Verifiers recognition kit – subclasses 15.2 and 17.1

Version 1.0 – January 2018
Contents

Your recognition kit.................................................................................................................................................. 1
Assessment instructions............................................................................................................................................... 1
Assessment recording form (Applicant) ....................................................................................................................... 3
Assessment recording form (Assessor) ....................................................................................................................... 4
Applicant’s work history and training ....................................................................................................................... 5
Written assessment (all subclasses) ......................................................................................................................... 6
  Instructions ............................................................................................................................................................. 6
  Questions .............................................................................................................................................................. 6
Written assessment (15.2 Cane sugar self-indicating polarimetric saccharimeters specific questions)......................... 13
Written Assessment (17.1 – Brix hydrometer specific questions) ............................................................................ 25
Verification form task ............................................................................................................................................... 36
  For subclass 15.2 ................................................................................................................................................... 36
  For subclass 17.1 ................................................................................................................................................... 36
Test report question (Subclass 15.2) ....................................................................................................................... 37
Workplace test reports and documents ..................................................................................................................... 42
  For each of the subclasses 15.2 and 17.1 ............................................................................................................... 42
Report of supervisor or referee .................................................................................................................................. 43
Review of applicant’s test reports ............................................................................................................................. 45
Record of interview with the applicant ..................................................................................................................... 46
Practical observation report ....................................................................................................................................... 47
Your recognition kit
This kit allows you to demonstrate your competence as a verifier of measuring instruments against the performance criteria set out in nationally recognised units of competency.

You have enrolled to be assessed for one or more of the following licence subclasses:

- 15.2 – Cane sugar self-indicating polarimetric saccharimeters
- 17.1 – Brix hydrometers for cane juice

On successful completion you will be awarded a statement of attainment for:

**MSMSS00011** – Trade Measurement Verification (Simple Measuring Instrument)

- MSMTMVER302 Verify simple measuring instruments.
- MSMTMREF301 – Use and maintain reference standards.

Assessment instructions
Before you complete and submit your recognition kit, you should have spent time in the field with an experienced verifier learning about:

- the instruments you intend to verify
- the techniques employed in carrying out testing, including any required planning and preparation
- the methods of storing, maintaining and handling reference standards
- the environment in which they are situated and the potential impact of that environment on the function of the instruments and/or the standards you use to verify them.
- the work health and safety considerations relevant to testing instruments
- your organisation’s and NMI’s requirements for recording and reporting details of verifications and other licensing matters
- any adjustments or corrections that you may need to employ in the verification process
- how to mark an instrument (what to mark and where to place the mark on the instrument)
- how you should communicate information about the instruments to the owner/user of the instruments or any assistance you may require from them.

In addition, you should have had the opportunity to personally test instruments, under supervision, using the relevant national instrument test procedures to develop your skills - either in the workplace or in a simulated workplace environment. Your supervisor should have personally observed you testing a minimum of 3 instruments.

Completion of the kit
The kit comprises a number of forms for you to complete relevant to the subclasses you are being assessed for including:

- your work history
- a report from your supervisor/referee
- completion of a verification form
- a number of written assessments which include the requirement to complete a test report using data provided for you for subclass 15.2.

In addition, you will be required to provide copies of test reports from instruments you have tested under supervision. You should have personally completed all the tests required for verification of that instrument.

The number of test reports you will need to provide is:

- Two reports for each subclass assessed.

Try to include examples of different instruments and situations where the instrument did not pass all the test criteria.
Submission of the kit and enrolment
Once you have completed all relevant forms and the other required documents, you should scan all sides of the kit, in the order shown, plus all the additional documents.

Email the scanned copy of your completed kit to nmiadministrator@measurement.gov.au and keep your original kit as your assessor will ask questions about your kit during the interview.

You are now ready to enrol!
Complete enrolment by choosing the appropriate kit(s) under the header ‘Verifier and Weighbridge Operator Assessments (Recognition kits) on the NMI web page, then adding each subclass to the cart to enrol and pay by credit card. Further instructions for payment by purchase order are given on the website.

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

Once your assessor receives your submitted material, they will:

- assess the submitted material
- determine if any further written evidence is required
- decide if they want to observe you verifying an instrument to assist the assessment process
- contact you to arrange a mutually convenient time for a telephone interview which they will use to clarify any of the answers you provided, confirm your understanding, discuss the reports you submitted and ask any other questions to confirm your competency
- they will advise you of the result of assessment and provide feedback
- record your results on the assessment recording form
- return the kit to our administrator for processing and confirmation of the result of your assessment, including posting out your statement of attainment when successful.
### Assessment recording form (Applicant)

**Applicant to complete this section**

<table>
<thead>
<tr>
<th>Name: First</th>
<th>Middle</th>
<th>Family</th>
</tr>
</thead>
</table>

**Email address:**

**Telephone:** Work  Mobile

**Name of supervisor/referee:**

**Supervisor/referee’s email address:**

**Company name:**

Check the subclass(es) and test methods (where appropriate) you wish to be assessed for:

- ☐ 15.2 – Cane sugar self-indicating polarimetric saccharimeters
- ☐ 17.1 – Brix hydrometers for cane juice

**Checklist to ensure you have included all required components of this kit.**

**Check all that apply:**

- ☐ Applicants work history
- ☐ Supervisor/referee report
- ☐ Written assessment (All subclasses)
- ☐ Written assessment (15.2 – specific questions)
- ☐ Written assessment (17.1 – specific questions)
- ☐ Completed test report question for: 15.2 – Cane sugar self-indicating polarimetric saccharimeters
- ☐ Completed verification forms for:
  - ☐ 15.2 – Cane sugar self-indicating polarimetric saccharimeters
  - ☐ 17.1 – Brix hydrometers for cane juice

Two (2) test reports (each) from instrument tests you have completed in the workplace:

- ☐ 15.2 – Cane sugar self-indicating polarimetric saccharimeters
- ☐ 17.1 – Brix hydrometers for cane juice

I verify that the work submitted in this kit has been completed by me and relates to activities I have completed personally.

**Applicant's signature:**  **Date:**
Assessment recording form (Assessor)

Assessor to complete this section

<table>
<thead>
<tr>
<th>Name:</th>
<th>Date kit received:</th>
</tr>
</thead>
</table>

Evidence sources used to assess the applicant:

- [ ] Written assessments
- [ ] Completed verification form
- [ ] Review of test reports
- [ ] Report from supervisor/referee
- [ ] Practical observation
- [ ] Questioning/structured interview
- [ ] Other – specify:

This applicant was assessed as: Competent Not yet competent

<table>
<thead>
<tr>
<th>MSMSS00011 – Trade Measurement Verification (Simple Measuring Instrument)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSMTMVER302 Verify simple measuring instruments</td>
</tr>
<tr>
<td>MSMTMREF301 Use and maintain reference standards</td>
</tr>
</tbody>
</table>

Check the subclass(es) requested and whether they are competent or not yet competent:

<table>
<thead>
<tr>
<th>Competent</th>
<th>Not yet competent</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.2 – Cane sugar self-indicating polarimetric saccharimeters</td>
<td></td>
</tr>
<tr>
<td>17.1 – Brix hydrometers for cane juice</td>
<td></td>
</tr>
</tbody>
</table>

Applicant’s ID checked at interview: [ ]

Signature of assessor: Date:

RTO Manager’s signature: Date:
Applicant’s work history and training

Details of current employment

Organisation:

Postal address:

Period of employment (years):

Title of your current position:

Details of previous relevant employment

Organisation:

Postal address:

Period of employment (years):

Title of your previous position:

Relevant work experience

Specify the length of time you have been testing each type of instrument and the approximate number of instruments you have tested (including under supervision)

15.2 – Cane sugar self-indicating polarimetric saccharimeters

17.1 – Brix hydrometers for cane juice

Detail any relevant training courses you have attended (name and date) and attach copies of any relevant trade qualifications:
Written assessment (all subclasses)

Instructions
For multiple choice questions, circle the correct answer, or answers. If you make a mistake, cross through any answers that you wish to change with a line and circle the new correct answer.

