NITP 5.1
National Instrument Test Procedures for Fuel Dispensers other than LPG Dispensers

With associated National Instrument Test Procedures for Control Systems for Liquid Measuring Systems under servicing licence sub-class 18.1
AMENDMENTS

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Date</th>
<th>Page/s</th>
<th>Location</th>
<th>Details of change</th>
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<tr>
<td>1</td>
<td>February 2015</td>
<td>-</td>
<td>Front page</td>
<td>Included reference to Servicing Licence Class 18.1 on front page.</td>
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<tr>
<td>2</td>
<td>February 2015</td>
<td>-</td>
<td>Multiple</td>
<td>Various editorial amendments made throughout the document.</td>
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<td>3</td>
<td>January 2014</td>
<td>-</td>
<td>Multiple</td>
<td>Removed all references to “certify” and “certification”.</td>
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<tr>
<td>4</td>
<td>January 2014</td>
<td>-</td>
<td>Multiple</td>
<td>Corrected references to the “trade measurement authority” as appropriate.</td>
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<td>January 2014</td>
<td>-</td>
<td>Multiple</td>
<td>Corrected references from Australian Institute of Petroleum to the Work Place Clearance Group.</td>
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<tr>
<td>6</td>
<td>February 2015</td>
<td>iv</td>
<td>Explanation of Terms</td>
<td>Removed terminology now found in General Information for Test Procedures.</td>
</tr>
<tr>
<td>7</td>
<td>February 2015</td>
<td>iv</td>
<td>Explanation of Terms</td>
<td>Included definition of “console” in order to align licence sub-classes and pattern approval certificates.</td>
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<tr>
<td>8</td>
<td>February 2015</td>
<td>1</td>
<td>Clause 1</td>
<td>Reworded Scope to reference current Regulations and documents.</td>
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<tr>
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<td>January 2014</td>
<td>1</td>
<td>Clauses 1 &amp; 2</td>
<td>Corrected references to current legislation.</td>
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<td>Clause 2</td>
<td>Included reference to maximum permissible variations. Provided additional clarifications.</td>
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<td>Table 1</td>
<td>Corrected uncertainties and provided clarification on use of standards in Table 1.</td>
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<td>3</td>
<td>Clause 3.3 Included additional inspection items and reworded as statements of compliance rather than questions.</td>
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<td>Clause 4.5.2 Reworded test procedure.</td>
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<td>Clause 4.7 Included option of determining maximum flowrate as part of conditioning the reference standard.</td>
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<td>8</td>
<td>Clause 4.7.1 Reworded such that test procedure is now applicable for all dispensers.</td>
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<td>8</td>
<td>Clause 4.8 Corrected terminology used in test procedure.</td>
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<td>8</td>
<td>Table 3 Corrected MPEs for in-service inspection.</td>
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<td>9</td>
<td>Clause 4.9 Clarification added to text of test procedure.</td>
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<td>19</td>
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<td>10</td>
<td>Clause 4.11 Included MPEs for larger dispensers.</td>
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<td>20</td>
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<td>10</td>
<td>4.11.1 and 4.11.2 Amended test procedure to allow use of suitable volume measure.</td>
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PREFACE
The Chief Metrologist of the National Measurement Institute (NMI) has determined that NITP 5.1 contains the test procedures for the verification of inspection of fuel dispensers other than LPG dispensers and control systems for liquid measuring systems.
CONTENTS

Amendments ...............................................................................................................................ii
Preface ......................................................................................................................................... iv
Explanation of Terms .................................................................................................................... vi
Abbreviations .............................................................................................................................. vi

1. Scope ....................................................................................................................................... 1

2. Equipment ................................................................................................................................. 1

3. Visual Inspection ........................................................................................................................ 2
   3.1 Safety Requirements ............................................................................................................ 2
   3.2 Required Data ..................................................................................................................... 3
   3.3 Characteristics of the Instrument ....................................................................................... 3

4. Test Procedures .......................................................................................................................... 4
   4.1 Checking Facility for Electronic Indicating Devices ............................................................ 4
   4.2 Zero Setting ......................................................................................................................... 5
   4.3 Price Computing ................................................................................................................ 6
   4.4 Nozzle Cut-off .................................................................................................................... 6
   4.5 Interlock ............................................................................................................................ 6
   4.6 Pre-set Indications ............................................................................................................. 7
   4.7 Maximum Flow Rate ......................................................................................................... 7
   4.8 Accuracy ............................................................................................................................ 8
   4.9 Accuracy of Pre-set ........................................................................................................... 8
   4.10 Gas Elimination ............................................................................................................... 9
   4.11 Anti-drain/Hose-dilation ................................................................................................. 10

5. Suggested Sequence for Testing .............................................................................................. 11

6. Test Procedure for the Verification and In-Service Inspection of a Console ......................... 12

APPENDIX A. Test Reports ........................................................................................................... 13
EXPLANATION OF TERMS

For explanations of other terms see General Information for Test Procedures. For other terms relating to fuel dispensers (other than LPG dispensers), refer to NMI R 117 Measuring Systems for Liquids Other than Water.

