

Schedule

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Certificate No. : LA-2007-0373-C

Issue No. : 16

Date : 31 March 2022

Page : 1 of 6

FIELD OF TESTING : Calibration and Measurement

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITIES (CMC *)
A. VOLUMETRIC		
1. Piston Pipettes (EX)		
a. Single & Multi-Channel, Air Displacement Calibration Volume: (0.1 to 10) µL (>10 to 20) µL (>20 to 30) µL (>30 to 50) µL (>50 to 100) µL (>100 to 200) µL (>200 to 300) µL (>300 to 1000) µL (>1000 to 1250) µL (>1250 to 5000) µL (>5 to 10) mL	In-House Procedure (BioCal™) BF-SOP-01 (R18)	0.013 µL 0.014 µL 0.017 µL 0.019 µL 0.07 µL 0.09 µL 0.10 µL 0.14 µL 0.24 µL 1.0 µL 2.1 µL
b. Single Channel, Positive Displacement Calibration Volume: (1 to 10) µL (>10 to 25) µL (>25 to 50) µL (>50 to 100) µL (>100 to 1000) µL	In-House Procedure (BioCal™) BF-SOP-01 (R18)	0.015 µL 0.031 µL 0.028 µL 0.06 µL 0.09 µL

Schedule



Certificate No. : LA-2007-0373-C

Issue No. : 16

Date : 31 March 2022

Page : 2 of 6

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<p>c. Single Channel, Repetitive Calibration Volume:</p> <p>(1 to 20) µL</p> <p>(>20 to 100) µL</p> <p>(>100 to 500) µL</p> <p>(>500 to 1000) µL</p> <p>(>1000 to 5000) µL</p> <p>(>5 to 10) mL</p> <p>(>10 to 25) mL</p> <p>(>25 to 50) mL</p>	In-House Procedure (BioCal™) BF-SOP-01 (R18)	0.017 µL 0.031 µL 0.07 µL 0.13 µL 0.38 µL 0.9 µL 1.8 µL 3.3 µL
<p>2. Bottle-Top Dispensers (Piston Operated, EX)</p> <p>Calibration Volume :</p> <p>(0.05 to 0.5) mL</p> <p>(>0.5 to 2) mL</p> <p>(>2 to 10) mL</p> <p>(>10 to 25) mL</p> <p>(>25 to 100) mL</p>	In-House Procedure (BioCal™) BF-SOP-01 (R18)	0.16 µL 0.24 µL 1.3 µL 5.8 µL 6.4 µL
<p>3. Bottle-Top Burettes (Piston Operated, EX)</p> <p>Calibration Volume:</p> <p>(1 to 25) mL</p> <p>(>25 to 50) mL</p>	In-House Procedure (BioCal™) BF-SOP-01 (R18)	1.7 µL 2.7 µL
<p>4. Dilutors (Piston Operated)</p> <p>Sample Volume (IN) or Diluent Volume (EX)</p> <p>(2.5 to 25) mL</p> <p>(>25 to 50) mL</p>	In-House Procedure (BioCal™) BF-SOP-01 (R18)	0.0023 mL 0.0043 mL
<p>5. Syringes (Digital with Reusable Plungers, EX)</p> <p>Calibration Volume:</p> <p>(0.2 to 25) µL</p> <p>(>25 to 50) µL</p> <p>(>50 to 100) µL</p> <p>(>100 to 1000) µL</p> <p>(>1000 to 5000) µL</p>	In-House Procedure (BioCal™) BF-SOP-01 (R18)	0.013 µL 0.014 µL 0.021 µL 0.08 µL 0.46 µL

Schedule



Certificate No. : LA-2007-0373-C

Issue No. : 16

Date : 31 March 2022

Page : 3 of 6

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<p>6. Peristaltic Pump (EX) Calibration Flow Rate: 2 µL/min (>2 to 90) µL/min (>90 to 840) µL/min (>840 to 5000) µL/min (>5 to 24) mL/min (>24 to 100) mL/min (>100 to 1000) mL/min (>1000 to 5000) mL/min</p>	<p>In-House Procedure (BioCal™) BF-SOP-01 (R18)</p>	<p>0.024 µL/min 0.037 µL/min 3.6 µL/min 24 µL/min 0.15 mL/min 0.41 mL/min 4.7 mL/min 24 mL/min</p>
<p>7. Volumetric Flasks (IN) Calibration Volume: (5 to 10) mL (>10 to 20) mL (>20 to 25) mL (>25 to 50) mL (>50 to 100) mL (>100 to 250) mL (>250 to 500) mL (>500 to 1000) mL (>1000 to 2000) mL</p>	<p>In-House Procedure (BioCal™) BF-SOP-05 (R05)</p>	<p>0.0045 mL 0.0074 mL 0.011 mL 0.014 mL 0.018 mL 0.020 mL 0.038 mL 0.073 mL 0.12 mL</p>
<p>8. Graduated Cylinders (IN) Calibration Volume: (1 to 10) mL (>10 to 25) mL (>25 to 50) mL (>50 to 100) mL (>100 to 250) mL (>250 to 500) mL (>500 to 1000) mL (>1000 to 2000) mL (>2000 to 5000) mL</p>	<p>In-House Procedure (BioCal™) BF-SOP-05 (R05)</p>	<p>0.013 mL 0.027 mL 0.049 mL 0.069 mL 0.12 mL 0.23 mL 0.39 mL 0.62 mL 3.0 mL</p>
<p>9. Glass Burettes (EX) Calibration Volume: (1 to 10) mL (>10 to 25) mL (>25 to 50) mL</p>	<p>In-House Procedure (BioCal™) BF-SOP-05 (R05)</p>	<p>0.0033 mL 0.0059 mL 0.0093 mL</p>

