified for subclass 5.3 (AA):

Describe briefly your level of experience in testing and verifying instruments of the subclasses for which the applicant is being assessed. For example, how long have you been working with these instruments and in what ways (repairs, installation, verification).

During the last 12 months, I have personally observed the applicant test the undermentioned instruments (including those detailed in the test report/s I have signed), without assistance, and in accordance with the National Instrument Test Procedures, paying close attention to detail and accuracy, while correctly selecting, using and handling the appropriate reference standards/test equipment:

	Yes	No	If yes, number of instruments tested
5.3 Anhydrous ammonia flowmetering systems – tested using a master meter			
5.3 Anhydrous ammonia flowmetering systems – tested using a mass flowmeter			
5.3 Anhydrous ammonia flowmetering systems – tested gravimetrically			

In addition, the applicant has demonstrated to me correctly, on at least one occasion (in a simulated environment), how a verification mark should be made and where it should be applied to instruments of this subclass.

Name of third party:

Date:

Telephone number of third party:

Third party report (experienced verifier)

Have you observed the applicant:	Yes	No	Not applicable or not able to comment
<ul style="list-style-type: none">liaise effectively with traders when organising site visits to ensure any assistance/equipment is provided, and to minimise impacts on traders, customers and employees – in accordance with company expectations? What interactions have you observed?			
<ul style="list-style-type: none">explain verification procedures and outcomes clearly and effectively to traders, including respectfully communicating any inadequacies in the way traders use instruments? When/where did you observe this?			
<ul style="list-style-type: none">correctly select, and ensure the suitability of, reference standards/test equipment for the specific task, as required by the relevant national instrument test procedures? How did they do this?			
<ul style="list-style-type: none">maintain the integrity of reference standards/test equipment during their storage, transport and use to ensure they are suitable for use? What did you observe?			
<ul style="list-style-type: none">identify, access and correctly interpret and apply certificates of approval and certificates of verification (Reg 13s)?			

Third party report (experienced verifier)

Have you observed the applicant:	Yes	No	Not applicable or not able to comment
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-
- identify, access and correctly interpret and apply relevant test procedures when testing instruments? **When did you observe this?**
-

-
- evaluate the impact of the **operating environment** on the performance of the **instrument/standards/test equipment** and make any adjustments to ensure there was no impact? **Provide an example of when and how they did this.**
-

-
- identify local hazards and apply appropriate safety precautions as relevant to the hazard/s, in accordance with local legislation and company procedures? Include in your comments:
 - how they ensure safety for self and others when testing instruments
 - examples of compliance with local induction requirements
 - how they establish access to first aid

Include an example of what you observed them do at a site.

Third party report (experienced verifier)

Have you observed the applicant:	Yes	No	Not applicable or not able to comment
<ul style="list-style-type: none">correctly apply calculations to determine the verification result, as required by the national instrument test procedures?			
<ul style="list-style-type: none">correctly identify and apply the correct maximum permissible errors for each individual test, as determined by national trade measurement legislation and the national instrument test procedures?			
<ul style="list-style-type: none">analyse test results to determine whether an instrument could be marked for trade use, in accordance with the national instrument test procedures?			
<ul style="list-style-type: none">record, report and maintain test results and findings clearly, accurately, securely and in accordance with company policy? Provide details of how they did this.			
<ul style="list-style-type: none">correctly assess for compliance any auxiliary printing and indicating devices (non-POS) attached to measuring instruments? Detail the device and the instrument it was attached to.			
<ul style="list-style-type: none">solve routine or unexpected problems and seek advice, when required? Provide at least one example.			

Detail the approximate date range during which you have observed the applicant as detailed above:

From:

To:

The applicant has demonstrated oral and written language skills and numeracy skills to a standard expected for this role in our organisation.

Yes

No

Name of third party:

Date:

Third party report (non-verifier)

(This form is only for use where the applicant has not been supervised/trained by an experienced verifier of instruments relating to this kit)

Applicant:

Use this form if you have worked with the applicant but do NOT hold statements of attainment for this skill set (and unit of competency, if applicable)/subclasses.