Console

A device that controls the authorisation of a delivery. A console may be a self-service device used as part of a self-service arrangement. This is also known as a control system for liquid measuring systems.

ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>$E_{AV}$</td>
<td>average error</td>
</tr>
<tr>
<td>$E_{D}$</td>
<td>error difference</td>
</tr>
<tr>
<td>$E_{FD}$</td>
<td>relative error</td>
</tr>
<tr>
<td>$E_{min}$</td>
<td>minimum specified volume deviation</td>
</tr>
<tr>
<td>LPG</td>
<td>liquefied petroleum gas</td>
</tr>
<tr>
<td>MPD</td>
<td>maximum permissible difference</td>
</tr>
<tr>
<td>MPE</td>
<td>maximum permissible error</td>
</tr>
<tr>
<td>MSPD</td>
<td>minimum specified price deviation</td>
</tr>
<tr>
<td>$Q_{max}$</td>
<td>maximum flow rate</td>
</tr>
<tr>
<td>$Q_{min}$</td>
<td>minimum flow rate</td>
</tr>
<tr>
<td>$V_{FD}$</td>
<td>volume indicated by the fuel dispenser</td>
</tr>
<tr>
<td>$V_{min}$</td>
<td>minimum measured quantity</td>
</tr>
<tr>
<td>$V_{REF}$</td>
<td>volume indicated by the reference standard measure</td>
</tr>
<tr>
<td>WPCG</td>
<td>Work Place Clearance Group</td>
</tr>
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</table>
1. **SCOPE**

NITP 5.1 describes the test procedures for the verification and in-service inspection of fuel dispensers (other than LPG dispensers) to assess whether they measure to within the maximum permissible errors (MPEs) specified in the *National Trade Measurement Regulations 2009* (Cth) and that they comply with the Certificate of Approval. Examples of products dispensed are petrol, diesel and kerosene. The test procedures for LPG dispensers are described in NITP 10.1.

Certificates of Approval are based on NMI R 117 *Measuring Systems for Liquids Other than Water*. Refer to NMI R 117 for all metrological and technical requirements.

All fuel dispensers must also comply with the *National Measurement Act 1960* (Cth), the *National Measurement Regulations 1999* (Cth) and the *National Trade Measurement Regulations 2009* (Cth).

NITP 5.1 also describes the test procedures for the verification and in-service inspection of consoles.

2. **EQUIPMENT**

1. Certificate(s) of Approval.

2. Appropriate reference standards of measurement as follows (also see Table 1 for a description of the measuring equipment):
   
   (a) A volume measure of at least 10 L capacity suitable for deliveries at maximum flow rate specified for the dispenser. The measure should be suitable for deliveries greater than three times the minimum measured quantity \(V_{\text{min}}\) specified for the dispenser. For dispensers greater than 60 L/min use a measure with a volume equivalent to at least 1 min delivery for both maximum and minimum approved flow rates.

   (b) A small capacity measure verified at relevant intervals for tests where small measures are required.

   The first fill into a dry standard volume measure may produce erroneous results if the internal walls of the measure are not wet with the liquid to be measured. Hence, it is essential that all standard volume measures be conditioned (wetted and drained) before being used. This procedure is only needed on the initial test run, and is not required on subsequent deliveries as long as the measure remains conditioned.

   Record details of the reference standards used on Test Report 1.


   All reference standards of volume shall comply with the uncertainties and variations permitted in the *National Measurement Regulations 1999* (Cth). With the exception of 10 litre (L) inspectors’ Class 1 volume standards, the combined uncertainties and variations of the reference standard shall not exceed one-third of the MPE of the dispenser being tested. Consult the NMI for more information.

4. Safety equipment (see clause 3.1).

5. Test report (see Appendix A).

6. Relevant material safety data sheets.

7. Work Place Clearance Group (WPCG) work clearance forms.

Table 1. Measuring equipment

<table>
<thead>
<tr>
<th>Description (Inspectors' Class 1)</th>
<th>Capacity/nominal range</th>
<th>Max scale interval</th>
<th>Uncertainty</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple conical measure (stainless steel or galvanised steel)</td>
<td>10 L</td>
<td>n/a</td>
<td>±2 mL</td>
<td>Can also be cylindrical/conical in construction</td>
</tr>
<tr>
<td></td>
<td>15 L</td>
<td>n/a</td>
<td>±3 mL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 L</td>
<td>n/a</td>
<td>±4 mL</td>
<td></td>
</tr>
<tr>
<td>Cylindrical/conical with sight glass and scale (stainless steel or galvanised steel)</td>
<td>15 L ± 100 mL scale range</td>
<td>10 mL</td>
<td>±3 mL</td>
<td>The range of the graduated scale should be not less than ±75 mL or greater than ±150 mL</td>
</tr>
<tr>
<td></td>
<td>200 L ± 1 L scale range</td>
<td>50 mL</td>
<td>±30 mL</td>
<td>Scale spacing should be a minimum of 3 mm</td>
</tr>
<tr>
<td>Cylindrical or cylindrical/conical with sight glass and scale (stainless steel or galvanised steel)</td>
<td></td>
<td></td>
<td></td>
<td>The range of the graduated scale should be not less than ±1L or greater than ±2 L</td>
</tr>
<tr>
<td>Measuring vessel (glass or other clear material suitable for use with petroleum fuels)</td>
<td>10 mL to 100 mL</td>
<td>See note</td>
<td>±0.02 mL to ±0.11 mL</td>
<td>A measuring vessel with a maximum graduation of not less than 20 mL and verified at relevant intervals for the relevant test</td>
</tr>
</tbody>
</table>

3. **VISUAL INSPECTION**

Visually inspect the fuel dispenser.

Gather the required data (see clause 3.2).

Determine compliance with applicable characteristics (see clause 3.3.).

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

Always follow the safety requirements in clause 3.1.

### 3.1 Safety Requirements

Testing fuel dispensers is potentially dangerous due to the highly flammable nature of the products dispensed and the movement of vehicles into and out of the service station. To reduce risk:

1. Consult the relevant material safety data sheets.
2. Follow the WPCG work clearance procedure and complete associated work clearance forms.
3. At all times minimise exposure to petroleum products, e.g. use a trolley measure rather than a conical one, do not lean over measures, move away from the fuel dispenser whenever possible, work up-wind to reduce inhalation, wear gloves and wash hands after testing, and wear a mask when there is a high risk of exposure.
4. Wear protective anti-static clothing, e.g. 100% cotton: long pants, a long-sleeved shirt, safety shoes and a safety vest.
5. Use a torch approved for use in hazardous areas.
6. Ensure that a suitable fire extinguisher is available and within easy reach at all times.
7. When checking for fuel leaks:
   (a) keep your hands clear of moving parts; and
   (b) stop testing immediately if there is any sign of a leak.
8. Ensure that there are no potential ignition sources (e.g. lit cigarettes and battery-operated equipment) within the hazardous zones (such as the tank fill points, fuel dispensers and tank vents) of the service station.
9. Place a suitable sign such as ‘pump being tested’ in a position so that it is clearly visible to the public.
10. Position safety cones or bollards to prevent vehicle access into the filling position of the dispenser being tested. Ensure that the safety cones are visible to all pedestrian and vehicular traffic.
11. Use a static lead to dissipate any potential static electricity, e.g. between the standard volume measure and the underground supply tank.

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 ensure that the verification mark is in place).
4. Name of owner/user.
5. Address of owner/user.
6. Name of contact on premises.
7. Trading name.
8. Address where the dispenser is located.
9. Manufacturer.
10. Model.
11. Dispenser number(s).
12. Dispenser serial number.
13. Certificate(s) of Approval number.
14. The fuel product(s) that the dispenser is approved to deliver.
15. For each nozzle, record the unit price and the readings on the volume totaliser to calculate the total volume of fuel used.
16. Minimum and maximum flow rate.

3.3 Characteristics of the Instrument
Where applicable the fuel dispenser and its use shall comply with the following clauses:
1. The fuel dispenser shall comply with its Certificate(s) of Approval.
2. The fuel 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. Where applicable, the data plate shall be fixed on the fuel dispenser.
5. The fuel dispenser shall be complete.
6. The fuel dispenser shall be clean.
7. The fuel dispenser shall be operational.
8. The operation of the fuel dispenser shall be free of any apparent obstructions.
9. The operator (and where applicable, the customer) shall have a clear and unobstructed view of the indicating device.
10. The external panels shall be secure.
11. The fuel dispenser shall be securely fixed on its foundations.
12. The cover windows shall not be broken.
13. If applicable, the sight glass shall contain a spinner or plastic ball and be full of product.
14. The indications of volume, unit price and total price shall correctly correspond to the selected hose.
15. All indications shall be clearly visible under all conditions, day and night.
16. Hoses shall be in reasonable condition, i.e. they are not badly chafed, split or worn through to the fabric.
17. Each nozzle shall terminate delivery when returned to its holster.
18. There shall be no leaks in any part of the fuel dispenser.
19. For self-service systems, the fuel dispenser number(s) shall correspond with the console.
20. For continuous indicators, the price-posting wheels shall line-up with, and follow, the internal price-setting range lever.

4. TEST PROCEDURES

The following series of test procedures determine if the performance of a fuel dispenser meets requirements and whether the fuel 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 provided in clause 5.

Remember to follow the safety requirements in clause 3.1.

Unless specified otherwise in the Certificate of Approval, all dispensers with a maximum approved flow rate not greater than 60 L/min shall have a $V_{\text{min}}$ of 2 L. Dispensers with a maximum approved flowrate greater than 60 L/min where the $V_{\text{min}}$ is not stated in the Certificate of Approval shall have a $V_{\text{min}}$ of 5 L.

The minimum specified volume deviation, $E_{\text{min}}$, is given by the formula:

$$E_{\text{min}} = 2 \times V_{\text{min}} \times \left(\frac{A}{100}\right)$$

where $A$ has the value of 0.5

Where required, record results on Test Report 1 (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 117, clause 4.3.4.2):

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 using an electronic reset mechanism (see clause 4.2.2).

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 volume-indicating device shall be designed in such a way that zeroing either indicating device automatically involves zeroing the other (NMI R 117, clause 3.3.5).

The zero-setting device shall not permit any alteration of the measurement result shown by the price/volume-indicating device other than by making the result disappear and displaying zeros (NMI R 117, clause 3.2.4.2).

Once the zeroing operation has begun it shall be impossible for the price/volume-indicating device to show a result different from that of the measurement that has just been made, until the zeroing operation has been completed. The price/volume-indicating device shall not be capable of being reset to zero during measurement (NMI R 117, clause 3.2.4.3).

Determine whether zero setting is mechanical or electronic and conduct the appropriate test as documented below.

4.2.1 Mechanical Reset Mechanism

For mechanical indicating devices, the residual volume indication after return to zero shall not be more than half the minimum specified volume deviation (i.e. \(0.5 E_{\text{min}}\)), e.g. 10 mL for dispensers with a \(V_{\text{min}}\) of 2 L (NMI R 117, clause 3.2.4.4).

Likewise, the residual price indication after return to zero shall not be more than half the minimum specified price deviation (i.e. \(0.5 \text{ MSPD}\)) where \(\text{MSPD} = E_{\text{min}} \times \text{unit price}\) (NMI R 117, clause 3.3.8).

1. Remove the delivery nozzle from its hang-up position.

2. If a previous sale remains on the indicator move the starting lever to the ON position and ensure that the pump motor does not start or the dispenser is not activated. If the pump motor does start or the dispenser is activated then the interlock mechanism is faulty.

3. Reset the indicator/s to zero and check that the volume indicator/s is/are zero within \(0.5 E_{\text{min}}\) and the price indicator/s is/are zero within \(E_{\text{min}} \times \text{unit price} \times 0.5\).

4. Move the starting lever slowly and gently towards the ON position until the motor starts (or the dispenser is activated) and then slowly and gently towards the OFF position until the motor stops (or the dispenser is deactivated).

5. Move the starting lever slowly and gently towards the ON position and check that the interlock has engaged and prevents the motor from starting or being activated.

6. Return the starting lever to the OFF position.

7. Determine whether the dispenser has passed or failed.

8. Record results on Test Report 1.

4.2.2 Electronic Reset Mechanism

For electronic indicating devices, the price/volume indication after return to zero shall be zero without any ambiguity (NMI R 117, clauses 3.2.4.5 and 3.3.9).

1. Remove the nozzle from its hang-up position and ensure that the display test is performed and the price and volume displays are on zero before any delivery of product is possible.

2. Carefully return the nozzle to its hang up position and 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.

3. Determine whether the dispenser has passed or failed.

4. Record results on Test Report 1.
4.3 Price Computing

The price indicated shall equal the price calculated from the volume and unit price indicated within the MPEs in Table 2.

<table>
<thead>
<tr>
<th>Unit Price</th>
<th>MPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not more than $1 per litre</td>
<td>±0.9 cents</td>
</tr>
<tr>
<td>More than $1 per litre but not more than $2 per litre</td>
<td>±1.0 cents</td>
</tr>
<tr>
<td>More than $2 per litre but not more than $5 per litre</td>
<td>±2.5 cents</td>
</tr>
<tr>
<td>More than $5 per litre but not more than $10 per litre</td>
<td>±5.0 cents</td>
</tr>
</tbody>
</table>

This test can be done at any time during a test delivery, e.g. accuracy test or nozzle cut-off test.

1. Reset the dispenser to zero.
2. Make a delivery of a convenient volume.
3. Calculate the total price (rounded to two decimal places) from the unit price and volume 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 Nozzle Cut-off

Where the hose is fitted with an automatic cut-off nozzle the nozzle should close automatically when the sensing port of the nozzle comes in contact with liquid or froth.

This test can be done during accuracy or anti-drain testing.

1. Make a delivery at normal flow rate.
2. Allow the sensing port of the nozzle to come in contact with liquid or froth.
3. Ensure the nozzle cuts off.
4. Repeat steps 1 to 3 twice more.
5. Determine whether the dispenser has passed or failed.
6. Record results on Test Report 1.

4.5 Interlock

The use of the same indicating device for the indications of several measuring systems (which have a common indicating device) is authorised provided it is impossible to use any two of these measuring systems simultaneously (NMI R 117, clause 2.9.6).

In measuring systems intended to deliver liquids, no means shall be provided by which any measured liquid can be diverted (NMI R 117, clause 2.16.1).

The selected unit price shall be displayed by an indicating device before the start of the measurement (NMI R 117, clause 3.3.2).

These requirements are interpreted to mean that no fuel can be dispensed unless it is measured and that the unit price indicated corresponds to the unit price of the fuel selected and delivered.

Determine whether the hoses have a common indicator or whether they share a pumping unit, and conduct the appropriate test as documented below.

4.5.1 Hoses Sharing a Common Indicator

1. Select and authorise any hose that shares a common indicator with the hose(s) being tested.
2. Check that the price and volume indications for the hose selected reset to zero, and for dispensers:
   (a) with separate unit price display: the unit price display for the type of fuel selected is transferred to the main indication;
   (b) without separate unit price display: the unit price display for the hose selected is displayed and all other unit price displays disappear until the delivery has been completed.
3. Check that all other hoses sharing the same indicator are disabled by removing the other nozzles from their hang up position and confirming that they do not authorise.
4. Determine whether the dispenser has passed or failed.
5. Record results on Test Report 1.

### 4.5.2 Hoses Sharing a Pumping Unit

1. Select and authorise any hose that shares the common pumping unit with the hose being tested.
2. While the pumping unit is operating, attempt to make a delivery from the hose being tested without allowing the dispenser to be actuated where it will initiate the zero setting sequence.
   Note: This may require the use of a dummy nozzle placed in the holster of the hose being tested.
3. Check that it is not possible to make a delivery from the hose being tested.
4. Determine whether the dispenser has passed or failed.
5. Record results on Test Report 1.

### 4.6 Pre-set Indications

Measuring systems with a price-indicating device may also be fitted with a price/volume pre-setting device, which stops the flow of the liquid when the price/quantity corresponds to the pre-set value (NMI R 117, clause 3.6.10).

This test can be combined with the pre-set accuracy test and one result recorded.
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 into the container with the nozzle fully open allowing the pre-set facility to slow down and complete the delivery automatically.
4. Check that the price/volume indication on the display corresponds to the pre-set amount and for self-serve remains on the display or is stored in memory until the transaction is finalised.
5. Determine whether the dispenser has passed or failed.
6. Record results on Test Report 1.

### 4.7 Maximum Flow Rate

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

This test is only indicative that the maximum achievable flow rate is within the approved range and can be performed during one of the fast flow accuracy test deliveries or during the conditioning of the reference standard.

#### 4.7.1 All Hoses

This is a requirement for all dispensers regardless of whether they share or have their own pumping unit.
1. Commence and time a delivery at the maximum achievable flow rate.
2. Stop the delivery after at least 10 s.
3. Note the indication on the dispenser and calculate the flow rate.
4. Determine whether the dispenser has passed or failed.
5. Record results on Test Report 1.

4.7.2 Hoses Sharing a Pumping Unit
This is a requirement at initial verification, when any site changes occur, or at the discretion of NMI. Refer to the Certificate of Approval for additional specific tests.

1. Select and authorise a number of hoses connected to the same pumping unit.
2. With all hoses operating at the maximum achievable flow rate, time the delivery for one of the hoses.
3. Stop the delivery after at least 10 s and calculate the flow rate.
4. Determine whether the dispenser has passed or failed.
5. Record results on Test Report 1.

4.8 Accuracy
Testing shall be carried out at the maximum achievable flow rate and at $Q_{min}$ (as per the procedure) and the results analysed to determine if the meter is operating within MPE, or whether it requires adjustment.

1. Condition the standard volume measure (see clause 2).
2. Make a delivery at maximum achievable flow rate. Record the volume indicated by the fuel dispenser ($V_{FD}$) and the volume indicated by the reference standard measure ($V_{REF}$).
3. Calculate and record the relative error (of indication) ($E_{FD}$).

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

4. Repeat steps 1 to 3 twice more.
5. Make one more delivery at minimum flow rate. Record the volume indicated by the fuel dispenser ($V_{FD}$) and the volume indicated by the reference standard measure ($V_{REF}$).
6. Calculate and record the relative error (of indication) ($E_{FD}$).
7. Determine if all the results are within the allowable MPE (see Table 3). If not, analyse the results and assess whether or not the meter can be adjusted so that all the results are within MPE.
8. If meter adjustments are made, circulate a quantity of fuel and repeat steps 2 to 7. Any other completed test that may be affected by the adjustment shall also be repeated.

<table>
<thead>
<tr>
<th>Accuracy Class</th>
<th>MPE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Verification</td>
</tr>
<tr>
<td>Class 0.5</td>
<td>$\pm 0.3%$</td>
</tr>
</tbody>
</table>

4.9 Accuracy of Pre-set
A pre-set accuracy test is only conducted when it is necessary to check the accuracy of the pre-set delivery volume.

1. Condition the standard volume measure (see clause 2).
2. Enter and record a suitable pre-set value using the pre-set facility. This pre-set value should deliver close to the value of the reference standard measure being used.

3. Make a delivery at maximum achievable flow rate until the delivery stops. Record the volume indicated by the fuel dispenser \((V_{FD})\) and the volume indicted by the reference standard measure \((V_{REF})\).

   Note: Ensure that the maximum achievable flowrate is maintained for the complete delivery. Do not slow the flowrate of the delivery as the pre-set amount is approached.

4. Calculate and record the relative error (of indication) \((E_{FD})\).

   \[
   E_{FD} = \frac{(V_{FD} - V_{REF})}{V_{REF}} \times 100 \%
   \]

5. Determine if the result is within the MPE (see Table 3).

6. Record results on Test Report 1.

4.10 Gas Elimination

This test is only necessary if a gas elimination device is fitted.

The error difference \((E_{D})\) between tests without air/gas and with introduced air/gas shall not exceed the maximum permissible difference (MPD) values given in Table 4.

Table 4. MPD for the gas elimination test

<table>
<thead>
<tr>
<th>Viscosity</th>
<th>MPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\leq 1 \text{ mPa.s, e.g. petrol})</td>
<td>0.5%</td>
</tr>
<tr>
<td>(&gt; 1 \text{ mPa.s, e.g. diesel, kerosene})</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

1. Calculate and record the average error \((E_{AV})\) of the three runs at maximum achievable flow rate recorded during the accuracy test (see clause 4.8).

2. Condition the standard volume measure (see clause 2).

3. If sealed, remove seal from the test valve.

4. Commence a delivery at the maximum achievable flow rate. During the delivery slowly open the air/gas test valve, causing the flow to decrease noticeably or to stop.

5. Close the test valve, and complete the delivery.

6. Record the volume indicated by the fuel dispenser \((V_{FD})\) and the volume indicated by the reference standard measure \((V_{REF})\).

7. Calculate and record the relative error (of indication) \((E_{FD})\).

   \[
   E_{FD} = \frac{(V_{FD} - V_{REF})}{V_{REF}} \times 100 \%
   \]

8. Determine the error difference \((E_{D})\) for the gas elimination device.

   \[
   E_{D} = E_{AV} - E_{FD}
   \]

9. Determine whether \(E_{D}\) is within the MPD specified in Table 4.

10. Record results on Test Report 1.

11. Where required, reseal the test valve.
4.11 Anti-drain/Hose-dilation

For full hoses in a measuring system provided with a hose reel, the increase in internal volume due to
the change from the coiled hose position when not under pressure to the uncoiled hose position when
under pressure without any flow of liquid shall not exceed twice the minimum specified volume
deviation.

If the measuring system is not provided with a hose reel, the increase in internal volume shall not
exceed the minimum specified volume deviation (NMI R 117, clause 2.15). The MPEs are given in
Table 5.

Table 5. MPEs for the anti-drain test

<table>
<thead>
<tr>
<th>( V_{\text{min}} )</th>
<th>MPE without hose reel</th>
<th>MPE with hose reel</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 L</td>
<td>20 mL</td>
<td>40 mL</td>
</tr>
<tr>
<td>5 L</td>
<td>50 mL</td>
<td>100 mL</td>
</tr>
<tr>
<td>10 L</td>
<td>100 mL</td>
<td>200 mL</td>
</tr>
<tr>
<td>20 L</td>
<td>200 mL</td>
<td>400 mL</td>
</tr>
</tbody>
</table>

Conduct the appropriate test (hose either provided without a hose reel or with a hose reel) as
documented below.

Where the value of \( V_{\text{min}} \) of the dispenser being tested is not specified in Table 5, the MPE shall be
determined as follows:

1. MPE without hose reel (mL) = \( V_{\text{min}} \) (L) \times 10
2. MPE with hose reel (mL) = \( V_{\text{min}} \) (L) \times 20

4.11.1 Without Hose Reel

1. Condition a suitable standard volume measure, e.g. graduated measuring cylinder (see clause
2).
2. Start the delivery to allow the hose to pressurise.
3. Stop the delivery suddenly by immersing the hose nozzle into the delivered liquid or by suddenly
releasing the trigger of the nozzle.
4. Deactivate the dispenser by manually operating the nozzle hang-up flap or by inserting a dummy
nozzle into the holster. Do not hang up the nozzle.
5. Whilst holding the nozzle down, drain for 5 s.
6. Open the nozzle and allow the pressure in the hose to reduce whilst draining the nozzle into the
small standard volume measure.
7. Close the nozzle when the flow stops, or after 30 s. If the nozzle still drips after 30 s the nozzle
should be repaired.
8. Record the volume of drained fuel indicated by the standard volume measure.
9. Determine whether the dispenser has passed or failed.

4.11.2 With Hose Reel

1. Fully uncoil hose from its reel.
2. Condition a suitable standard volume measure, e.g. graduated measuring cylinder (see clause
2).
3. Start the delivery to allow the hose to pressurise.
4. Stop the delivery suddenly by immersing the hose nozzle into the delivered liquid or by suddenly
releasing the trigger of the nozzle.
5. Deactivate the dispenser by manually operating the nozzle hang-up flap and do not hang up the nozzle.
6. Fully coil the hose back on its reel.
7. Whilst holding the nozzle down, drain for 5 s.
8. Open the nozzle and allow the pressure in the hose to reduce whilst draining the nozzle into the small standard volume measure.
9. Close the nozzle when the flow stops, or after 30 s. If the nozzle still drips after 30 s the nozzle should be repaired.
10. Record the volume of drained fuel indicated by the standard volume measure.
11. Determine whether the dispenser has passed or failed.

5. SUGGESTED SEQUENCE FOR TESTING
1. Conduct assessment of site in accordance with WPCG requirements
2. Where required, raise 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 an accuracy test (clause 4.8).
6. Whilst conducting the accuracy test, check:
   (a) interlock (clause 4.5);
   (b) the checking facility for electronic indicating devices (clause 4.1);
   (c) zero setting (clause 4.2);
   (d) nozzle cut-off (clause 4.4);
   (e) price computing (clause 4.3); and
   (f) maximum flow rate (clause 4.7).
7. Conduct a gas elimination test, if such a device is fitted (clause 4.10).
8. Conduct a hose-dilation test (clause 4.11).
9. Conduct a pre-set indication test (clause 4.6).
10. If required, conduct a pre-set volume accuracy test (clause 4.9).
11. Determine whether the fuel dispenser has passed or failed.
12. 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 verification mark from the dispenser;
   (b) applying a verification mark; and
   (c) applying seals as specified in the Certificate of Approval.
13. If required, check the console (clause 6).
14. Where required, 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 fuel dispenser is communicating correctly with its console. They are carried out:

- at initial installation;
- when repairs are carried out that affect the approved functions;
- 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.

Ensure the console is complete, undamaged and complies with the Certificate of Approval.

Ensure that the dispenser is communicating with the console.

1. Authorise the dispenser at the console.

2. Remove the nozzle from its hang-up position and deliver sufficient product to cause the price and volume indicators to move significantly off zero.

3. Return the nozzle to its hang-up position.

4. Record the dispenser number/nozzle identification and the price/volume displayed on the dispenser.

5. At the console check that the dispenser number/nozzle identification and the price/volume displayed is the same as recorded from the dispenser.

6. 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.

7. Complete any other tests required in the Certificate of Approval.

8. Record results on Test Report 2.
APPENDIX A. TEST REPORTS

Appendix A contains two test reports:

- Test Report 1 is for fuel dispensers; and
- Test Report 2 is for consoles.

Although the format of the test reports may vary according to the individual needs and requirements of trade measurement inspectors and servicing licensees, the following test reports contain 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 of the following pages.
Test Report 1 for Fuel Dispensers (other than LPG Dispensers)

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

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

For in-service inspection 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 instrument ...................................................................................................................

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

Dispenser number(s) ........................................................ Dispenser serial number ................................

Fuel product(s) dispenser approved to deliver ...................................................................................

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

Details of the Reference Standards of Measurement (clause 2)

<table>
<thead>
<tr>
<th>Reference standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make</td>
</tr>
<tr>
<td>Model</td>
</tr>
<tr>
<td>Serial number</td>
</tr>
<tr>
<td>Volume</td>
</tr>
<tr>
<td>Regulation 13 certificate number</td>
</tr>
<tr>
<td>Certificate expiry date</td>
</tr>
</tbody>
</table>
## General Characteristics (clause 3.3)

