

Schedule

Mettler-Toledo (S) Pte Ltd
Blk 28 Ayer Rajah Crescent
#01-02A
Singapore 139959

Certificate No. : LA-2005-0329-C

Issue No. : 14

Date : 14 August 2018

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FIELD OF TESTING : Calibration and Measurement

MEASURED QUANTITIES/ INSTRUMENT/ RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
A. MECHANICAL		
1. Weighing Balances and Scales		
In-house / on-site calibration	QP-SVC-7-011, Rev.:17, 9 April 2018	
	QP-SVC-7-010 Rev.: 14, 9 April 2018	
<u>Range</u>		
0 to 2.1 g		0.030 mg
0 to 5.1 g		0.035 mg
0 to 22 g	i) Off-center errors	0.06 mg
0 to 52 g	ii) Hysteresis	0.065 mg
0 to 220 g	iii) Repeatability	0.2 mg
0 to 220 g	iv) Accuracy and Linearity	0.16 mg
0 to 520 g		0.5 mg
0 to 1 210 g	<u>Environmental Conditions:</u>	0.002 g
0 to 2 300 g	Temperature : 18 °C to 29 °C	0.006 g
0 to 8 100 g	Relative Humidity : 45 % to 73 %	0.02 g
0 to 10 100 g	Air pressure: 1005 hPa to 1030 hPa	0.02 g
0 to 32 000 g		0.1 g
0 to 150 000 g		0.4 g