E.g. Q 3. What is the colour of my dog?

- Black.
- Brown.
- Brindle.
- Spotty.

For free text questions, space is provided below each question where your response should be written, including any calculations.

If you need more space, complete it on a separate piece of paper and identify the question as per the following example:

‘Written assessment – all subclasses Q4’

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

   a) The requirement for all measuring instruments to be of an approved pattern and comply with their certificate of approval.
   b) Details of instrument reverification periods.
   c) References to the national instrument test procedures relevant to the servicing licence.
   d) Procedures relating to instruments that cannot be verified.

2. Which document, maintained by the servicing licensee, details the required format of the verification mark to be applied by verifiers working under that servicing licence? Choose the single correct answer.

   b) The licensee’s quality manual.
   c) The National Instrument Test Procedures.
   d) The licensee’s servicing licence.

3. What is the verification mark that you would apply to an instrument/measure you verified on 26 June 2016 if your servicing licensee code is DBA and you have the verifier number VR 01278? Choose the single correct answer.

   a) DBA 01278 F6
   b) 1278 F 16
   c) DBA1278F6
   d) 1278 DBA F16

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

   a) Replace the verification mark with one indicating the instrument can no longer be used.
   b) Remove any existing verification mark (where feasible).
   c) Notify the owner within 14 days.
   d) Notify the owner immediately.
   e) Notify NMI within 14 days.
   f) Notify NMI immediately.
5. If you verify a measuring instrument or measure, how long do you have to submit notice of the verification to the National Measurement Institute on the approved form? Choose the single correct answer.

   a) 7 days.
   b) 14 days.
   c) 21 days.
   d) 1 month.

6. If you were unsure of the correct way to apply a verification mark on a measuring instrument/measure, or whether or not you should apply a seal, what would you do? Write your answer below.

   ____________________________________________

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   ____________________________________________

   ____________________________________________

7. How often must a measuring instrument/measure used for trade be re-verified? Choose the single correct answer.

   a) Whenever an adjustment or repair affects its metrological performance.
   b) Whenever it has been adjusted/repaired or every 2 years.
   c) Every 3 years.
   d) Every 5 years.

8. Can you verify a measuring instrument/measure where the certificate of approval states 'cancelled in respect of new instruments as from 1 January 2014'? Choose the single correct answer.

   a) No, never.
   b) Yes, always.
   c) Yes, if the instrument/measure was manufactured before 1 January 2014.
   d) Yes, provided the instrument is new.

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

   a) No consequence, provided I told the trader they couldn't use the instrument/measure for trade.
   b) Customers could get incorrect measure.
   c) I could lose my job.
   d) Nothing, it's the trader's responsibility to check the instrument/measure is correctly marked.
   e) I could be fined.
   f) I could be restricted from verifying instruments/measures.
10. List the reference standards or equipment you use when verifying measuring instruments or measures? The answer you give should relate to all instrument subclasses for which you are being assessed. Write your answer below.

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

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

13. How do you control these factors when undertaking a verification? The answer you give should relate to all instrument subclasses for which you are being assessed. Write your answer below.

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

   a) Use it until it can be repaired.
   b) Quarantine it and then use it once repaired, if it is repairable.
   c) Quarantine it, until it has been repaired, tested and approved for use by the appropriate authority.
15. You have verified and marked a measuring instrument or measure when you realise that the reference standard or equipment that you used was damaged or faulty. What should you do with the verified instrument/measure? Write your answer below.

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

a) Nothing.
b) Notify my employer who will notify NMI within 14 days.
c) Notify my employer who will notify NMI within 2 months.
d) Call my local trade measurement inspector and leave a message.

17. What are the main workplace health and safety hazards that you face when verifying a measuring instrument or measure? Your answer should relate to the verification of instruments for which you are currently being assessed. Write your answer below.

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18. What do you do to minimise the risks from the hazards that you have identified when undertaking verification activities? Write your answer below.

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

   a) Ensure new standards have the appropriate certification.
   b) Allocate a junior member of staff to clean the new standards.
   c) Update the list of reference standards.
   d) Supply a copy of the updated list of reference standards to NMI within 30 days of the change.
   e) Supply a copy of the updated list of reference standards to NMI within 14 days.
20. The following questions relate to the connection of auxiliary devices to measuring equipment.

This question is not applicable if you are only being assessed for Brix hydrometers (17.1)

a) Which document specifies the requirements for the installation of auxiliary indicating or printing devices and POS systems installed prior to 1 August, 2012? Choose the single correct answer.

   i. S1/0/A
   ii. S1/0B
   iii. Supplementary certificate of approval for the device/system
   iv. Measuring instrument approval

b) Which document specifies the requirements for the installation of auxiliary indicating or printing devices installed after 1 August, 2012, excluding POS or Control systems? Choose the single correct answer.

   i. S1/0/A
   ii. S1/0B
   iii. Supplementary certificate of approval for the device/system
   iv. Measuring instrument approval

c) Which document specifies the requirements for the installation of POS systems installed after 1 August, 2012? Choose the single correct answer.

   i. S1/0/A
   ii. S1/0B
   iii. Supplementary certificate of approval for the device/system
   iv. Measuring instrument approval

d) When verifying an instrument which has an auxiliary device (other than a POS or control system) connected to it, what are the requirements for verification marking? Choose the single correct answer. Choose the single correct answer.

   i. Apply a mark to the instrument only
   ii. Apply a mark to the auxiliary device only
   iii. Apply a mark to both the auxiliary device and the instrument
Written assessment (15.2 Cane sugar self-indicating polarimetric saccharimeters specific questions)

Complete ONLY if you are being assessed for this subclass

1. What is the name, current version number and release date for the test procedure used to verify cane sugar self-indicating polarimetric saccharimeters (cane sugar polarimeters)? Choose the single correct answer.

   a) NITP 5.2 First edition – December 2011
   b) NITP 15.2 First edition - October 2012
   d) NMI V 0 First edition – February 2015

2. What measuring instrument does the pattern approval number 15/3/151 relate to? Choose the single correct answer.

   a) Polarimeter (Pol) Tubes used in cane sugar polarimeters to set Optical Length
   b) Schmidt & Haensch Model Polartronic Universal Polarimetric Saccharimeter and Polarimeter
   d) Foss model EyeFoss Grain Analysing Instrument.

