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National Measurement Institute

NITP 12.1

National Instrument Test Procedures for CNG Dispensers

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Contents

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PREFACE

The Chief Metrologist of the National Measurement Institute (NMI) has determined that NITP 12.1 contains the test procedures for the verification of CNG dispensers and control systems for liquid measuring systems.

While it is acknowledged that CNG is not a liquid, references to control systems for liquid measuring systems, including sub-class 18.1, have been included for reasons of convenience and practicality. The test procedures specified for control systems (consoles) used to control the operation of CNG dispensers are largely equivalent to those used to test control systems used in the delivery of liquid fuel dispensers.

Explanation of Terms

For explanations of other terms see *General Information for Test Procedures*. For other terms relating to CNG Dispensers, refer to NMI R 139 *Compressed Gaseous Fuel Measuring Systems for Vehicles*.

Console
A device which controls the authorisation of a delivery. A console may be a self-service device used as part of a self-service arrangement. Also known as a control system for liquid measuring systems.

Abbreviations

CNG	compressed natural gas
E_{FD}	relative error
E_{MIN}	minimum specified mass deviation
M_{FD}	mass indicated by the dispenser
M_{MFM}	mass indicated by the mass flowmeter
M_{min}	minimum measured quantity
M_{REF}	mass indicated by the reference standard measure
MF_{MFM}	mass flowmeter correction factor
MMQ	minimum measured quantity
MPE	maximum permissible error
P_E	pressure of the CNG test cylinder required prior to testing
P_V	maximum rated pressure of the CNG test cylinder
Q_{max}	maximum flowrate
Q_{min}	minimum flowrate
Q_{av}	average test flowrate
WPCG	Work Place Clearance Group

1. Scope

NITP 12.1 describes the test procedures for the verification and in-service inspection of compressed natural gas (CNG) dispensers, to assess whether they measure within the maximum permissible errors (MPEs) specified in their Certificate of Approval.

Certificates of Approval are based on *NMI R 139 Compressed Gaseous Fuel Measuring Systems for Vehicles*. Refer to NMI R 139 for all metrological and technical requirements.

Note: There are currently no MPEs specified in the *National Trade Measurement Regulations 2009* (Cth) for natural gas meters, dispensers or systems. The MPEs for CNG dispensers are specified in their Certificate of Approval. For convenience the MPEs for CNG Dispensers are replicated in clause 4.8 below and are identical to those specified in *NMI R 139*.

Two test methods are described to test accuracy:

- the **mass flow method** which uses a **mass flowmeter** as the traceable reference standard; and
- the **gravimetric method** which uses **weights in conjunction with a weighing instrument** (control instrument) as the traceable reference standard.

NITP 12.1 also describes the test procedures for the verification and in-service inspection of consoles.

All dispensers must comply with the *National Measurement Act 1960* (Cth) and the *National Trade Measurement Regulations 2009* (Cth).

2. Equipment

1. Certificate(s) of approval.
2. For the **mass flow method**, suitable standards as follows:
   (a) A mass flowmeter (±0.5% uncertainty) and 35,000 kPa reference standard pressure gauge (±350 kPa uncertainty) fitted to the inlet of the flowmeter.
   (b) A 35,000 kPa reference standard pressure gauge (±350 kPa uncertainty) suitable for measuring the pressure of the CNG test cylinders.
3. For the **gravimetric method**, equipment and suitable standards as follows:
   (a) A suitable weighing instrument (the control instrument) with a scale interval not greater than 20 g, such that the uncertainty in the measurement of the delivered quantity does not exceed one-third of the MPE of the dispenser under test.
   (b) Reference standard weights equivalent to the weight of the:
      i. Product for the intended mass delivery plus an additional 10% where the receiving vessel is tared; or
      ii. Receiving vessel plus the weight of the product for the intended mass delivery plus an additional 10% where the receiving vessel is not tared.
   (c) A 35,000 kPa reference standard pressure gauge (±350 kPa uncertainty) suitable for measuring the pressure of the CNG test cylinders.
4. An appropriate number of 60 litre compressed CNG test cylinders which incorporate suitable flow control valves. Alternative arrangements of cylinders with comparable volumes are also acceptable. When selecting test cylinders, consideration shall be given to the MPE of the dispenser under test, the minimum measured quantity and the potential effects of test volume on the uncertainty of the reference device and errors of indication of the dispenser under test.
5. Suitable valves, hoses and couplings required for filling and emptying the cylinders.
6. A timing device
7. Current Regulation 13 certificates for all standards of measurement and/or Regulation 37 certificates for all certified measuring instruments.