You must complete all pages of this report. In particular, you must include written comments to support your responses in the checklist, including details of how the applicant ensured safety for self and others and how clearly and effectively the applicant communicated with clients/colleagues. We thank you for your contribution. The applicant's assessor may need to contact you to clarify your responses, or to gain additional information.

Describe briefly your working relationship to the applicant and the types of work activities you have observed the applicant undertake:

Have you observed the applicant:	Yes	No	Not applicable or not able to comment
<ul style="list-style-type: none">liaise effectively with traders when organising site visits to ensure any assistance/equipment is provided, and to minimise impacts on traders, customers and employees – in accordance with company expectations? What interactions have you observed? Provide at least one example.			
<ul style="list-style-type: none">communicate clearly, effectively and respectfully with clients and colleagues? Give at least two examples.			

Third part report (non-verifier)

Have you observed the applicant:	Yes	No	Not applicable or not able to comment
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- identify local hazards and apply appropriate safety precautions as relevant to the hazard/s, in accordance with local legislation and company procedures? Include in your comments:
 - how they ensure safety for self and others when testing instruments
 - examples of compliance with local induction requirements
 - how they establish access to first aid

Include an example of what you observed them do at a site.

- record, report and maintain test results and findings clearly, accurately and securely and in accordance with company policy?
Provide details of how they did this.

- solve routine or unexpected problems and seek advice, when required? **Provide at least one example**

Detail the approximate date window during which you have observed the applicant as detailed above:

From:

To:

The applicant has demonstrated oral and written language skills and numeracy skills to a standard expected for this role in our organisation.

Yes

No

Name of third party:

Date:

Telephone number of third party:

Record of assessor's conversation with third party (if required)

The assessor will speak to any third party/s where they have not provided sufficient confirmation of the performance of the applicant they have observed. This form will be used to record the outcomes of any conversation between the assessor and a third party.

Name/s of third party/ies

Assessor's name:

Date:

Outcome of assessor's review of applicant's test reports/printed documents

Applicant:

As part of your assessment, your assessor will use this form to record the accuracy of your submitted workplace documents.

Assessor: Use the check boxes to record if the documents have been completed/evaluated satisfactorily.

Instrument subclass	Satisfactory	Unsatisfactory	Not applicable
5.3 Anhydrous ammonia flowmetering systems – tested using a master meter			
5.3 Anhydrous ammonia flowmetering systems – tested using a mass flowmeter			
5.3 Anhydrous ammonia flowmetering systems – tested gravimetrically			

Please provide comments to support your findings on the submitted documents.

Assessor's name:

Date:

Record of conversation with the applicant (to be completed by the assessor)

Applicant:

As part of your assessment, you will have a conversation with your assessor who may ask questions to clarify your knowledge in the following areas. Your assessor will use this checklist to record your responses.

Assessor: Use the check boxes to record the competency areas where you have asked questions. **You need not ask questions for all areas**, particularly where satisfactory evidence of competence has already been provided. You should include a list of questions asked, with expected answers and responses given, in a separate Word document. Note each correct answer provided or detail any incorrect response.

	Satisfactory	Unsatisfactory	Not asked/not required
• Preparation, planning and communication with trader			
• Using and maintaining reference standards and/or test equipment			
• Certificates of approval			
• Operating environment			
• Work, health and safety including use of SDS/SWMS			
• Maximum permissible errors			
• Test procedures			
• Test points			
• Analysis of test results			
• Marking instruments and verification documentation			
• Auxiliary devices			
• Reporting test results			
• Inappropriate use of instruments by trader			
• Servicing licence documentation and procedures including maintaining confidentiality and security of data			

Applicant's ID checked at interview:

Assessor's name:

Date:

Skills observation report to be completed by the assessor or an NMI-appointed skills observer (SO)

Name of applicant:

Skill set/unit of competency being assessed:

Subclass of instrument being observed:

Name of observer: SO Assessor

Contact number for skills observer:

Applicant's photo ID viewed by observer Type of ID viewed:

Test report attached

Time at observation site:

As part of your assessment, you will need to demonstrate completing a simulated initial verification of at least one instrument/measure in a real or simulated workplace environment. This is a requirement of the performance evidence you must demonstrate for this skill set/unit of competency. During the observation, you should complete a test report for each instrument/measure tested and provide a copy of this to the person completing the skills observation. See also the [Instructions for observation assessments](#).