3. Which of the following are required specifications for reference materials/standards used to test cane sugar polarimeters? Check all that apply

   a) Must have a current Regulation 13 or 21 certificate
   b) Must have a current test report
   c) Must have a current Regulation 48 certificate
   d) Uncertainties and variations must be within one third of the MPE for the class of instrument tested.
   e) A minimum of 4 quartz plate reference standards.
   f) A minimum of 3 certified reference sugar solutions, ranging from min to max capacity of the instrument under test.
   g) °Z optical rotation values must be at the wavelength of the instrument under test.
   h) Any thermometer used should have a maximum scale interval of 0.1 °C and an uncertainty of ±0.2 °C
   i) Any thermometer used should have a maximum scale interval of 1 °C and an uncertainty of ±0.5 °C

4. Consider the Certificate of Verification below and answer the following questions that relate to it.

   a) When do the reference standards expire? Choose the single correct answer.
      i. 29th May 2012
      ii. 28th May 2016
      iii. 30th October 2011
      iv. 6th June 2012
b) What is the calibration mark? Choose the single correct answer.
   i. 4322
   ii. PTB 4.21-4054038
   iii. 25.09 °Z
   iv. IP 909 – 1358 PTB 11

c) What is the certificate number of this notice of recognition? Choose the single correct answer.
   i. NMI2012-031-FEIM
   ii. PTB 4.21-4054038
   iii. 25665
   iv. IP 909 – 1358 PTB 11

d) What is the value of this reference standard? Choose the single correct answer.
   i. 4322
   ii. PTB 4.21-4054038
   iii. 25.09 °Z
   iv. IP 909 – 1358 PTB 11

e) What conditions applied to the calibration of the reference standard?

f) Who can issue Regulation 21 certificates? Choose the single correct answer.
   i. The National Association of Testing Authorities (NATA)
   ii. The Chief Metrologist
   iii. A verifying authority
   iv. Standards Australia
Notice of Recognition of a Foreign Reference Standard of Measurement

In accordance with regulation 21 of National Measurement Regulations 1999 (Cth), in force under the National Measurement Act 1960 (Cth), the Chief Metrologist recognises the following foreign reference standard:

Schmidt + Haensch
Quartz Control Plate
Calibration Mark: IP 909 – 1358 PTB II
Serial Number: 4332

Applicant: Brian Feim, PO Box 331, Yarra Junction, Victoria 3797


Note: Under regulation 21 of the National Measurement Regulations 1999 (Cth) this foreign reference standard of measurement is taken to be a reference standard of measurement under the National Measurement Act 1960 (Cth) and National Measurement Regulations 1999 (Cth). This notice of recognition is taken to be a certificate issued under regulation 19 of the National Measurement Regulations 1999 (Cth).


Accuracy: As given in PTB Calibration Certificate reference number PTB 4.21-4054038 dated 30 October 2011. This uncertainty is taken to be calculated in accordance with the principles in the JCGM 100: 2008 - Evaluation of Measurement Data – Guide to the Expression of Uncertainty in Measurement, with an interval estimated to have a level of confidence of 95% at the time of verification.

Dated this 6th day of June 2012

[Signature]

Dr P T H Fisk
Chief Executive Officer and Chief Metrologist
National Measurement Institute

Certificate No. NMI2012-031-FEIM Form No. NMI/R21Rec Rev. 2.0 Page 1 of 1
5. What is the MPE for the instrument approved as NMI 15/3/1? Choose the single correct answer.

   a) ± 0.05%
   b) ± 0.02 °Z
   c) ± 0.05 °Z
   d) ± 0.1 °Z

6. You are verifying a cane sugar polarimeter with the following characteristics:
   - Min -259 °Z
   - Max +259 °Z
   - Scale interval 0.01 °Z
   - Wavelength 546.2271 nm
   - Accuracy class 0.05
   - Routine analysis product – cane juice (Approximately 75 °Z)

   a) In the table below, check the optical rotational values at 546.2271 nm that must be included in the set of quartz plates used for testing this instrument from the options given.

   | -30 °Z | □ | +75 °Z | □ |
   | -25 °Z | □ | +90 °Z | □ |
   | +5 °Z  | □ | +95 °Z | □ |
   | +25 °Z | □ | +100 °Z | □ |
   | +50 °Z | □ | +130 °Z | □ |

   b) Are the values you have selected sufficient to complete testing of this instrument? Provide a reason for your answer.
7. What is meant by the term ‘admissible deviation’ (ΔL)?

8. What is the admissible deviation for a class 0.01 Pol tube of nominal length 50 mm? Choose the single correct answer.
   a) ±5 mm  
   b) ±5 µm  
   c) ±15 µm  
   d) ±0.5 mm

9. How is the admissible deviation for a pol tube determined?

10. What is meant by internal strain (with reference to a cover glass) and how might it affect the measurement in a cane sugar polarimeter?

11. What is the maximum permissible deviation due to internal strain in a cover glass? Choose the single correct answer.
   a) 0.01 °Z  
   b) 0.1 °Z  
   c) 0.5 °  
   d) 0.01 °
12. See the verification certificate for a reference standard thermometer given on page 19.

Complete the table below to give the true temperature for each temperature indicated by the thermometer, based on the report included, to 2 decimal places. Keep all your calculations and have them available at your interview.

<table>
<thead>
<tr>
<th>Indicated temperature °C</th>
<th>True Temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.4</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
</tr>
</tbody>
</table>

13. A cane sugar polarimeter of accuracy class 0.1, without automatic temperature correction, gives an indicated measurement $I_t$ of 100.12 °Z when a quartz plate reference standard of $QP_{20}$ +99.93 °Z is used at wavelength 589.440 nm. The recorded temperature (as corrected) $T_t$ is 26.1 °C.

a) What is the value of the quartz plate corrected to the calibration temperature - $QP_{CTt}$ rounded to 2 decimal places? Choose the single correct answer. Keep all your calculations and have them available at your interview.
   i. + 26.10 °C
   ii. + 100.12 °Z
   iii. + 100.01 °Z
   iv. + 100.02 °Z

b) Is the indicated reading within MPE?

14. Which of the following would trigger the need to re-verify a cane sugar polarimeter? Check **all** that apply.

   a) Replacement of a worn data plate
   b) Calibration adjustment of instrument
   c) Replacement of the temperature sensor.
   d) Replacement of the operator keyboard with touch screen with an identical screen.
   e) All of the above
MEASUREMENT REPORT ON

Digital thermometer with a detachable probe
Thermometer Range: -50 °C to +150 °C x 0.1 °C
Calibrated Range: 0 °C to +50 °C only
Serial number: 01029393, probe s/n 01029393

Accredited for compliance with ISO/IEC 17025.
Accreditation Number 1.

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

For further information contact: Umesh Kotwal
Telephone: +61 2 8467 3858
Email: umesh.kotwal@measurement.gov.au

Ref: RN152345 File: CB/15/0751 Checked: SMS Date: 14 October 2015
This report may not be published except in full unless permission for the publication of an approved extract has been obtained from the Chief Metrologist, National Measurement Institute.
For: National Measurement Institute, Trade Measurement Services, Brisbane 33 Kingal Place GEEBURG QLD 4034

Description: Digital thermometer with a detachable probe

Category of Standard: Reference Standard of Temperature

Class of Standard: N/A

Make and model: Delta Ohm, HD9215

Serial Number: 01029393, probe s/n 01029393

Calibrated Range: 0 °C to +50 °C only, as per customer request

Ambient Temperature: 20.5 °C to 21.2 °C

Date(s) of Test: 12 October 2015 to 13 October 2015

Table

<table>
<thead>
<tr>
<th>Device under test Temperature (°C)</th>
<th>Reference Temperature (°C)</th>
<th>Temperature Correction (°C)</th>
<th>Uncertainty (± °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+0.4 (ice point before)</td>
<td>0.0</td>
<td>-0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>10.4</td>
<td>10.0</td>
<td>-0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>20.4</td>
<td>20.0</td>
<td>-0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>30.5</td>
<td>30.0</td>
<td>-0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>40.6</td>
<td>40.0</td>
<td>-0.6</td>
<td>0.1</td>
</tr>
<tr>
<td>50.5</td>
<td>50.0</td>
<td>-0.5</td>
<td>0.1</td>
</tr>
<tr>
<td>+0.4 (ice point after)</td>
<td>0.0</td>
<td>-0.4</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Notes

1. The uncertainty stated in this Report has been calculated in accordance with the principles in JCGM 100:2008 - Evaluation of measurement data - Guide to the expression of uncertainty in measurement, and gives an interval estimated to have a level of confidence of 95%. Unless otherwise stated, a coverage factor of 2.0 has been used for all readings. The uncertainty applies at the time of measurement only and

Ref: RN152345 File: CB/15/0751 Checked: UMS Date: 14 October 2015
takes no account of any drift or other effects that may apply afterwards. When estimating the uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specification.