   Uncertainties and variations of reference standards shall comply with the *National Measurement Regulations 1999* (Cth).

The combined uncertainties and variations of reference standard weights shall not exceed one-third of the MPE of the control instrument.

The uncertainties for certified measuring instruments and control instruments shall not exceed one-third of the MPE of the dispenser under test.

Note: Pressure gauges can be traceable by either a NATA certificate or a Regulation 13 certificate.

8. Safety equipment (see clause 3.1).
9. Test report (see Appendix A).
10. Work Place Clearance Group (WPCG) work clearance forms.
11. Fuel withdrawal advice.

3. Visual Inspection

Visually inspect the measuring instrument in order to:

1. Gather the required data (see clause 3.1); and
2. Determine compliance with applicable characteristics (see clause 3.2).

Where required, record details on the test report (Appendix A).

3.1 Safety Guidance

Testing dispensers is potentially dangerous due to the high pressures, the highly flammable nature of the product dispensed and the movement of vehicles into and out of the service station. Persons and organisations should comply with any relevant workplace health and safety requirements and procedures relevant for CNG handling and dispensing.

3.2 Required Data

1. Test report reference number.
2. Date of test.
3. Type of test: verification or in-service inspection (for in-service inspection or re-verification, ensure that the verification mark is in place).
4. Verifier's name.
5. Name of owner/user.
6. Address of owner/user.
7. Name of contact person on premises.
8. Trading name.
9. Address of dispenser location.
10. Description of instrument.
11. Manufacturer.
12. Model.
13. Dispenser number(s).
14. Dispenser serial number.
15. Certificate(s) of Approval number.
16. Minimum and maximum flow rate.
17. Hose length.
18. The initial supply pressure of each supply bank.

3.3 Characteristics of the Instrument

Where applicable the dispenser and its use shall comply with the following clauses:

1. The dispenser shall comply with its Certificate(s) of Approval.
2. The dispenser shall be used in an appropriate manner.
3. All mandatory descriptive markings as required by the relevant Certificate of Approval shall be clearly and permanently marked on the data plate.
4. The data plate shall be fixed on the dispenser.
5. The dispenser shall be complete.
6. The dispenser shall be clean.
7. The dispenser shall be operational.
8. The operation of the dispenser shall be free of any apparent obstructions.
9. The dispenser shall be firmly fixed on its foundations.
10. All external panels shall be secure.
11. Cover windows shall be not be broken.
12. The operator (and where applicable, the customer) shall have a clear and unobstructed view of the indicating device.
13. The indications of mass, unit price and total price shall correctly correspond with the selected hose.
14. All indications shall be clearly visible under all conditions day and night.
15. All hoses shall be in a serviceable condition, e.g. they shall not be badly chafed, split, or worn through to the reinforcing material.
16. There shall be no leaks in any part of the dispenser.
17. For self-service systems, the dispenser number(s) shall correctly correspond with the console.

4. Test Procedures

The following series of test procedures determine if the performance of a dispenser meets requirements and whether the dispenser requires adjustment or service.

Each test procedure is explained as a discrete test. However tests can be combined to expedite the testing procedure. A suggested sequence for testing is shown in clause 5.

For each nozzle, record the readings on the mass totaliser at the start and end of testing to calculate the total mass of CNG used.

Remember to follow the safety requirements in clause 3.1.

Where required, record results on the test report (Appendix A).

4.1 Checking Facility for Electronic Indicating Devices

The checking facility for an electronic indicating device shall provide visual checking of the entire display, which shall meet the following description (NMI R 139, clause 5.3.4.3):

1. displaying all the elements (eights test);
2. blanking all the elements (blank test); and
3. displaying zeros.

This test can be carried out in conjunction with the test for zero setting (see clause 4.2).

1. Remove the nozzle from its hang-up position and check that the:
   (a) display test is performed; and
   (b) display segments are not faulty.

2. Determine whether the dispenser has passed or failed.
3. Record results on Test Report 1.

4.2 Zero Setting

The zero-setting devices of the price-indicating device and of the mass-indicating device shall be designed in such a way that zeroing either indicating device automatically involves zeroing the other (NMI R 139, clause 4.3.2).