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<p>2. Weighing Balances and Scales (ACC)</p> <p>On-site calibration</p> <p>2A. Balance</p> <table> <thead> <tr> <th>Range</th> <th>Resolution</th> </tr> </thead> <tbody> <tr><td>≤ 20mg</td><td>0.000 1 mg</td></tr> <tr><td>> 20mg . ≤ 50mg</td><td>0.000 1 mg</td></tr> <tr><td>> 50mg . ≤ 100mg</td><td>0.000 1 mg</td></tr> <tr><td>> 100mg ≤ 200mg</td><td>0.000 1 mg</td></tr> <tr><td>> 200mg ≤ 500mg</td><td>0.000 1 mg</td></tr> <tr><td>> 500mg ... ≤ 1g</td><td>0.000 1 mg</td></tr> <tr><td>> 1g ... ≤ 2g</td><td>0.000 1 mg</td></tr> <tr><td>> 2g ... ≤ 5g</td><td>0.000 1 mg</td></tr> <tr><td>> 5g ... ≤ 6g</td><td>0.000 1 mg</td></tr> <tr><td>> 6g ... ≤ 10g</td><td>0.00 1 mg</td></tr> <tr><td>> 10g ... ≤ 20g</td><td>0.00 1 mg</td></tr> <tr><td>> 20g ... ≤ 50g</td><td>0.00 1 mg</td></tr> <tr><td>> 50g ... ≤ 100g</td><td>0.0 1 mg</td></tr> <tr><td>> 100g ... ≤ 150g</td><td>0.0 1 mg</td></tr> <tr><td>> 150g ... ≤ 200g</td><td>0.0 1 mg</td></tr> <tr><td>> 200g ... ≤ 300g</td><td>0.0 1 mg</td></tr> <tr><td>> 300g ... ≤ 400g</td><td>0.0 1 mg</td></tr> <tr><td>> 400g ... ≤ 500g</td><td>0.0 1 mg</td></tr> <tr><td>> 500g ... ≤ 700g</td><td>0. 1 mg</td></tr> <tr><td>> 700g ≤ 1000g</td><td>0. 1 mg</td></tr> <tr><td>> 1kg ... ≤ 1.5kg</td><td>0. 1 mg</td></tr> <tr><td>> 1.5kg ... ≤ 2kg</td><td>0. 1 mg</td></tr> <tr><td>> 2kg ... ≤ 2.3kg</td><td>0. 1 mg</td></tr> <tr><td>> 2.3kg ... ≤ 3kg</td><td>1 mg</td></tr> <tr><td>> 3kg ... ≤ 4kg</td><td>1 mg</td></tr> <tr><td>> 4kg ... ≤ 5.1kg</td><td>1 mg</td></tr> <tr><td>> 5.1kg ... ≤ 6kg</td><td>1 mg</td></tr> <tr><td>> 6kg ... ≤ 7kg</td><td>0.0 1 g</td></tr> <tr><td>> 7kg ... ≤ 8kg</td><td>0.0 1 g</td></tr> <tr><td>> 8kg ... ≤ 10kg</td><td>0.0 1 g</td></tr> </tbody> </table>	Range	Resolution	≤ 20mg	0.000 1 mg	> 20mg . ≤ 50mg	0.000 1 mg	> 50mg . ≤ 100mg	0.000 1 mg	> 100mg ≤ 200mg	0.000 1 mg	> 200mg ≤ 500mg	0.000 1 mg	> 500mg ... ≤ 1g	0.000 1 mg	> 1g ... ≤ 2g	0.000 1 mg	> 2g ... ≤ 5g	0.000 1 mg	> 5g ... ≤ 6g	0.000 1 mg	> 6g ... ≤ 10g	0.00 1 mg	> 10g ... ≤ 20g	0.00 1 mg	> 20g ... ≤ 50g	0.00 1 mg	> 50g ... ≤ 100g	0.0 1 mg	> 100g ... ≤ 150g	0.0 1 mg	> 150g ... ≤ 200g	0.0 1 mg	> 200g ... ≤ 300g	0.0 1 mg	> 300g ... ≤ 400g	0.0 1 mg	> 400g ... ≤ 500g	0.0 1 mg	> 500g ... ≤ 700g	0. 1 mg	> 700g ≤ 1000g	0. 1 mg	> 1kg ... ≤ 1.5kg	0. 1 mg	> 1.5kg ... ≤ 2kg	0. 1 mg	> 2kg ... ≤ 2.3kg	0. 1 mg	> 2.3kg ... ≤ 3kg	1 mg	> 3kg ... ≤ 4kg	1 mg	> 4kg ... ≤ 5.1kg	1 mg	> 5.1kg ... ≤ 6kg	1 mg	> 6kg ... ≤ 7kg	0.0 1 g	> 7kg ... ≤ 8kg	0.0 1 g	> 8kg ... ≤ 10kg	0.0 1 g	<p>QP-SVC-7-025, Rev.:01 18 April 2017 (Euramet Cg-18)</p> <p><u>Uncertainty contributions:</u></p> <p>i) Rounding error at load ii) Rounding error at no load iii) Error due to eccentricity iv) Error due to repeatability v) Uncertainty of reference mass vi) Correction of air buoyancy vii) Correction of drift of weights viii) Correction of convection</p>	<p>0.0019 mg 0.0025 mg 0.0030 mg 0.0036 mg 0.0048 mg 0.0059 mg 0.0071 mg 0.0094 mg 0.0150 mg 0.020 mg 0.030 mg 0.062 mg 0.14 mg 0.22 mg 0.25 mg 0.38 mg 0.48 mg 0.61 mg 2.1 mg 3.0 mg 4.5 mg 5.9 mg 7.0 mg 9 mg 12 mg 15 mg 25 mg 0.027 g 0.029 g 0.035 g</p>
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<p>2B. Scale</p> <table border="0"> <thead> <tr> <th><u>Range</u></th> <th><u>Resolution</u></th> </tr> </thead> <tbody> <tr><td>> 10kg ... ≤ 15kg</td><td>0.1 g</td></tr> <tr><td>> 15kg ... ≤ 20kg</td><td>0.1 g</td></tr> <tr><td>> 20kg ... ≤ 30kg</td><td>0.1 g</td></tr> <tr><td>> 30kg ... ≤ 40kg</td><td>0.1 g</td></tr> <tr><td>> 40kg ... ≤ 50kg</td><td>0.1 g</td></tr> <tr><td>> 50kg ... ≤ 60kg</td><td>0.1 g</td></tr> <tr><td>> 60kg ... ≤ 64kg</td><td>0.1 g</td></tr> <tr><td>> 64kg ... ≤ 150kg</td><td>1 g</td></tr> <tr><td>> 150kg ... ≤ 300kg</td><td>1 g</td></tr> <tr><td>> 300kg ... ≤ 600kg</td><td>10 g</td></tr> <tr><td>> 600kg ... ≤ 1000kg</td><td>10 g</td></tr> </tbody> </table>	<u>Range</u>	<u>Resolution</u>	> 10kg ... ≤ 15kg	0.1 g	> 15kg ... ≤ 20kg	0.1 g	> 20kg ... ≤ 30kg	0.1 g	> 30kg ... ≤ 40kg	0.1 g	> 40kg ... ≤ 50kg	0.1 g	> 50kg ... ≤ 60kg	0.1 g	> 60kg ... ≤ 64kg	0.1 g	> 64kg ... ≤ 150kg	1 g	> 150kg ... ≤ 300kg	1 g	> 300kg ... ≤ 600kg	10 g	> 600kg ... ≤ 1000kg	10 g		<p>0.19 g 0.19 g 0.20 g 0.25 g 0.26 g 0.28 g 0.29 g 1.6 g 2.8 g 38 g 180 g</p>
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<p>3. Pipettes</p> <p>Accuracy and Precision Test In-house only</p> <p><u>Range</u></p> <p>0.2 µl to 2 µl 2.1 µl to 10 µl 10.1 µl to 20 µl 20.1 µl to 100 µl 100.1 µl to 200 µl 200.1 µl to 300 µl 300.1 µl to 1000 µl 1000.1 µl to 2000 µl 2000.1 µl to 5000 µl 5000.1 µl to 10 000 µl 10 000.1 to 50 000 µl</p>	<p>QP-SVC-7-019, Rev.: 09 9 April 2018</p>	<p>0.011 µl 0.012 µl 0.02 µl 0.039 µl 0.077 µl 0.13 µl 0.34 µl 0.65 µl 1.1 µl 2.6 µl 5.7 µl</p>																								

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<p>4. Standard Weights (Lab) (Class F and below) In-house calibration</p> <p><u>Range</u> 1 mg 2 mg 5 mg 10 mg 20 mg 50 mg 100 mg 200 mg 500 mg 1 g 2 g 5 g 10 g 20 g 50 g 100 g 200 g 500 g 1 kg 2 kg 5 kg 10 kg 20 kg</p>	<p>QP-SVC-7-021, Rev.: 04, 10 June 2015</p>	<p>0.003 mg 0.003 mg 0.003 mg 0.003 mg 0.004 mg 0.005 mg 0.007 mg 0.007 mg 0.01 mg 0.02 mg 0.02 mg 0.02 mg 0.03 mg 0.04 mg 0.05 mg 0.06 mg 0.11 mg 0.3 mg 0.6 mg 0.7 mg 3 mg 4 mg 6 mg</p>
<p>5. Standard Weights (Lab) (Class E2 ONLY) In-house calibration</p> <p><u>Range</u> 1 mg 2 mg 5 mg</p>	<p>QP-SVC-7-026, Rev.: 01, 11 April 2018</p>	<p>0.001 mg 0.002 mg 0.002 mg</p>

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10 mg		0.002 mg
20 mg		0.002 mg
50 mg		0.002 mg
100 mg		0.002 mg
200 mg		0.003 mg
500 mg		0.004 mg
1 g		0.005 mg
2 g		0.006 mg
5 g		0.010 mg
10 g		0.016 mg
20 g		0.019 mg
50 g		0.020 mg
100 g		0.02 mg
200 g		0.05 mg
500 g		0.13 mg
1 kg		0.30 mg
2 kg		0.50 mg
6. Standard Weights (IND) (Class M2 and below) In-house calibration	WI-SVC-MAS-001, Rev.:01 24 April 2018	
<u>Range</u> 1000 kg		0.06 kg

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

Approved signatories :

Mr Lee Yong Yee - All items
Mr Tan Aik Chuan - All items
Mr Orlando Encabo - Item 2 only
Mr Marlee Jay S. Mangahas - Item 2 only

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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 test 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.