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes, no or N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the instrument comply with its Certificate(s) of Approval?</td>
<td></td>
</tr>
<tr>
<td>Is the instrument being used in an appropriate manner?</td>
<td></td>
</tr>
<tr>
<td>Are all mandatory descriptive markings clearly and permanently marked on the data plate?</td>
<td></td>
</tr>
<tr>
<td>If applicable, is the data plate fixed on the instrument?</td>
<td></td>
</tr>
<tr>
<td>Is the instrument complete?</td>
<td></td>
</tr>
<tr>
<td>Is the instrument clean?</td>
<td></td>
</tr>
<tr>
<td>Is the instrument operational?</td>
<td></td>
</tr>
<tr>
<td>Is the operation of the instrument free of any apparent obstructions?</td>
<td></td>
</tr>
<tr>
<td>Does the operator (and where applicable, the customer) have a clear and unobstructed view of the indicating device and the entire measuring process?</td>
<td></td>
</tr>
<tr>
<td>Are the external panels secure?</td>
<td></td>
</tr>
<tr>
<td>Is the dispenser firmly fixed on its foundations?</td>
<td></td>
</tr>
<tr>
<td>Are the cover windows broken?</td>
<td></td>
</tr>
<tr>
<td>If applicable, does the sight glass contain a spinner or plastic balls, and is it clean and full of product?</td>
<td></td>
</tr>
<tr>
<td>Do the indications of volume, unit price and total price correspond with the hose selected?</td>
<td></td>
</tr>
<tr>
<td>Are all indications clearly visible under all conditions day and night?</td>
<td></td>
</tr>
<tr>
<td>Are the hoses in reasonable condition, e.g. they are not badly chafed, split, or worn?</td>
<td></td>
</tr>
<tr>
<td>Does each nozzle terminate the delivery when returned to its holsters?</td>
<td></td>
</tr>
<tr>
<td>Are there any leaks?</td>
<td></td>
</tr>
<tr>
<td>For self-service systems: do the dispenser number(s) correspond with the console?</td>
<td></td>
</tr>
<tr>
<td>For continuous indicators: do the price-posting wheels line up with, and follow, the internal price-setting range lever?</td>
<td></td>
</tr>
</tbody>
</table>
Test Report 1 for Fuel Dispensers (other than LPG Dispensers)

Test Results

<table>
<thead>
<tr>
<th>Disperser number and nozzle identification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit price displayed</td>
<td>$/L</td>
</tr>
<tr>
<td>Reading on volume totaliser at end of testing</td>
<td>L</td>
</tr>
<tr>
<td>Reading on volume totaliser at start of testing</td>
<td>L</td>
</tr>
<tr>
<td>Total volume used for testing</td>
<td>L</td>
</tr>
<tr>
<td>Q_{\text{min}} and Q_{\text{max}} on data plate</td>
<td>L/min</td>
</tr>
<tr>
<td>Maximum achievable flow rate (clause 4.7)</td>
<td>L/min</td>
</tr>
<tr>
<td>Accuracy (clause 4.8)</td>
<td></td>
</tr>
<tr>
<td>( E_{\text{FD}} = \frac{(V_{\text{FD}} - V_{\text{REF}}) \times 100}{V_{\text{REF}}} )</td>
<td></td>
</tr>
<tr>
<td>Delivery 1 at maximum achievable flow rate</td>
<td>L</td>
</tr>
<tr>
<td>Delivery 2 at maximum achievable flow rate</td>
<td>L</td>
</tr>
<tr>
<td>Delivery 3 at maximum achievable flow rate</td>
<td>L</td>
</tr>
<tr>
<td>Average error (( E_{\text{AV}} )) for 3 runs (needed for clause 4.10)</td>
<td>%</td>
</tr>
<tr>
<td>Delivery at minimum flow rate</td>
<td>L</td>
</tr>
<tr>
<td>Pre-set delivery (clause 4.9)</td>
<td>L</td>
</tr>
<tr>
<td>Gas elimination delivery (clause 4.10)</td>
<td>L</td>
</tr>
<tr>
<td>Checking facility for indicating devices (clause 4.1)</td>
<td>Pass</td>
</tr>
<tr>
<td>Zero setting (clause 4.2)</td>
<td>Pass</td>
</tr>
<tr>
<td>Price computing (clause 4.3)</td>
<td>Pass</td>
</tr>
<tr>
<td>Nozzle cut-off (clause 4.4)</td>
<td>Pass</td>
</tr>
<tr>
<td>Interlock (clause 4.5)</td>
<td>Pass</td>
</tr>
<tr>
<td>Pre-set indications (clause 4.6)</td>
<td>Pass</td>
</tr>
<tr>
<td>Overall result</td>
<td>Pass</td>
</tr>
</tbody>
</table>

Verifier's name ................................................................. Identification number ....................................................

Signature .............................................................................................................................

Comments .................................................................................................................................
<table>
<thead>
<tr>
<th>Does the dispenser communicate with the console?</th>
<th>☐ Yes</th>
<th>☐ No</th>
<th>☐ Yes</th>
<th>☐ No</th>
<th>☐ Yes</th>
<th>☐ No</th>
</tr>
</thead>
<tbody>
<tr>
<td>First transaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dispenser number and nozzle identification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price displayed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume displayed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second transaction (if console supports stored transactions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dispenser number and nozzle identification</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price displayed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume displayed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the first transaction stored and displayed correctly</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td>☐ Yes</td>
<td>☐ No</td>
<td>☐ Yes</td>
<td>☐ No</td>
</tr>
<tr>
<td>Overall result</td>
<td>☐ Pass</td>
<td>☐ Fail</td>
<td>☐ Pass</td>
<td>☐ Fail</td>
<td>☐ Pass</td>
<td>☐ Fail</td>
</tr>
</tbody>
</table>