The zero-setting device shall not permit any alteration of the measurement result shown by the price/mass-indicating device other than by making the result disappear and displaying zeros (NMI R 139, clause 4.3.1.1).

Once the zeroing operation has begun it shall be impossible for the price/mass-indicating device to show a result different from that of the measurement which has just been made, until the zeroing operation has been completed. The price/mass-indicating device shall not be capable of being reset to zero during measurement (NMI R 139, clause 4.3.1.2).

For electronic indicating devices, the price/mass indication after return to zero shall be zero without any ambiguity.

1. Remove the nozzle from its hang-up position and ensure that the display test is performed and the price and mass displays are on zero before any delivery of product is possible.
2. Carefully return the nozzle to its hang up position
3. Ensure that when the nozzle is then removed no further deliveries are possible without the segment test being initiated and the indications returning to zero.
4. Determine whether the dispenser has passed or failed.
5. Record results on Test Report 1.

4.3 Price Computing

The price indicated shall equal the price calculated from the mass and unit price indicated within the MPE of 0.5 of the scale interval of the total price display.

This test can be done at any time during a test delivery.

1. Reset the dispenser to zero.
2. Make a delivery of a convenient mass.
3. Calculate the total price from the unit price and mass indicated.
4. Compare this calculated price with all price displays.
5. Determine whether the dispenser has passed or failed.
6. Record results on Test Report 1.

4.4 Meter Creep

Measuring systems intended to deliver CNG shall either prevent or compensate for the registration of mass in the absence of actual flow (NMI R 139, clause 4.3.4).

This test may be combined with the zero setting test.

1. Remove the nozzle from its hang-up position and ensure that the price and mass displays are on zero.
2. Observe the mass and price indications for 1 minute, and ensure that there is no change in the indication.
3. Carefully return the nozzle to its hang up position.
4. Determine whether the dispenser has passed or failed.
5. Record results on Test Report 1.

4.5 Pre-set Indications

Measuring systems with a price-indicating device may also be fitted with a price/mass pre-setting device, which stops the flow of the CNG when the price/quantity corresponds to the pre-set value (NMI R 139, clause 4.7.8).

This test can be combined with the pre-set accuracy test.

1. Reset the dispenser to zero.
2. Enter a suitable pre-set value using the pre-set facility. Make sure the pre-set amount appears on the display.
3. Commence a delivery with the nozzle fully open allowing the pre-set facility to slow down and complete the delivery automatically.
4. Check that the price/mass indication on the display corresponds to the pre-set amount.
5. Determine whether the dispenser has passed or failed.
6. Record results on Test Report 1.

4.6 Pre-set Accuracy

A pre-set accuracy test is only conducted when it is necessary to check the accuracy of the pre-set delivery mass. This test may be combined with the maximum flowrate test (clause 4.9)

1. Enter and record a suitable pre-set value using the pre-set facility.
2. Make a delivery at maximum achievable flow rate until the delivery stops. Record the mass indicated by the CNG dispenser (M_{FD}) and the mass indicated by the reference standard (or control instrument) (M_{REF}).
3. Calculate and record the relative error (of indication) (E_{FD}).

$$E_{FD} = \frac{(M_{FD} - M_{REF})}{M_{REF}} \times 100\ \%$$

4. Determine if the result is within the MPE (see clause 4.8).
5. Record results on Test Report 1.

4.7 Maximum Flowrate

The maximum achievable flow rate shall be within the approved range (Q_{min} to Q_{max}) marked on the data plate.

In practice it is recognised that the test flowrate will vary over the course of the test as a result of the change in pressure in the supply banks and the receiving CNG test cylinders.

Similarly the maximum achievable flowrate will vary across sites and tests depending on the supply conditions, ambient conditions and the conditions of the CNG test cylinders. Nonetheless, testing in accordance with this NITP shall be performed in conditions such that the maximum achievable flowrate (at any point during the testing process) is within the approved flowrate range of the dispenser under test.

4.8 Maximum Permissible Errors

The maximum permissible errors applicable to CNG dispensers are dependent on the hose length of the dispenser under test. The MPEs for each case are specified in Table 1 below.

Table 1. MPEs for the accuracy test

	Dispenser with hose ≤ 5m	Dispenser with hose > 5 m
Verification	±1.5%	±2.0%
In-service inspection	±1.5%	±2.0%

The MPE which applies from the Table 1 will depend on the hose length of the dispenser under test. Consult the certificate of approval for the MPE(s) applicable to dispenser under test.