Your assessor, or an NMI-appointed skills observer, will observe you. They will contact you to discuss arrangements for this part of your assessment.

During the observation, the assessor/observer will use this checklist to record your skills in verifying measuring instruments/measures in accordance with legal requirements. They will also be noting how you:

- interact with businesses and their employees before, during and after completing testing
- assess and manage safety during the task
- store, use and handle any reference standards or equipment used (where applicable)
- consider any real or potential environmental impacts on the instrument/measure under test (and the standards and equipment used in testing) and take any necessary steps to account for any impacts
- identify, access and interpret relevant documentation
- record, analyse and report the findings of testing
- communicate the results of testing and any other factors relevant to the usage of instruments/measures
- identify the location for, and simulate the application of, a verification mark

For subclasses 6.1-6.3 and some simple measures/measuring instruments, you may be invited to complete the observation in the trade measurement office in your local city.

For skills observations for other instrument/measure types, or where you do not live in a major city, we will ask you to arrange a site local to you, where a suitable instrument/measure is available. We will contact you with further instructions.

Skills observation report to be completed by the assessor or an NMI-appointed skills observer (SO)

Observer: Use the check boxes to record your conclusions regarding each of the specific items detailed in the following list, where applicable. You must record additional notes and comments that are relevant to, and support, your conclusions, under each item. Essentially, you should describe what you have observed that supports the finding you have checked (what the applicant did).

NOTE: Items 2, 3, 4, 5, 6 and 9 not applicable for subclasses 18.1 and 18.2.

(Use one form per instrument observed)

I have observed the applicant complete a simulated verification test on the following instrument/measure and simulate applying a verification mark: (Include details of instrument/measure tested, reference standards/equipment used and dates/locations):

Did the applicant:	Yes	No	Not applicable
1. liaise and communicate effectively with the trader prior to, during and after testing to ensure verification testing was carried out safely and with minimal disruption to the trader's business?			
2. select and validate the suitability of reference standards/equipment for the specific verification task?			

Name of assessor/SO:

Date:

**Skills observation report
to be completed by the assessor or an NMI-appointed skills observer (SO)**

Did the applicant: **Yes** **No** **Not applicable**

3. determine whether reference standards/equipment were suitable for use for the verification task/not defective?

4. maintain the integrity of reference standards/equipment during their transport, storage and use?

5. use the reference standards/equipment in the correct manner?

Name of assessor/SO:

Date:

**Skills observation report
to be completed by the assessor or an NMI-appointed skills observer (SO)**

Did the applicant: **Yes** **No** **Not applicable**

6. evaluate and (where required) adjust the impact of the operating environment on the performance of the standards/equipment?

7. evaluate and (where required) adjust the impact of the operating environment on the performance of the instrument/measure?

8. apply appropriate safety precautions and conduct testing safely?

Name of assessor/SO:

Date:

**Skills observation report
to be completed by the assessor or an NMI-appointed skills observer (SO)**

Did the applicant: **Yes** **No** **Not applicable**

9. identify, access, interpret and apply certificates of verification for reference standards/equipment?

10. identify, access, interpret and apply certificates of approval?

11. identify, access, interpret and apply relevant test procedures?

Name of assessor/SO:

Date:

**Skills observation report
to be completed by the assessor or an NMI-appointed skills observer (SO)**

Did the applicant: **Yes** **No** **Not applicable**

12. use specified calculations to determine the performance result?

13. apply appropriate maximum permissible errors?

14. analyse test results to determine whether the measure could be marked for trade use?

Name of assessor/SO:

Date:

**Skills observation report
to be completed by the assessor or an NMI-appointed skills observer (SO)**

Did the applicant: **Yes** **No** **Not applicable**

15. report results and findings clearly and accurately?

16. demonstrate how to apply the verification mark?

17. identify and communicate any inadequacies in trader's use of the instrument/measure?

Name of assessor/SO:

Date: