



Australian Government
National Measurement
Institute



NITP 4.2 National Instrument Test Procedures for Beverage Dispensers

NSC V 3

First edition — February 2004

NMI V 3

First edition, first revision — July 2004

First edition, second revision — May 2008

NITP 4.2

First edition — December 2011

First edition, first revision — June 2013

National Measurement Institute
Bradfield Road, Lindfield, NSW 2070
PO Box 264, Lindfield, NSW 2070

T (61 2) 8467 3600
F (61 2) 8467 3610
W www.measurement.gov.au

AMENDMENTS

Item no	Date	Page	Location	Details of change
1	01/06/2013	all	all	Deleted references to certification, updated information, clarified meaning and made minor editorial changes.
2	01/06/2013	iv	Explanation of Terms	Revised terminology and removed references to terminology that is not relevant to the test procedure for beverage dispensers.
3	01/06/2013	1	clause 2	Revised manner in which the equipment list is presented to enable easy identification of reference standards of measurement.
4	01/06/2013	2	clause 3.2	Reworded requirements for instrument characteristics to a statement (from a question)
5	01/06/2013	2	clause 4	Clarified requirements for the control (weighing) instrument (for the gravimetric method) and the test procedures to assess instrument accuracy.
6	01/06/2013	3	Table 1	Clarified the MPEs for in-service inspection to assist in determining whether the volume is deficient or in excess.
7	01/06/2013	3	clause 5.1.2	Clarified the components of the density formula.
8	01/06/2013	4	clause 5.2	Clarified when the interlock test is to be conducted and the corresponding test procedure.
9	01/06/2013	4	clause 5.3	Clarified when the low-level cut-out test is to be conducted and the corresponding test procedure.
10	01/06/2013	5 and 7	test report	Added section to record details of equipment and reference standards
11	01/06/2013	5 to 10	test report	Amended to allow recording of test procedures outlined in the NITP. Reformatted test report.

PREFACE

On 30 June 2010 the uniform test procedures (i.e. relevant NMI V documents) were deemed to be national instrument test procedures (NITPs) for the purposes of section 18GG of the *National Measurement Act 1960* (Cth).

In 2011 the NITPs were renumbered to better align the numbers with the classes of pattern approval and servicing licensee. As a result this document (NMI V 3) became NITP 4.2.

The only changes that have been made to the latest edition of this document are it has been rebranded, renumbered, renamed and its cross-references have been updated. In all other respects it is identical with NMI V 3.

NMI's Chief Metrologist has determined that NITP 4.2 contains the test procedures for the verification of beverage dispensers.

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EXPLANATION OF TERMS

For explanations of other terms see [General Information for Test Procedures](#).

Adjustment

Alteration of the measurement parameters to bring the instrument in use within the allowable MPEs.

Calibration

The set of operations that (under specified conditions) establishes the relationship between the indicated or nominal value of an instrument and the corresponding known value of the measured quantity.

In-service Inspection

The examination of an instrument by a *Trade Measurement Inspector* to check that:

- the verification mark is valid; and
- the errors do not exceed the MPEs permitted for in-service inspection.

In-service inspection does not permit the instrument to be marked with a verification mark.

Verification

The examination of an instrument by a *Trade Measurement Inspector, servicing licensee* or an *employee of a servicing licensee* in order to mark the instrument indicating that it conforms with the relevant test procedures.

Initial verification is the verification of a new instrument which does not bear a verification mark and has never been verified before.

ABBREVIATIONS

e	verification scale interval
L	applied load
I	indication
Max	maximum capacity
Min	minimum capacity
MPE	maximum permissible error
MPD	maximum permissible difference
Q_n	nominal mass of the liquid equivalent to the volume purported to be delivered from the dispenser

1. SCOPE

NITP 4.2 describes the test procedures for the verification and in-service inspection of beverage dispensers to assess that they measure accurately within the maximum permissible errors (MPEs) specified in Schedule 1 of the *National Trade Measurement Regulations 2009* (Cth) and that they comply with the relevant certificate(s) of approval.

Certificates of approval are based on [NMI M 2 Pattern Approval Specifications for Beverage Dispensers](#). Refer to NMI M 2 for all metrological and technical requirements. All 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).

Beverage dispensers may be mounted on bottles or may be devices for dispensing from bulk storage containers either by a fixed or hand held nozzle.

Examples of beverages dispensed are:

- (a) spirits, e.g. whisky (whiskey), rum, vodka, brandy and gin;
- (b) non-alcoholic beverages, e.g. water and orange juice.

This document does not include within its scope dispensers used for dispensing carbonated beverages.

Two test methods are described:

- the *volumetric* method (see clause 5.1.1); and
- the *gravimetric* method (see clause 5.1.2).

2. EQUIPMENT

Record details of the equipment used on the applicable test report – Test Report 1 (*volumetric* method) or Test Report 2 (*gravimetric* method).

1. Certificate(s) of Approval.
2. Appropriate reference standards of:
 - (a) volume to measure a known volume of liquid (for the *volumetric* method),
 - (b) weight to test the control instrument (for the *gravimetric* method)
 - (c) density cup/bottle or one-mark measuring flask to determine the density of the liquid (for the *gravimetric* method)

The reference standards of measurement shall comply with the uncertainties and

variations permitted in the *National Measurement Regulations 1999* (Cth).

For the *volumetric* method the combined uncertainties and variations of the volume measure shall be three times better than the MPE of the instrument being tested (i.e. not greater than one-third of the MPE of the beverage dispenser under test).

For the *gravimetric* method the combined uncertainties and variations of the reference weights shall be three times better than the MPE of the control instrument being tested (i.e. not greater than one-third of the MPE of the control instrument under test).

3. Current Regulation 13 certificates for all reference standards of measurement.
4. Weighing instrument(s) (hereinafter referred to as control instrument) suitable for determining the mass of delivered volume and/or the density of the liquid (for *gravimetric* method) (see clause 4.1.1).
5. Test report (see Appendix A).

3. VISUAL INSPECTION

Visually inspect the beverage dispenser and determine if:

- all the required data is supplied; and
- the applicable characteristics are correctly marked.

Record details on the applicable test report – Test Report 1 (*Volumetric* method) or Test Report 2 (*Gravimetric* method).

3.1 Required Data

1. Test report number.
2. Date of test.
3. Verifier's name
4. Test type: verification or in-service inspection (ensure that the verification marks is in place for in-service inspection or reverification).
5. Name of owner/user.
6. Address of owner/user.
7. Name of contact person on premises.
8. Address of instrument location.
9. Description of dispenser.
10. Manufacturer(s)'s name.
11. Model.
12. Dispenser serial number.
13. Certificate(s) of Approval number.

14. Capacity or capacities.
15. Test liquid as specified in the Certificate of Approval (see clause 5).

3.2 Characteristics of the Instrument

Where applicable, the beverage dispenser and its use shall comply with the following clauses.

1. The beverage dispenser shall comply with its certificate of approval.
2. The beverage dispenser shall be used in accordance with its certificate of approval.
3. All mandatory descriptive markings shall be clearly and permanently marked on the instrument data plate.
4. The beverage dispenser shall be clean.
5. The beverage dispenser shall be free of any leaks.

4. STANDARD PROCEDURES

4.1 Control Instrument

A control instrument is used to determine the mass of the delivery and/or density of the liquid being dispensed.

Note: Depending on the volume of the sample used to determine the density, the control instrument for determining the mass of a delivery during accuracy testing may not be suitable as a control instrument for the density determination.

4.1.1 Suitability

A suitable control instrument shall:

- be a non-automatic weighing instrument;
- have a scale interval that is less than:
 - 0.2% of the nominal mass of the liquid equivalent to the volume purported to be delivered from the dispenser (Q_n) for determining the mass of the delivery; or
 - 0.1% of the mass of the density sample when determining the density;
- be capable of having standard masses deposited on the load receptor; and
- have a maximum capacity at least 10% greater than the gross mass that will be weighed.

4.1.2 Initial Test

Place the control instrument on a suitable surface at a convenient height.

Test the control instrument in accordance with [NITP 6.1 to 6.4 National Instrument Test](#)

[Procedures for Non-automatic Weighing Instruments](#) for the following tests:

- (a) repeatability;
- (b) eccentricity; and
- (c) weighing performance.

The instrument shall not have an error (MPE and MPD) greater than 0.5e.

Record results on the applicable test report (Appendix A).

The control instrument should be validated immediately before commencing any testing of the beverage dispensers or determination of density.

It is not necessary to test the control instrument to its maximum capacity. The control instrument only needs to be tested to 110% of the gross mass to which it will be used.

5. TEST PROCEDURES

The following series of test procedures determine if the performance of a beverage dispenser meets requirements and whether the dispenser can be verified for trade use or 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 6.

Test dispensers with a beverage nominated in the Certificate of Approval. Once testing is finalised the verifier shall dispose of the test liquid in accordance with standard operating procedures.

5.1 Accuracy

Two test methods are described:

- the *volumetric* method for alcoholic and non-alcoholic beverage dispensers (record results on Test Report 1 in Appendix A); and
- the *gravimetric* method for non-alcoholic beverage dispensers when volumetric testing is impractical or the quantities delivered are not equal to the standard volume measures available (record results on Test Report 2 in Appendix A).

An accuracy test is required for each combination of products and nominated volumes the instrument can dispense.

5.1.1 Volumetric Method

1. Make the required number of deliveries for each volume capable of being dispensed:
 - for *alcoholic* beverage dispensers make at least *five* deliveries

- for *non-alcoholic* beverage dispensers make at least *two* deliveries.
2. Calculate the error of measurement or relative percentage error for each delivery.
 3. Ensure that the error of measurement or relative percentage error for each delivery is within the MPE for volume delivered (see Table 1).
 4. Record results on the Test Report 1.

Table 1. MPEs for verification and in-service inspection for beverage dispensers

Quantity delivered	MPEs		
	Verification	In-service inspection	
		Deficiency	Excess
10 mL	±0.5 mL	-0.5 mL	+1.0 mL
15 mL	±0.6 mL	-0.6 mL	+1.2 mL
30 mL	±1.0 mL	-1.0 mL	+2.0 mL
60–100 mL	±1.5 mL	-1.5 mL	+3.0 mL
>100 mL	±1.5% of quantity dispensed	-1.5% of quantity dispensed	+3.0% of quantity dispensed

5.1.2 Gravimetric Method

1. Determine the density of the liquid being dispensed:
 - (a) If the dispensed liquid is treated or purified water the density is deemed to be 1 g/mL or 1 kg/L.
 - (b) If the dispensed liquid is *not* water, use a density cup/bottle or one-mark flask to determine the density.
 - (i) Test the control instrument using standard weights, equivalent to the gross mass of the density cup/bottle or one-mark flask being used, in accordance with clause 4.1.2. Record the results on Test Report 2.
 - (ii) Place the density cup/bottle or one-mark flask on the load receptor of the weighing instrument and tare off the density cup/bottle or one-mark flask or record the tare value.
 - (iii) Fill the density cup/bottle or one-mark flask with the test liquid.

- (iv) Record the mass (M) of the test liquid.
- (v) Calculate the density of the test liquid using the following formula:

$$D = \frac{M}{V}$$

where

D is the density of liquid (g/mL or kg/L)

M is the mass of test liquid in the cup/bottle or one-mark flask (g or kg)

V is the volume of the cup/bottle or one-mark flask (mL or L)

2. Determine the mass of the delivery.
 - (a) Place a suitable container on the load receptor of the control (weighing) instrument and tare off the container or record the tare value.
 - (b) Remove the container from the control instrument and dispense a delivery into the container.
 - (c) Place the container on the load receptor of the control instrument.
 - (d) Record the mass (M_1) of the dispensed liquid.
 - (e) Make at least one more delivery for each delivery capacity and record the mass for each delivery.
3. Determine the volume (V_1) of each delivery by using the following formula:

$$V_1 = \frac{M_1}{D}$$

where

D is the density of liquid (g/mL or kg/L)

M_1 is the mass of liquid delivered (g or kg)

V_1 is the volume of each delivery (mL or L)

4. Ensure that the error of measurement or relative percentage error for each delivery is within the MPE for volume delivered (see Table 1).
5. Record results on the Test Report 2.

5.2 Interlock

Under normal operating conditions, once delivery is started, another delivery shall not be able to commence until the first delivery is complete.

Carry out one interlock test for each dispenser during any delivery.

1. Complete an accuracy test in accordance with clause 5.1
2. During the delivery, operate the discharge mechanism a second time.

Note: No further delivery should take place until the initial delivery is complete and the operating mechanism is reactivated.

3. Ensure that the error of measurement or relative percentage error for the delivery is within the MPE for volume delivered (see Table 1).
4. Record results on the relevant test report (see Appendix A).

5.3 Low-level Cut-out

A new delivery shall not be possible unless there is sufficient beverage for the dispenser to complete the next delivery.

Check the certificate(s) of approval to determine if the instrument is fitted with a low-level cut out.

Note: Some dispensers were not originally approved with this feature.

Where a specific low-level cut out procedure is described in the certificate of approval, apply the test procedure detailed in the certificate approval. In all other cases:

1. Reduce the product supply to just above the level where the low-level cut out will operate.
2. Complete an accuracy test in accordance with clause 5.1.
3. Ensure that the error of measurement or relative percentage error for the delivery is within the MPE for volume delivered (see Table 1).
4. Repeat steps 2 to 3 until the low-level cut out prevents any further deliveries.
5. Record results on the relevant test report (see Appendix A).

6. SUGGESTED SEQUENCE FOR TESTING

Where there is more than one dispenser to be tested, conduct tests of these dispensers together.

1. Check the certificate(s) of approval for any additional tests required. Make provision for including these tests in the testing sequence.
2. Visually inspect the dispenser and make note of its metrological characteristics.
3. Conduct the accuracy test. Use either the *volumetric* method or the *gravimetric* method.
4. Perform the interlock test on each dispenser.
5. Perform the low-level cut-out test, where applicable.
6. Determine whether the dispenser has passed or failed.
7. Complete the test report (see Appendix A).
8. Carry out anything else you need to do to complete the procedure. See [General Information for Test Procedures](#) for more information. This may include:
 - obliterating the verification mark from the dispenser; and
 - applying a verification mark.

APPENDIX A. TEST REPORTS

Appendix A contains two test reports:

- Test Report 1 is for beverage dispensers which are tested using the *volumetric* method; and
- Test Report 2 is for beverage dispensers which are tested using the *gravimetric* method.

The following test reports contain the minimum amount of information that is recommended to 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 reports in the style shown at the top of each page.

Test Report 1 for Beverages Dispensers Tested Using the Volumetric Method

Test report number Date of test.....

Test type (tick one) Verification In-service inspection

Verification mark (for in-service inspection or reverification)

Name of owner/user.....

Address of owner/user

Name of contact person on premises

Address of instrument location

Description of dispenser(s)

Details of the Equipment and Reference Standards of Measurement (clause 2)

Volume measure	
Make	
Model	
Serial number	
Volume measure	
Regulation 13 certificate number	
Certificate expiry date	

	Dispenser 1	Dispenser 2	Dispenser 3	Dispenser 4	Dispenser 5	Dispenser 6	Dispenser 7
Beverage dispenser data (clause 3.1)							
Make							
Model							
Manufacturer's name							
Dispenser serial number							
Certificate of approval number							
Verification mark (where applicable)							
Capacity (mL or L)							
Test liquid							
Characteristics of the Instrument (clause 3.2)							
Does the dispenser comply with its Certificate of Approval?	yes/no						
Is the dispenser being used in accordance with its Certificate of Approval?	yes/no						
Are all mandatory descriptive markings clearly and permanently marked on the data plate?	yes/no						
Is the dispenser clean?	yes/no						
Does the dispenser have any leaks?	yes/no						
Accuracy test — volumetric method (clause 5.1.1)							
Volume of delivery 1 (mL or L)							
Volume of delivery 2 (mL or L)							
Volume of delivery 3 (mL or L if applicable)							
Volume of delivery 4 (mL or L if applicable)							
Volume of delivery 5 (mL or L if applicable)							
Allowable MPE							
Is the dispenser measuring within the allowable limits?	yes/no						
Interlock test (clause 5.2)	pass/fail or N/A						
Low-level cut-out test (clause 5.3)	pass/fail or N/A						
Are error indicators working? (clause 5.3)	pass/fail or N/A						
Overall result	pass/fail						

Verifier's name Identification number

Signature.....

Comments.....

Test Report 2 for Beverage Dispensers Tested Using the Gravimetric Method

Test report number Date of test

Test type (tick one) Verification In-service inspection

Verification mark (for in-service inspection or reverification)

Name of owner/user

Address of owner/user

Name of contact person on premises

Address of instrument location

Description of dispenser(s)

Details of the Equipment and Reference Standards of Measurement (clause 2)

Test weight	
Test weight set serial number	
Regulation 13 certificate number	
Certificate expiry date	
Density cup/bottle or one-mark measuring flask	
Make	
Model	
Serial number	
Volume	
Regulation 13 certificate number	
Certificate expiry date	

Testing the Control Instrument (clause 4.1.2)

Repeatability (NITP 6.1 to 6.4, clause 5.1)	Load		
	First reading		
	Second reading		
	Third reading		
	Difference		
	<input type="checkbox"/> Pass <input type="checkbox"/> Fail		
Eccentricity (NITP 6.1 to 6.4, clause 5.2)	Number of supports		
	Load used		
	Position 1		
	Position 2		
	Position 3		
	Position 4		
	Position 5		
	Position 6		
<input type="checkbox"/> Pass <input type="checkbox"/> Fail			
Weighing performance (NITP 6.1 to 6.4, clause 5.4.1) Note: When performing a performance test only weighing performance is required.	Loads applied (minimum 5)	Up	Down
<input type="checkbox"/> Pass <input type="checkbox"/> Fail			
Overall result			
<input type="checkbox"/> Pass <input type="checkbox"/> Fail			

	Dispenser 1	Dispenser 2	Dispenser 3	Dispenser 4	Dispenser 5	Dispenser 6	Dispenser 7
Beverage dispenser data (clause 3.1)							
Make							
Model							
Manufacturer's name							
Dispenser serial number							
Certificate of approval number							
Verification mark (where applicable)							
Capacity (mL or L)							
Test liquid							
Characteristics of the Instrument (clause 3.2)							
Does the dispenser comply with its certificate of approval?	yes/no						
Is the dispenser being used in accordance with its certificate of approval?	yes/no						
Are all mandatory descriptive markings clearly and permanently marked on the data plate?	yes/no						
Is the dispenser clean?	yes/no						
Does the dispenser have any leaks?	yes/no						
Liquid dispensed							
Accuracy test — gravimetric method (clause 5.1.2)							
Density of liquid dispensed (D) (g/mL or kg/L)							
Mass of delivery 1 (M ₁) (g or kg)							
Volume of delivery 1 (mL or L) V ₁ = M ₁ /D							
Mass of delivery 2 (M ₂) (g or kg)							
Volume of delivery 2 (mL or L) V ₂ = M ₂ /D							
Allowable MPE							
Is the dispenser measuring within the allowable limits?	yes/no						
Interlock test (clause 5.2)	pass/fail/ or N/A						
Low-level cut-out test (clause 5.3)	pass/fail/ or N/A						
Are error indicators working? (clause 5.3)	pass/fail/ or N/A						
Overall result	pass/fail						

Verifier's name Identification number

Signature.....

Comments.....

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