For quantities at or near the minimum measured quantity (M_{min}), the maximum permissible error is determined to be the greater of either:

1. The MPE value specified in Table 1; or
2. The minimum specified mass deviation (E_{min}) which is calculated using the following formula:

$$E_{min} = 3 \times M_{min}/100$$

where: M_{min} is the minimum measured quantity.

By way of example, for an M_{min} of 2 kg, then E_{min} = 60 g

4.9 Accuracy

In this section, two test methods are described to test accuracy:

1. The **mass flow method** which uses a **mass flowmeter** as the reference standard (see clause 4.9.2);
2. The **gravimetric method** which uses **weights in conjunction with a weighing instrument** as the reference standard (see clause 4.9.3).

Accuracy tests shall be performed at the ambient temperature of the test-site and within the rated operating conditions of the dispenser under test.

4.9.1 Accuracy tests for both methods

Accuracy testing shall consist of the following tests:

1. **Test 1 – Maximum achievable flowrate test**

   This test requires the receiving CNG test cylinder(s) to be filled at the maximum achievable flowrate from P_E to 60% (±15%) of P_V. This test is to be performed three times.

2. **Test 2 – Minimum flowrate test**

   This test requires the receiving CNG test cylinder(s) to be filled at the minimum approved flowrate from 60% (±15%) of P_V to P_V. Note that quantities delivered for this test may be at or near the M_{MIN}. This test is to be performed three times

3. **Test 3 –Bank switching test**

   This test is intended to ensure that the accuracy of the dispenser under test is not significantly affected by large and rapid changes in supply pressure. The following conditions apply:

   (a) Where a dispenser is installed with a single supply bank arrangement, this test may be disregarded.

(b) Where a dispenser incorporates a compensated filling mode, this test can be combined with Test 1. For the purposes of this test, a compensated filling mode is considered to be any automated operation that starts and stops the flow of CNG in order to allow for the measurement of temperature and/or pressure at the inlet of the receiving vessel. The results of such measurements are then used to control the subsequent delivery of product. In this case, if the dispenser passes Test 1, it is considered to pass Test 3 as well.

(c) Where a dispenser is installed with a multiple supply bank arrangement and the dispenser does not incorporate a compensated filling mode, this test shall be performed at initial verification as follows:

i. The test requires the receiving CNG test cylinder to be filled at the maximum achievable flowrate from P_E to P_V. This test is to be performed once and may replace one of the test deliveries required under Test 1 above.

ii. This test shall commence with the CNG supply from the low pressure bank. Test conditions shall ensure that the CNG supply switches to a higher pressure bank least once during the test.

Following initial verification, if the site conditions are changed such that it is not practical to perform Test 3 (for the purposes of subsequent verifications), the test may be disregarded.

P_E is defined as a pressure equal to or less than 1500 kPa.

4.9.2 Mass Flowmeter Method

For each of the accuracy tests described in clause 4.9.1 the following test procedure shall be followed.

1. Ensure the receiving CNG test cylinders are preconditioned for the specific test as specified in clause 4.9.1.
2. Connect the mass flowmeter outlet hose to the inlet of a CNG cylinder.
3. Connect the dispenser nozzle to the inlet of the mass flowmeter.
4. Condition the mass flowmeter. This may be achieved by passing a quantity of CNG through the mass flowmeter.
5. Reset the mass flowmeter and dispenser to zero.
6. Authorise the dispenser, open the dispenser nozzle and then control the delivery by slowly opening the flow control valve on the mass flowmeter to allow testing at maximum achievable flowrate.
7. Record the CNG supply pressure and the pressure of the CNG test cylinder.
8. Make a delivery at the flowrate and pressure for the relevant test specified in clause 4.9.1 above.
9. Time the filling process and determine the average flowrate.
10. Complete the delivery and record the mass indication (M_{FD}) on the dispenser and the mass indicated by the mass flowmeter (M_{MFM}).
11. Record the pressure of the receiving CNG test cylinder and the gas supply pressure.
12. Use the mass flowmeter correction factor (MF_{MFM}) to calculate the reference mass (M_{REF}). $M_{REF} = M_{MFM} \times MF_{MFM}$
13. Calculate the relative error (E_{FD})

$$E_{FD} = \frac{(M_{FD} - M_{REF})}{M_{REF}} \times 100\ \%$$

Note: A positive error means that the flowmetering system is over-indicating and under-delivering.

14. Repeat steps 2 to 13 for each test specified in 4.9.1.
15. Determine if all the results in step 13 are within the MPE (see clause 4.8).
16. If meter adjustments are made repeat steps 1 to 15 for all test specified in 4.9.1.
17. Record results on Test Report 1.

4.9.3 Weighing Method

For each of the accuracy tests described in clause 4.9.1 the following test procedure shall be followed.

1. Ensure the receiving CNG test cylinders are the pressure specified in clause 4.9.1.
2. Set up the weighing instrument on a flat surface in a position which will not be affected by wind. Level the instrument, switch on, and allow for any warm-up time.
3. Test the control instrument for compliance with *NITP 6.1 to 6.4 National Instrument Test Procedures for Non-automatic Weighing Instruments*, for the following tests:

    a. weighing performance;

    b. eccentricity; and

    c. repeatability.

    The weighing instrument shall not have an error greater than ±10 g. The weighing instrument should be tested immediately before commencing any testing. It is not necessary to test the weighing instrument to its maximum capacity. It is sufficient to test the weighing instrument up to 110% of the maximum delivered quantity of CNG.

    Note: If testing is performed without the cylinders tared off, the weighing instrument shall be tested up to 110% of the weight of the cylinders plus the maximum delivered quantity of CNG.
4. Zero the weighing instrument and place the CNG test cylinder on the weighing platform. Either record the mass of the CNG test cylinder or tare off the mass of the CNG test cylinder.
5. Remove the CNG test cylinder from the weighing instrument and place it in the vicinity of the dispenser.
6. Zero the dispenser.
7. Connect the nozzle of the dispenser to the inlet of a CNG test cylinder.
8. Record the gas supply pressure and the pressure of the CNG test cylinder.
9. Authorise the dispenser, open the CNG test cylinder valve, then open the dispenser nozzle and make a delivery at the required flowrate until the pressure in the CNG test cylinder reaches the required pressure. Required flowrates and pressures for each test are specified in clause 4.9.1 above.
10. Time the filling process and determine the average flowrate.
11. Close the CNG test cylinder valve and the nozzle and return the nozzle to the dispenser.
12. Record the mass indication (M_{FD}) on the dispenser.
13. Record the pressure of the receiving CNG test cylinder and the gas supply pressure.
14. Place the CNG test cylinder on the weighing instrument, determine and record the reference mass (M_{REF}).

    Note: Subtract the tare mass of the cylinder if the cylinder has not been tared off to obtain the reference mass (M_{REF}). Apply any corrections.
15. Calculate the relative error (E_{FD})

$$E_{FD} = \frac{(M_{FD} - M_{REF})}{M_{REF}} \times 100\ \%$$

    Note: A positive error means that the flowmetering system is over-indicating and under-delivering.
16. Repeat steps 3 to 15 for each test specified in 4.9.1.
17. Determine if all the results in step 15 are within the allowable MPE (see clause 4.8).
18. If meter adjustments are made repeat steps 1 to 17 for all tests specified in 4.9.1
19. Record results on Test Report 1.

5. Suggested sequence for testing

1. Consult the relevant materials safety data sheets.
2. Raise a WPCG work clearance permit and a fuel withdrawal advice form.
3. Check the Certificate(s) of Approval for any additional tests required. Make provision for including these tests in the testing sequence.
4. Visually inspect the dispenser and record the required data and characteristics of the dispenser on the test report.
5. Conduct the three accuracy tests as described in clause 4.9.
6. Whilst conducting the accuracy test check:
   (a) Meter creep (clause 4.4);
   (b) the checking facility for electronic indicating devices (clause 4.1);
   (c) zero setting (clause 4.2); and
   (d) price computing (clause 4.3).
7. Conduct a pre-set indication test if required (clause 4. 5).
8. Determine whether the instrument has passed or failed.
9. Carry out anything else you need to do to complete the procedure. See *General Information for Test Procedures* for more information. This may include:
   (a) obliterating the verification mark from the dispenser;
   (b) applying a verification mark to the dispenser; and
   (c) applying seal(s) as specified in the Certificate of Approval.
10. If required, check the console (clause 6).
11. Complete the WPCG work clearance forms and the fuel withdrawal advice.

6. Test Procedure for the Verification and In-service Inspection of a Console

Verification and in-service inspection of a console are carried out to ensure that a dispenser is communicating correctly with its console. They are carried out:

(a) at initial installation;

(b) when repairs are carried out that affect the approved functions;

(c) at the request of the owner, user or NMI.

Check the Certificate of Approval for any additional tests required. Make provision for including these tests in the testing sequence.

1. Ensure that the dispenser is communicating with the console.
2. Authorise the dispenser at the console.
3. Remove the nozzle from its hang-up position and deliver sufficient product to cause the price and mass indicators to move significantly off zero.
4. Return the nozzle to its hang-up position.
5. Record the dispenser number/nozzle identification and the price/mass displayed on the dispenser.
6. At the console check that the dispenser number/nozzle identification and the price/mass displayed is the same as recorded from the dispenser.
7. If the console supports stored transaction sales:
   (a) store the current transaction;
   (b) repeat steps 2 to 5; and
   (c) check that the stored transaction and the second transaction can be displayed on the console and correspond with the delivery details recorded from the dispenser.
8. Record results on Test Report 2.

APPENDIX A. TEST REPORTS

Appendix A contains two test reports:

1. Test Report 1 has a front page which must be accompanied by **one** of the following:
   (a) Test Report 1-1 is for dispensers which are tested using a **mass flowmeter**; or
   (b) Test Report 1-2 is for dispensers which are tested using **weights and a weighing instrument.**
2. Test Report 2 is for consoles.

Although the format of the test reports may vary according to the individual needs and requirements of NMI and servicing licensees, the following test reports contains the minimum amount of information that must be recorded.

If the Certificate of Approval requires additional tests, attach pages that record the results of these tests.

Number each page of the test report in the style shown at the top of each page.

Test Report 1 for CNG Dispensers

Test report reference number ..... Date of test .....

Type of test (tick one) ☐ Verification ☐ In-service inspection

For in-service inspection or re-verification, record the verification mark: .....

Name of owner/user .....

Address of owner/user .....

Name of contact person on premises .....

Trading Name .....

Address of instrument location .....

Description of dispenser .....

Manufacturer ..... Model .....

Dispenser number(s) .....

Dispenser serial number ..... Certificate(s) of Approval number .....

Hose length .....

Minimum flowrate .....Maximum flowrate .....

Details of the Reference Standards of Measurement (clause 2)

Reference standards (e.g. mass flowmeter)	
Make	
Model	
Serial number(s)	
Flowrate range/weight	
Regulation 13/37 certificate number	
Certificate expiry date	

Test Report 1 for CNG Dispensers

Optional

Additional standards (e.g. pressure gauges)	
Make	
Model	
Serial number(s)	
Operational range	
Calibration certificate number	
Certificate expiry date	

Test Report 1 for CNG Dispensers

General Characteristics (clause 3.3)	Yes, no or N/A
Does the dispenser comply with its Certificate(s) of Approval?	
Is the dispenser being used in an appropriate manner?	
Are all mandatory descriptive markings clearly and permanently marked on the data plate?	
Is the data plate fixed on the dispenser?	
Is the dispenser complete?	
Is the dispenser clean?	
Is the dispenser operational?	
Is the operation of the dispenser free of any apparent obstructions?	
Is the dispenser firmly fixed on its foundations?	
Are all external panels secure?	
Are the cover windows broken?	
Does the operator (and where applicable, the customer) have a clear and unobstructed view of the indicating device and the entire measuring process?	
Do the indications of mass, unit price and total price correctly correspond with the selected hose?	
Are all indications clearly visible under all conditions day and night?	
Are all hoses in a serviceable condition, e.g. not badly chafed, split, or worn through to the fabric?	
Are there any leaks?	
For self-service systems, do the dispenser number(s) correctly correspond with the console?	
Checking facility for electronic indicating devices (clause 4.1)	☐ Pass ☐ Fail
Zero setting (clause 4.2)	☐ Pass ☐ Fail
Price computing (clause 4.3)	☐ Pass ☐ Fail
Meter creep (clause 4.4)	☐ Pass ☐ Fail
Pre-set indications (clause 4.5)	☐ Pass ☐ Fail

Test Report 1-1 for for dispensers which are tested using a mass flowmeter

Test (see clause 4.9.1)	Test 1: Maximum achievable flowrate							
	Delivery 1		Delivery 2		Delivery 3		Notes	
Gas supply pressure (initial)	kPa		kPa		kPa			
Test cylinder pressure (initial)	kPa		kPa		kPa			
Mass indication on dispenser, M_{FD}	kg		kg		kg			
Mass indicated on mass flowmeter, M_{MFM}	kg		kg		kg			
Time of delivery	s		s		s			
Average flowrate, Q_{av}	kg/min		kg/min		kg/min			
Gas supply pressure (final)	kPa		kPa		kPa			
Test cylinder pressure (final)	kPa		kPa		kPa			
Mass flowmeter factor, MF_{MFM}								
Reference mass, M_{REF}	kg		kg		kg			
Relative error, E_{FD}	%		%		%			
MPE	%		%		%			
Delivery result	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐		
Test result	Pass ☐	Fail ☐						

Inspector's/Licensee name .....Identification number .....

Signature .....

Comments .....

Test (see clause 4.9.1)	Test 2: Minimum flowrate		
	Delivery 1		Notes
Gas supply pressure (initial)	kPa		
Test cylinder pressure (initial)	kPa		
Mass indication on dispenser, M_{FD}	kg		
Mass indicated on mass flowmeter, M_{MFM}	kg		
Time of delivery	s		
Average flowrate, Q_{av}	kg/min		
Gas supply pressure (final)	kPa		
Test cylinder pressure (final)	kPa		
Mass flowmeter factor, MF_{MFM}			
Reference mass, M_{REF}	kg		
Relative error, E_{FD}	%		
MPE	%		
Delivery result	Pass ☐	Fail ☐	
Test result	Pass ☐	Fail ☐	

Inspector's/Licensee name .....Identification number .....

Signature .....

Comments .....

Test (see clause 4.9.1)	Test 3: Bank switching		
	Delivery 1		Notes
Gas supply pressure (initial)	kPa		
Test cylinder pressure (initial)	kPa		
Mass indication on dispenser, M_{FD}	kg		
Mass indicated on mass flowmeter, M_{MFM}	kg		
Time of delivery	s		
Average flowrate, Q_{av}	kg/min		
Gas supply pressure (final)	kPa		
Test cylinder pressure (final)	kPa		
Mass flowmeter factor, MF_{MFM}			
Reference mass, M_{REF}	kg		
Relative error, E_{FD}	%		
MPE	%		
Delivery result	Pass ☐	Fail ☐	
Test result	Pass ☐	Fail ☐	

Inspector's/Licensee name .....Identification number .....

Signature .....

Comments .....

Test Report 1-2 for for dispensers which are tested using weights and a weighing instrument

It is recommended that the test report found in NITP 6.1 to 6.4 is used to record the test results of the control instrument.

Test (see clause 4.9.1)	Test 1: Maximum achievable flowrate / Test 2: Minimum flowrate / Test 3: Bank switching (delete not applicable)						
	Delivery 1		Delivery 2		Delivery 3		Notes
Gas supply pressure	kPa		kPa		kPa		
Test cylinder pressure	kPa		kPa		kPa		
Time of delivery	s		s		s		
Average flowrate, Q_{av}	kg/min		kg/min		kg/min		
Mass indication on dispenser, M_{FD}	kg		kg		kg		
Reference mass M_{REF}	kg		kg		kg		
Gas supply pressure	kPa		kPa		kPa		
Test cylinder pressure	kPa		kPa		kPa		
Relative error, E_{FD}	%		%		%		
MPE	%		%		%		
Delivery result	Pass ☐	Fail ☐	Pass ☐	Fail ☐	Pass ☐	Fail ☐	
Test result	Pass ☐	Fail ☐					

Inspector's/certifier's name .....Identification number .....

Signature .....

Comments .....

Test Report 2 for the Verification or In-service Inspection of Consoles (clause 6)

Does the dispenser communicate with the console?		☐ **Yes** ☐ **No**		☐ **Yes** ☐ **No**		☐ **Yes** ☐ **No**	
		Dispenser	Console	Dispenser	Console	Dispenser	Console
First transaction	Dispenser number and nozzle identification						
	Price displayed						
	Mass displayed						
Second transaction (if console supports stored transactions)	Dispenser number and nozzle identification						
	Price displayed						
	Mass displayed						
Is the first transaction stored and displayed correctly		☐ **Yes** ☐ **No**		☐ **Yes** ☐ **No**		☐ **Yes** ☐ **No**	
Overall result		☐ **Pass** ☐ **Fail** ☐ **na**					