Schedule



Certificate No. : LA-2007-0373-C

Issue No. : 16

Date : 31 March 2022

Page : 4 of 6

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITIES (CMC *)
B. MECHANICAL		
1. Weighing Balances		
In-House Calibration using OIML Class E ₁ weights :		
<u>Range</u>	<u>Resolution</u>	
(0 to 5) g	0.001 mg	0.012 mg
(0 to 22) g	0.001 mg	0.023 mg
(0 to 50) g	0.01mg	0.05 mg
(0 to 100) g	0.01 mg	0.10 mg
On-Site Calibration using OIML Class E ₂ weights :		
<u>Range</u>	<u>Resolution</u>	
(0 to 2) g	0.1 µg	0.024 mg
(0 to 5) g	0.001 mg	0.032 mg
(0 to 6) g	0.001 mg	0.048 mg
(0 to 52) g	0.001 mg	0.067 mg
(0 to 40) g	0.01 mg	0.09 mg
(0 to 100) g	0.01 mg	0.13 mg
(0 to 230) g	0.01 mg	0.24 mg
(0 to 220) g	0.1 mg	0.3 mg
(0 to 230) g	0.1 mg	0.4 mg
(0 to 520) g	0.1 mg	0.6 mg
(0 to 2300) g	0.001 g	0.003 g
(0 to 6100) g	0.01 g	0.02 g
(0 to 12,000) g	0.01 g	0.03 g
(0 to 15,000) g	0.1 g	0.2 g
2. Rotational Speed Measurement		
In-House/On-Site: (0 to 20,000) rpm		
	In-House Procedure (BioCal™) BF-SOP-09 (R04)	5.7 rpm
3. Time Measurement		
In-House/On-Site: (1 to 180) min		
	In-House Procedure (BioCal™) BF-SOP-09 (R04)	0.15 sec

Schedule



Certificate No. : LA-2007-0373-C

Issue No. : 16

Date : 31 March 2022

Page : 5 of 6

MEASURED QUANTITIES / RANGE / INSTRUMENT TO BE CALIBRATED	METHOD	CALIBRATION & MEASUREMENT CAPABILITIES (CMC *)
C. TEMPERATURE		
1. Centrifuges		
In-House/On-Site:		
a) Sample Temperature (4 to 25) °C	In-House Procedure (BioCal™) BF-SOP-09 (R04)	0.64 °C
b) Chamber Temperature (4 to 25) °C		0.62 °C
2. Thermocyclers (PCR Systems)		
In-House/On-Site:		
Using MTAS™ System with Up to 15 Temperature Sensors		
Values in order of cycling temperatures :		
95 °C	In-House Procedure (BioCal™) BF-SOP-04 (R04)	0.29 °C
30 °C		0.29 °C
90 °C		0.29 °C
50 °C		0.28 °C
70 °C		0.29 °C
60 °C		0.29 °C
3. Temperature Enclosures (Fridge, Freezers, Incubators, Ovens, Furnaces & Liquid Baths)		
On-Site Calibration:		
(-86 to -81) °C	In-House Procedure (BioCal™) BF-SOP-06 (R05)	0.80 °C
(-80 to -21) °C		0.59 °C
(-20 to 100) °C		0.49 °C
(101 to 200) °C		0.65 °C
4. Heating Block / Dry Bath		
In-House/On-Site:		
(4 to 100) °C	In-House Procedure (BioCal™) BF-SOP-07 (R01)	0.66 °C
(101 to 150) °C		0.79 °C

Schedule



Certificate No. : LA-2007-0373-C

Issue No. : 16

Date : 31 March 2022

Page : 6 of 6

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<p>5. Temperature Sensors (with or without Indicator)</p> <p>a. Thermocouples Type T (-80 °C to 250) °C Type K (-80 °C to 400) °C</p> <p>b. PRT / RTD (-80 to -20) °C (-19 to 100) °C (101 to 200) °C (201 to 300) °C (301 to 400) °C</p> <p>D OPTICAL</p> <p>1. UV-Vis Spectrophotometers with Spectral Bandwidth 1-5 nm</p> <p>In-House/On-Site:</p> <p>a) Wavelength Accuracy (241 to 641) nm</p> <p>b) Photometric Accuracy (235, 257, 313 & 350) nm</p>	<p>In-House Procedure (BioCal™) BF-SOP-11 (R02)</p> <p>In-House Procedure (BioCal™) BF-SOP-10 (R03)</p>	<p>0.25 °C 0.59 °C</p> <p>0.081 °C 0.072 °C 0.088 °C 0.093 °C 0.12 °C</p> <p>0.18 nm</p> <p>20 mg/L – 0.013 A 60 mg/L – 0.014 A 100 mg/L – 0.016 A</p>

* CMC is expressed as an expanded uncertainty estimated at a level of confidence of approximately 95%.

Approved signatories

Mr Sim Koon Meng	For all calibration except items B2, C1, C4 and C5.
Ms Quek Wang Sim	For all calibration.
Ms Lim Pei San	For all calibration except item A.
Ms Veronica	For item A.

Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and **management system requirements** that are necessary for it to consistently deliver technically valid calibration results. The **management system requirements** in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001.