2. The temperature measurements contained in this measurement report are referenced to ITS-90.

3. An ice point check should be done every six months from the date of test. If the observed variation is more than the above uncertainty, then the thermometer should be re-calibrated.

4. The calibration was conducted at Trade Measurement Laboratory, Sydney, Bradfield Road, West Lindfield NSW 2070 using Test Method 14.6.1 Thermometers.

Mr Umesh Kotwal
for Dr P T H Fisk
Chief Metrologist

Mr Umesh Kotwal
NMI approved signatory

Ref: RN152345 File: CB/15/0751 Checked: UMS Date: 14 October 2015
Certificate of Verification of a Reference Standard of Measurement in accordance with Regulation 13 of the National Measurement Regulations 1999 (Cth) in accordance with the National Measurement Act 1960 (Cth)

Certificate Number RN152345

Description of standard of measurement: Digital thermometer with a detachable probe, Delta Ohm model HD9215
Thermometer Range: -50 °C to +99 °C x 0.1 °C
Calibrated Range: 0 °C to +50 °C

Permanent distinguishing marks: Serial No: 01029393, probe s/n 01029393

Date of verification: 13 October 2015

Period of certificate: From date of verification until 13 October 2017

Value(s) of standard of measurement: As stated in Report RN152345 of the National Measurement Institute

Accuracy of verification: Uncertainty of value(s) as stated in Report RN152345 of the National Measurement Institute

Values and uncertainties of relevant influence factors: As stated in Report RN152345 of the National Measurement Institute

Signature: __________________________ Date: 14 October 2015

Name of Signatory: Mr Umesh Kotwal

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

Note: Report RN152345 of the National Measurement Institute forms part of this Certificate.
15. You have recently been employed by a licensee who holds a licence for instruments of subclasses 15.2 and 17.1. You have obtained your statement of attainment for 17.1 but have yet to complete your assessment and obtain a statement of attainment for instrument subclass 15.2. Your manager tells you to verify a cane sugar polarimeter for a customer who needs the instrument verified this week. Usually your manager would do the verification, but he is away on a business trip. He tells you that he has confidence in your capability to verify the instruments, and you can use his verifier number, if you like. What should you do? Choose the single correct answer.

   a) Verify the instruments, using your verifier number.
   b) Verify the instruments, using your manager’s verifier number
   c) Test the instrument, but don’t apply a mark, then send it to the customer advising the instrument is accurate and can be used but your manager will apply the mark next week when he returns.
   d) Tell your manager you are not yet competent to verify the instrument.

16. You are carrying out annual accuracy tests on a number of cane sugar polarimeters for a customer. The instruments have been tested regularly over the last 5 years and shown consistent accuracy each time. From the first instrument you test, you notice significant measurement errors outside MPE. As you continue on, you find the same pattern of errors with all the instruments. What might be the reason for this and what should you do?
17. You are carrying out an annual accuracy check at a site when you notice that cane sugar polarimeters (NMI approval 15/3/1) are being used in a shed where there is no air conditioning and the temperatures is pushing 40 °C. What is the significance of this in relation to the use of this instrument (rather than any WHS considerations) and what action would you take?
Written Assessment (17.1 – Brix hydrometer specific questions)
Complete this section if you are being assessed for Brix hydrometers.

1. What is the name, current version number and release date for the national instrument test procedure used to verify Brix hydrometers? Choose the single correct answer.
   a) NITP 0 First edition – February 2015
   b) NITP 17.1 First edition – December 2015
   c) NITP 17.1 First edition, first revision – February 2016
   d) NITP 15.2 First edition – October 2012

2. Where should the verification mark be applied following the successful verification of a Brix hydrometer? Choose the single correct answer.
   a) The base of the Brix hydrometer bulb.
   b) On the Brix hydrometer storage case.
   c) Adjacent to the paper scale within the Brix hydrometer stem.
   d) A verification mark is not required.

3. While verifying a Brix hydrometer you notice the Regulation 13 certificate for your reference hydrometer expired two days ago. What should you do with the reference hydrometer?
   a) Use it to verify the Brix hydrometer and arrange for a new Regulation 13 certificate to be issued for the reference hydrometer immediately
   b) Quarantine it and then use it once a new Regulation 13 certificate has been issued
   c) Use it to verify the Brix Hydrometer and responsibly inform the customer the results may not be accurate.

4. What are the requirements for a reference standard hydrometer used for verifying Brix hydrometers?

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
5. These questions relate to the Regulation 13 certificate included on the following pages

   a) When does the reference standard expire?

   b) What uncertainty applies to the correction factors to be used with this reference standard?

   c) What is the certificate reference number?

   d) What conditions apply to the use of the reference standard?

   e) Assuming the conditions are identical to calibration conditions, what would be the corrected brix reading for a hydrometer reading of 20°Brix? Choose the single correct answer.
      i. 20°Brix
      ii. 19.813°Brix
      iii. 19.811°Brix
      iv. 19.809°Brix
CERTIFICATE OF VERIFICATION OF A REFERENCE STANDARD OF MEASUREMENT IN ACCORDANCE WITH REGULATION 13 OF THE NATIONAL MEASUREMENT REGULATIONS 1999 (Cth) IN ACCORDANCE WITH THE NATIONAL MEASUREMENT ACT 1960 (Cth)

Certificate Number RN122989

Description of standard of measurement: Brix Hydrometer

Permanent distinguishing marks: Serial No: 221291

Date of verification: 20 November 2012

This certificate is given for a period until: 20 November 2017

Value(s) of standard of measurement: As stated in Report RN122989 of the National Measurement Institute

Uncertainty of value(s): As stated in Report RN122989 of the National Measurement Institute

Values and uncertainties of relevant influence factors: As stated in Report RN122989 of the National Measurement Institute

Signature: 

Date: 3 December 2017

Name of Signatory: Dr John Man

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

Note: Report RN122989 of the National Measurement Institute forms part of this Certificate.
MEASUREMENT REPORT ON

A Brix Hydrometer
Serial No. 221291

Accredited for compliance with ISO/IEC 17025.
Accreditation Number 1.

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

For further information contact: Ms Xiu Jiang
TelephoneNumber: +61 2 8467 3515
Facsimile: +61 2 8467 3700
Email: Xiu.Jiang@measurement.gov.au

Ref: RN122989
File: CB/12/0932
Checked: √
Date: 22 November 2012

This report may not be published except in full unless permission for the publication of an approved extract has been obtained in writing from the Chief Metrologist, National Measurement Institute.
This hydrometer has been examined at the National Measurement Institute Lindfield, Bradfield Road, West Lindfield NSW 2070 and the corrections given in Table 1 are applicable to the scale readings when the hydrometer is used in a liquid at 20 °C and the surface tension as indicated.

### TABLE 1

<table>
<thead>
<tr>
<th>Scale Reading (*°Brix)</th>
<th>Density (g/ml)</th>
<th>Correction (*°Brix)</th>
<th>Surface Tension (mN/m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>1.058</td>
<td>-0.157</td>
<td>75</td>
</tr>
<tr>
<td>17</td>
<td>1.067</td>
<td>-0.173</td>
<td>75</td>
</tr>
<tr>
<td>19</td>
<td>1.076</td>
<td>-0.187</td>
<td>75</td>
</tr>
<tr>
<td>21</td>
<td>1.085</td>
<td>-0.191</td>
<td>75</td>
</tr>
<tr>
<td>23</td>
<td>1.094</td>
<td>-0.195</td>
<td>75</td>
</tr>
<tr>
<td>25</td>
<td>1.103</td>
<td>-0.194</td>
<td>75</td>
</tr>
</tbody>
</table>

When the sign of the correction is positive (+), the correction is to be added to the observed reading; when negative (-), the magnitude of the correction is subtracted from it.

The uncertainty associated with these corrections is ± 0.020 °Brix.

The uncertainty stated in this Report has been calculated in accordance with the principles in JCGM 100:2008 – Evaluation of measurement data - Guide to the expression of uncertainty in measurement, and gives an interval estimated to have a level of confidence of 95%. The coverage factor is equal to 2.0. The uncertainty applies at the time of measurement only and takes no account of any drift or other effects that may apply afterwards. When estimating the uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the performance of the instrument and the manufacturer's specifications.
NOTES AND CONDITIONS OF TEST

1. The corrections given in Table 1, when applied to readings taken on the hydrometer in a liquid having a surface tension and temperature as indicated, give the value in “Brix.

2. The results relate to readings taken at the intersection of the liquid surface with the scale, the readings being made by viewing the scale upwards through the liquid.

3. Corrections, in addition to those given in Table 1, must be applied if the hydrometer is used in conditions where temperature, surface tension or manner of reading differ from those for which the hydrometer is calibrated.

4. For each graduation line examined on the Brix Hydrometer scale, the corresponding density at 20 °C was determined. The “Brix is calculated with reference to the International Commission for Uniform Methods of Sugar Analysis ICUMSA Specification and Standard “Densimetry and Tables: Sucrose-Official; Glucose, Fructose and Invert Sugar – Official” ICUMSA SPS-4(1998).

5. The calibration of this hydrometer was carried out according to the Test Method and Work Instruction detailed in the NMI Project Operations Manual EAFA - Mass and Related Quantities. The relevant Test Method for this calibration is EAFA 8.2.8 Calibration of Hydrometers and the relevant Work Instruction is EAFA 9.2.5 Hydrometry Procedures.

Dr John Man
for Dr P T H Fisk
Chief Metrologist

Ms K Fen
NATA Approved Signatory

Ref: RN122989  File: CB/12/0932  Checked: ✔  Date: 22 November 2012
6. How do you confirm whether a liquid-in-glass thermometer is calibrated to be fully immersed or only partially immersed (i.e. how should a thermometer be used)? Choose the single correct answer.

   a) If scale intervals are not stated for the entire range the thermometer is calibrated to be fully immersed
   b) If all scale corrections are within ±0.2°C the thermometer is calibrated to be partially immersed.
   c) The calibration certificate for the thermometer will state whether it is a partial-immersion or full-immersion device.

7. Which of the following is one of the three requirements for a comparator jar? Choose the single correct answer.

   a) Sufficient depth so the hydrometers can float freely at least 25 mm above the bottom.
   b) The comparator jar shall be made of suitable opaque material.
   c) The dimensions shall be large enough to contain at least six hydrometers while maintaining at least 10 mm between hydrometers.
   d) The comparator jar shall be capable of containing at least 500 mL of liquid.

8. For each category/characteristic (a - d) below, select the single best option for a test liquid used to test Brix hydrometers.

<table>
<thead>
<tr>
<th>Category</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparency</td>
<td>Clear</td>
<td>Semi-transparent</td>
<td>Opaque</td>
<td></td>
</tr>
<tr>
<td>Colour</td>
<td>Colourless</td>
<td>White</td>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>Surface tension</td>
<td>25 mN/m</td>
<td>75 mN/m</td>
<td>75 N/m</td>
<td></td>
</tr>
<tr>
<td>Brix value</td>
<td>As requested by client</td>
<td>1000 to 1400 kg/m³</td>
<td>In the range of submitted instrument</td>
<td></td>
</tr>
</tbody>
</table>

9. Which is the most likely Brix reading in a 40 wt % aqueous solution of potassium iodide (KI)? Choose the single correct answer.

   a) 57.4
   b) 67
   c) 77.5
   d) >90

10. Describe the method you would use when taking a reading from a Brix hydrometer

   ____________________________________________________________
   ____________________________________________________________
   ____________________________________________________________
11. When taking a reading of the hydrometer, what should you do if you observe an abnormal meniscus/misshaped meniscus? Choose the single correct answer.

   a) Clean the stem or remove the hydrometer from the jar and thoroughly clean.
   b) Make a correction for the faulty meniscus reading.
   c) Take note of the temperature with each reading of the hydrometer.

12. For the following questions, use the look-up tables in the test procedures along with the certificate of verification for a Brix hydrometer given above at pages 27-30 (RN122989) and the correction table for the thermometer given below – assume the certificates are current as of today’s date.

   **Correction table for a reference thermometer**

<table>
<thead>
<tr>
<th>Reference Thermometer denomination (°C)</th>
<th>True Temperature (°C)</th>
<th>Temperature Correction (°C)</th>
<th>Uncertainty (±°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+0.3 (ice point before)</td>
<td>0.0</td>
<td>-0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>10.0</td>
<td>9.6</td>
<td>-0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>15.0</td>
<td>14.7</td>
<td>-0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>20.0</td>
<td>19.7</td>
<td>-0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>25.0</td>
<td>24.8</td>
<td>-0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>30.0</td>
<td>29.8</td>
<td>-0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>+0.3 (ice point after)</td>
<td>0.0</td>
<td>-0.3</td>
<td>0.1</td>
</tr>
</tbody>
</table>

a) Complete the table on the next page, by using interpolation, to provide temperature corrections you will use later in this question. **For the purpose of this question, interpolate to two (2) decimal places.**
Temperature Correction Table to Convert Observed Temperature to True Temperature for the Thermometer

<table>
<thead>
<tr>
<th>Observed temp (°C)</th>
<th>Correction (°C)</th>
<th>True temp (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Certified</td>
<td>Interpolated</td>
</tr>
<tr>
<td>20.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) Using the observed temperatures and hydrometer readings given and the relevant look-up table, complete the table below for a single test point of a Brix hydrometer under test. Provide your answers to 2 decimal places.

Note: there was a long break between the first two readings and the third reading.

Comparison against a reference standard

Test point 1

<table>
<thead>
<tr>
<th>Observed temperature</th>
<th>True temperature</th>
<th>Hydrometer serial # or designation</th>
<th>Tick if ref std.</th>
<th>Observed Brix reading</th>
<th>Temperature-corrected Brix value (°Bx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.2</td>
<td>XYZ467</td>
<td></td>
<td></td>
<td>15.20</td>
<td></td>
</tr>
<tr>
<td>20.2</td>
<td>221291</td>
<td></td>
<td>☐</td>
<td>15.22</td>
<td></td>
</tr>
<tr>
<td>20.2</td>
<td>XYZ467</td>
<td>☑</td>
<td></td>
<td>15.20</td>
<td></td>
</tr>
<tr>
<td>20.2</td>
<td>221291</td>
<td>☑</td>
<td></td>
<td>15.25</td>
<td></td>
</tr>
<tr>
<td>20.9</td>
<td>XYZ467</td>
<td>☐</td>
<td></td>
<td>15.15</td>
<td></td>
</tr>
<tr>
<td>20.9</td>
<td>221291</td>
<td>☐</td>
<td></td>
<td>15.20</td>
<td></td>
</tr>
</tbody>
</table>

Add extra rows for multiple hydrometers under test
c) Is the data at test point 1 validated? Provide a reason for your answer.


d) Complete the examination of results table using the corrected values provided.

Examination of results

<table>
<thead>
<tr>
<th>Test point number</th>
<th>Reference standard hydrometer:</th>
<th>Hydrometer under test:</th>
<th>Difference/error</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[Scale and temperature-corrected]</td>
<td>Temperature-corrected Brix value (°Bx)</td>
<td>Brix value (°Bx)</td>
</tr>
<tr>
<td></td>
<td>True Brix value (°Bx)</td>
<td></td>
<td>(°Bx)</td>
</tr>
<tr>
<td>1</td>
<td>24.01</td>
<td>23.93</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>23.98</td>
<td>23.89</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>24.01</td>
<td>23.91</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>19.50</td>
<td>19.45</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>19.48</td>
<td>19.44</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>19.52</td>
<td>19.47</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15.03</td>
<td>15.22</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15.04</td>
<td>15.22</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>15.02</td>
<td>15.17</td>
<td></td>
</tr>
</tbody>
</table>

e) Does the hydrometer pass? Provide a reason for your answer.
13. You have just been employed by a licensee who holds a licence for instruments of subclasses 15.1, 15.2, and 17.1. You have obtained your statements of attainment for 15.1 and 15.2 but have yet to obtain a statement of attainment for instrument subclass 17.1 but have been involved with the industry using Brix hydrometers for many years. Your manager tells you to verify a set of new Brix hydrometers that are required urgently for a customer, while he is away on a business trip, telling you that you know what you are doing. He says you can use his verifier number, if you are not comfortable using your own number. What should you do? Choose the single correct answer.

a) Verify the hydrometers, using your verifier number.
b) Verify the hydrometers, using your manager’s verifier number.
c) Tell your manager that you are not yet competent to verify the instrument.

14. When collecting a number of Brix hydrometers from a customer for an annual accuracy check, you notice that a lot of the hydrometers are scratched and dirty and are no longer kept within their original cases. Is there anything you would say to the customer?

15. If the measurement scale strip within a verified density hydrometer used for trade has moved, what should you do? Check all that apply.

a) Re-verify the hydrometer
b) Remove the verification mark as it no longer meets the requirements for verification
c) Issue a notice of non-verification
d) All of the above
Verification form task

Download a Certificate of Verification or notice of non-verification of a measuring instrument from (Form 6) from the NMI website.

Complete the form using the information given below.

Once you have completed the form, scan it and include it in your submitted recognition kit. You will need to complete 2 forms if being assessed for both subclasses.

For subclass 15.2
- Verification carried out at Greenfields Sugar Refinery, Lot 456 Excalibur HWY, Mount Marron, SA 5099
- Verification carried out on the 14/9/17 by Angelique Roscoe Verifier number VR-06999.
- Licensee is Calpak Pty Ltd SL-0865, Licensee’s Mark is XXX. Licensee’s ABN is 56785678567
- Instrument Verified is a Schmidt & Haensch Model Polartronic Universal Polarimetric Saccharimeter and Polarimeter Tube, approval number 15/3/150, serial number IN4254737
- Accuracy class 0.1
- Also verified Schmidt & Haensch pol tube of 50 mm nominal length serial number A1253 accuracy class 0.03
- Instrument was verified at the request of the customer, but was not outside MPE prior to verification.

For subclass 17.1
- Verification carried out at licensee’s premises and instrument owned by licensee - Sugartec Pty Ltd, 43 Atlas Drive, Mackay, QLD 4740.
- Verification carried out on the 23/11/2017 by Dan Nguyen Verifier number VR-01111.
- Licensee is Sugartec Pty Ltd SL-0989, Licensee’s Mark is STQ. Licensee’s ABN is 434353536565
- Instrument Verified has approval number NMI 17/1/0, Manufactured by Labware, capacity -2 to +8 °Brix, serial number M173356.
- Instrument was verified as new.
Test report question (Subclass 15.2)
Complete the test report for cane sugar polarimeters below (page 39) using the information provided. Where any calculations are required to complete any parts of the test report, then complete the calculations so you can fully populate the test report form. At the bottom of the form state whether the instrument has passed or failed and give reasons for any failure.

Scan the completed form and include it with your recognition kit.

Assume that ALL tests required to be completed for the instrument for INITIAL verification have been carried out and passed, where not described below, and complete the form appropriately.

If you do not currently have a verifier number, use the verifier number VR-09999.

Details:
Verification carried out on 14/2/2017 at Greenfields Sugar Refinery, Lot 456 Excalibur HWY, Mount Marron, SA 5099
Contact - manager Ed Dawson.
Instrument owned by Greenfields Agricultural and Rural Pty Ltd, 463 King St, Adelaide 5000.
Instrument verified - A Schmidt & Haensch model M101 Polartronic Sugar Purity Analyser Polarimetric Saccharimeter, NMI 15/3/1, accuracy class 0.05, with a scale interval of 0.01°Z, and an operating range of±259 °Z, used to measure cane sugar juice.
Serial Number 546342355
No additional indicating devices are connected.
Instrument used and tested at an operating wavelength of 882.60 nm.
New instrument used for analysing cane sugar juice of typical value 75 °Z.
Instrument has automatic temperature correction.
Includes Schmidt & Haensch pol tube of nominal length 100 mm, serial number R1945

For the details of the reference standards to be included on the test report, use the following information:

<table>
<thead>
<tr>
<th>Quartz plate number</th>
<th>Serial number</th>
<th>( QP_{20} ) (°Z) @ 882.60 nm</th>
<th>Reg 21 details</th>
<th>Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>934766</td>
<td>+75.15</td>
<td>546331</td>
<td>6/2/20</td>
</tr>
<tr>
<td>2</td>
<td>836483</td>
<td>-24.97</td>
<td>538655</td>
<td>4/11/19</td>
</tr>
<tr>
<td>3</td>
<td>834625</td>
<td>+50.85</td>
<td>536234</td>
<td>18/10/19</td>
</tr>
<tr>
<td>4</td>
<td>738565</td>
<td>+99.93</td>
<td>512212</td>
<td>21/6/17</td>
</tr>
</tbody>
</table>

Instrument data:
Visual inspection: All components are as per certificate of approval and the instrument is in good condition, with no adverse findings – repaired instrument. Assume POL tube and cover glasses meet all requirements.
Data plate markings:

Pattern approval mark – NMI No. 15/3/1
Manufacturer's name – Schmidt & Haensch
Model – M202
Serial number - 546342355
Verification scale interval – 0.01 °Z
Wavelength – 589.44 nm
Temperature range - 15 to 30°C

Test results:

Repeatability
Used quartz plate standard number 1
Instrument readings:
75.18; 75.15; 75.16; 75.13

Accuracy

<table>
<thead>
<tr>
<th>Quartz plate number</th>
<th>Instrument indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>-24.98</td>
</tr>
<tr>
<td>3</td>
<td>50.86</td>
</tr>
<tr>
<td>4</td>
<td>99.95</td>
</tr>
</tbody>
</table>

Include any additional information calculated from the data and determine whether the instrument has passed the required tests for an instrument of this accuracy class.
Test Report for Self-indicating Polarimetric Saccharimeters

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 on premises ..................................................................................................................

Address where located ............................................................................................................................

Description of saccharimeter (select one):
☐ Mechanical circular polariser  ☐ Optomagnetic polariser  ☐ Quartz wedge polariser
☐ Other balancing mechanism (give details) ...........................................................................................

Manufacturer ............................................. Model ........................................... Operating wavelength (nm) .........................

Serial number ................................................. Certificate(s) of approval number .............................................

Measuring range (°Z)  Minimum .............................................. Maximum .................................................

Length(s) of the pol tubes routinely used:
☐ 200 mm  ☐ 100 mm  ☐ 50 mm  ☐ 10 mm

Temperature correction status (select one):
☐ Automatic  ☐ Manual (automatic facility unavailable/disabled)

Quartz plate(s) serial number and optical rotation:

<table>
<thead>
<tr>
<th>Serial number</th>
<th>Optical rotation (°Z)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Product type(s) analysed and typical optical rotation range(s):

<table>
<thead>
<tr>
<th>Product/sample</th>
<th>Optical rotation (°Z)</th>
<th>min</th>
<th>max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product/sample</th>
<th>Optical rotation (°Z)</th>
<th>min</th>
<th>max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product/sample</th>
<th>Optical rotation (°Z)</th>
<th>min</th>
<th>max</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Does the saccharimeter comply with its certificate of approval?  ☐ Yes  ☐ No

Are all mandatory descriptive markings clearly and permanently marked on the data plate?  ☐ Yes  ☐ No

Is the saccharimeter complete?  ☐ Yes  ☐ No

Are all seals (physical and electronic) intact?  ☐ Yes  ☐ No  ☐ n/a

Is the saccharimeter on a firm base?  ☐ Yes  ☐ No

Is the saccharimeter clean?  ☐ Yes  ☐ No

Is the saccharimeter adequately protected against influences that are likely to affect its performance?  ☐ Yes  ☐ No

For additional indicating devices: do they exactly repeat the information on the primary indication?  ☐ Yes  ☐ No  ☐ n/a

For devices for ticket/label printing: do they comply with the requirements of General Supplementary Certificate S1/0B?  ☐ Yes  ☐ No  ☐ n/a
### Details of the Standards of Measurement (see clause 2)

<table>
<thead>
<tr>
<th>Quartz plates</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certified optical rotation at saccharimeter wavelength (°Z)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Expanded uncertainty (k = 2) (°Z)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation 13 or 21 number</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation 13 or 21 expiry date</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Thermometer** (only for saccharimeters with manual temperature correction)

| Serial number |   |   |   |   |   |   |
| Smallest scale graduation/interval (°C) |   |   |   |   |   |   |
| Uncertainty of corrections (k = 2) (°C) |   |   |   |   |   |   |
| Calibration expiry date |   |   |   |   |   |   |

### Test Results for Automatic Temperature Correction (see clauses 4.2 and 4.3)

<table>
<thead>
<tr>
<th>Plate number</th>
<th>QP&lt;sub&gt;20&lt;/sub&gt; (°Z)</th>
<th>I&lt;sub&gt;20&lt;/sub&gt; (°Z)</th>
<th>Error&lt;sub&gt;20&lt;/sub&gt; (°Z) (I&lt;sub&gt;20&lt;/sub&gt; – QP&lt;sub&gt;20&lt;/sub&gt;) (for comparison with MPE)</th>
<th>Error&lt;sub&gt;20&lt;/sub&gt; range (°Z) (for comparison with MPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
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<td></td>
</tr>
<tr>
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<td>3</td>
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<td></td>
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</tr>
<tr>
<td>3</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Test Results for Manual Temperature Correction (see clauses 4.2 and 4.3)

<table>
<thead>
<tr>
<th>Plate number</th>
<th>QP&lt;sub&gt;20&lt;/sub&gt; (°Z)</th>
<th>Observed temp (°C)</th>
<th>True temp T&lt;sub&gt;t&lt;/sub&gt; (°C)</th>
<th>I&lt;sub&gt;t&lt;/sub&gt;</th>
<th>CT&lt;sub&gt;QP&lt;/sub&gt;</th>
<th>QP&lt;sub&gt;CTI&lt;/sub&gt; (QP&lt;sub&gt;20&lt;/sub&gt; + CT&lt;sub&gt;QP&lt;/sub&gt;)</th>
<th>Error&lt;sub&gt;t&lt;/sub&gt; (°Z) (k – QP&lt;sub&gt;CTI&lt;/sub&gt;) (for comparison with MPE)</th>
<th>Error&lt;sub&gt;t&lt;/sub&gt; range (°Z) (for comparison with MPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
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<tr>
<td>2</td>
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<td></td>
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<td></td>
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<tr>
<td>3</td>
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<td></td>
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<tr>
<td>4</td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

* 0.000 144 × QP<sub>20</sub> × (T<sub>t</sub> – 20) or 0.000 139 × QP<sub>20</sub> × (T<sub>t</sub> – 20)

Did the saccharimeter pass the inspection, repeatability and accuracy tests? □ Yes □ No

Was the saccharimeter verified? □ Yes □ No

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

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

Comments ..........................................................................................................................
## Temperature Correction Table to Convert Observed Temperature to True Temperature

<table>
<thead>
<tr>
<th>Observed temp (°C)</th>
<th>Correction (°C)</th>
<th>True temp (°C)</th>
<th>Observed temp (°C)</th>
<th>Correction (°C)</th>
<th>True temp (°C)</th>
<th>Observed temp (°C)</th>
<th>Correction (°C)</th>
<th>True temp (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.0</td>
<td>19.7</td>
<td>25.4</td>
<td>14.1</td>
<td>19.8</td>
<td>25.5</td>
<td>14.2</td>
<td>19.9</td>
<td>25.6</td>
</tr>
<tr>
<td>14.3</td>
<td>20.0</td>
<td>25.7</td>
<td>14.4</td>
<td>20.1</td>
<td>25.8</td>
<td>14.5</td>
<td>20.2</td>
<td>25.9</td>
</tr>
<tr>
<td>14.6</td>
<td>20.3</td>
<td>26.0</td>
<td>14.7</td>
<td>20.4</td>
<td>26.1</td>
<td>14.8</td>
<td>20.5</td>
<td>26.2</td>
</tr>
<tr>
<td>14.9</td>
<td>20.6</td>
<td>26.3</td>
<td>15.0</td>
<td>20.7</td>
<td>26.4</td>
<td>15.1</td>
<td>20.8</td>
<td>26.5</td>
</tr>
<tr>
<td>15.2</td>
<td>20.9</td>
<td>26.6</td>
<td>15.3</td>
<td>21.0</td>
<td>26.7</td>
<td>15.4</td>
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<td>26.8</td>
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<tr>
<td>15.5</td>
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<td>27.1</td>
</tr>
<tr>
<td>15.8</td>
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<td>27.2</td>
<td>15.9</td>
<td>21.6</td>
<td>27.3</td>
<td>16.0</td>
<td>21.7</td>
<td>27.4</td>
</tr>
<tr>
<td>16.1</td>
<td>21.8</td>
<td>27.5</td>
<td>16.2</td>
<td>21.9</td>
<td>27.6</td>
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<td>27.7</td>
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<td>22.4</td>
<td>28.1</td>
<td>16.9</td>
<td>22.5</td>
<td>28.2</td>
<td>17.0</td>
<td>22.6</td>
<td>28.3</td>
</tr>
<tr>
<td>17.1</td>
<td>22.7</td>
<td>28.4</td>
<td>17.2</td>
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<td>17.3</td>
<td>22.9</td>
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<tr>
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<td>23.3</td>
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<td>18.0</td>
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<td>23.7</td>
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</tr>
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<td>18.3</td>
<td>23.9</td>
<td>29.6</td>
<td>18.4</td>
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<td>18.6</td>
<td>24.2</td>
<td>29.9</td>
<td>18.7</td>
<td>24.3</td>
<td>30.0</td>
<td>18.8</td>
<td>24.4</td>
<td>30.1</td>
</tr>
<tr>
<td>18.9</td>
<td>24.5</td>
<td>30.2</td>
<td>19.0</td>
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<td>30.3</td>
<td>19.1</td>
<td>24.7</td>
<td>30.4</td>
</tr>
<tr>
<td>19.2</td>
<td>24.8</td>
<td>30.5</td>
<td>19.3</td>
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<td>19.4</td>
<td>25.0</td>
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<td>30.8</td>
<td>19.6</td>
<td>25.2</td>
<td>30.9</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Workplace test reports and documents

In your workplace you need to develop your skills by testing instruments of the subclasses for which you are being assessed under the supervision of an experienced, competent verifier. When completing tests, record your results in test reports using the template test report from the test procedure or the report used in your workplace.

For each of the subclasses 15.2 and 17.1

From those test reports you have produced, select two that represent your best work and demonstrate your understanding of the test procedures, perhaps because the instrument failed the tests. Try to include reports of testing of different types of instrument.

Scan those test reports and include them with your completed recognition kit.

If you are being assessed for more than one subclass, include two per subclass.

Once you have completed all your written assessments and test reports, ask your supervisor/referee to complete the following form before you scan and email it to NMI.
**Report of supervisor or referee**

We are seeking reports from a supervisor or referee who works closely with the applicant and who can comment on his/her ability to verify measures, weights or instruments in accordance with statutory requirements either in the workplace or a simulated workplace environment. Please be sure to provide written comments to support your responses to the questions below. Thank you for your contribution.

**Please complete both pages of this report.**

**During the last 12 months I have observed the applicant test the undermentioned instruments in accordance with the National Instrument Test Procedures with close attention to detail and accuracy**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>If yes, number of instruments tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.2 – Cane sugar self-indicating polarimetric saccharimeters</td>
<td>☐</td>
<td>☐</td>
<td>☐&lt;3 ☐ 3+ ☐</td>
</tr>
<tr>
<td>17.1 – Brix hydrometers for cane juice</td>
<td>☐</td>
<td>☐</td>
<td>☐&lt;3 ☐ 3+ ☐</td>
</tr>
</tbody>
</table>

**In addition, the applicant has demonstrated to me on at least three occasions (in a simulated environment) how a verification label should be marked and where it should be applied to instruments of these subclasses**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**To your knowledge, does the applicant:**

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Not applicable or not able to comment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>plan site visits to ensure quality outcomes and minimise impacts on traders, their suppliers and employees</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>explain verification procedures and outcomes clearly to traders</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>demonstrate professionalism and respect the rights of traders at all times</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>mark instruments in accordance with the requirements for verification (under supervision if not already a verifier for other instrument subclasses)</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>access and interpret certificates of approval</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>work safely and effectively without close supervision</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>solve routine problems</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>solve unexpected problems</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Name of supervisor/referee:**

**Signature:**

**Date:**

---

RK 15.2 & 17.1 V1.0
Report of supervisor or referee

Please provide comments below to support the responses contained in this form:

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

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____________________________________________________________________________________

Are you a verifier?

Yes ☐ No ☐ Verifier number:

Please describe briefly your level of experience in verifying instruments of these subclasses:

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

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For referees, please describe your business relationship with the applicant:

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

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____________________________________________________________________________________

____________________________________________________________________________________

Name of supervisor/referee:

Signature: Date:
Review of applicant’s test reports
(to be completed by the assessor)

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

Use the check boxes to record if the documents have been completed/evaluated correctly

<table>
<thead>
<tr>
<th>Instrument subclass</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.2 – Cane sugar self-indicating polarimetric saccharimeters</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>17.1 – Brix hydrometers for cane juice</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Comments on the submitted documents:

________________________________________________________________________

________________________________________________________________________

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________________________________________________________________________

Assessor’s signature: ___________________________ Date: ____________
Record of interview with the applicant
(to be completed by the assessor)

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

Use the check boxes to record where questions have been asked in relation to the following topics. It is not mandatory to ask questions for all topics if satisfactory evidence of competency has already been provided. Assessor to attach a list of questions asked and responses given (Correct answer or detail of any incorrect response)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Satisfactory</th>
<th>Unsatisfactory</th>
<th>Not asked</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liaison with trader</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Certificates of approval</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Operating environment</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Work, health and safety</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Maximum permissible errors</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Test procedures</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Test points</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Analysis of test results</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Marking instruments and verification documentation</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Reporting test results</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Inadequate use of instruments by trader</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Servicing licence documentation and procedures including maintaining confidentiality and security of data</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Applicant’s ID checked at interview:** ☐

**Assessor’s signature:**

**Date:**
Practical observation report  
(to be completed by the assessor)

As part of your assessment, your assessor may wish to observe you conducting a simulated verification. If completed, your assessor will use this checklist to record your ability to verify measures, weights or measuring instruments in accordance with legal requirements.

I have observed the applicant complete a verification test on the following instrument(s) and simulate applying a verification mark (give details of instrument/measure tested):

<table>
<thead>
<tr>
<th>Use the check boxes to record your observations and attach a separate sheet for your observations.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Did the applicant:</strong></td>
</tr>
<tr>
<td>Liaise and communicate effectively with the trader?</td>
</tr>
<tr>
<td>Evaluate and adjust the impact of the operating environment on the performance of the instrument(s)?</td>
</tr>
<tr>
<td>Apply appropriate safety precautions?</td>
</tr>
<tr>
<td>Identify, access, interpret and apply certificates of approval?</td>
</tr>
<tr>
<td>Identify, access, interpret and apply relevant test procedures?</td>
</tr>
<tr>
<td>Apply appropriate maximum permissible errors?</td>
</tr>
<tr>
<td>Analyse test results to determine whether the instrument could be marked for trade use?</td>
</tr>
<tr>
<td>Report results and findings clearly and accurately?</td>
</tr>
</tbody>
</table>

**Assessor’s signature:**

**Date:**