

Mass Calibration Report

METTLER TOLEDO

Report No: MC2311073

Mettler-Toledo (S) Pte Ltd

Address	1 Clementi Loop #02-03A, Singapore 129808
Telephone	65 6890 0011
Facsimile	65 6890 0012

Customer Information

Name of customer : Mettler-Toledo Pac Rim AG Taiwan Branch (Switzerland)
Customer Address : Jiu Zong Rd Neihu District 17 Lane 171 Sec 2 Taipei Taiwan
R.O.C.11494 Taiwan

Customer's Weight Information

Customer Weight Serial No/ ID : C143834690 / SVC-W066
Customer's Weight Range : 1mg - 1kg
Customer's Weight Class : E Class
Customer Weight Manufacturer : Mettler-Toledo

Calibration Location

METTLER TOLEDO Mass Calibration Laboratory
1 Clementi Loop #02-03A, Singapore 129808

Calibration Information

Calibration Date : 15-Nov-23
Report Issue Date : 16-Nov-23
Work Order No. : 220720349
Equipment Type : Mass Comparator
Manufacturer : Mettler Toledo

Details of Mass Comparators can be found on Pg 2

Environment Conditions

Atmospheric Pressure, hPa : 1012.2
Ambient Temperature, °C : 20.4
Relative Humidity, %RH : 53.15



Cheng Yu Xiang
Calibration Officer



Sun Xueyang
Approved Signatory



Report No: MC2311073

Method of Calibration

The calibration procedure is performed according to Mettler-Toledo quality procedure reference no. QP-SVC-9-020 and using Standard mass set serial number C314945270 traceable to international standards with calibration report number C314945270.

The calibration was performed by comparison with the reference weights of the Calibration Laboratory in a controlled environment by using substitution weighing method (ABA) on a mass comparator. The conventional mass values were determined.

Reference


Conventional density of the weights : 8000 kg/m³
 Mean air density : 1.20 kg/m³

Reference standards instrument :

Instrument	OIML Class	Model	Serial No.	Certificate No.	Due Date
Mass comparator	N/A	XP205CDR	B321363756	SG0114-027-071723-ACC-SG	17-Jul-24
Mass comparator	N/A	XP2004S	B323399156	SG0036-046-071723-ACC-SG	17-Jul-24
Mass comparator	N/A	XP26003L	B323399155	SG0036-047-071723-ACC-SG	17-Jul-24
Mass comparator	N/A	XPE26C	B502454763	SG0036-048-071823-ACC-SG	18-Jul-24
Mass comparator	N/A	XPE505C	B502465607	SG0114-028-071723-ACC-SG	17-Jul-24
METTLER TOLEDO Weight Set	E1	1mg to 2kg	C314945270	C314945270	19-Apr-24

The results reported herein have been performed in accordance with the laboratory's term of accreditation under Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme.

The reports shall not be reproduced except in full, unless the management representative of the accredited inspection body/ laboratory has given approval in writing.



 Cheng Yu Xiang
 Calibration Officer



Report No. MC2311073

Results of Calibration

Nominal Value	Marking /Serial No.	OIML Class	Conventional Mass Correction g	Measured Conventional Mass g	Expanded Uncertainty g	OIML Tolerance g	Within Class Tolerance? (Y/N)
1mg		E2	0.000002	0.001002	0.000002	0.000006	Y
2mg		E2	0.000002	0.002002	0.000002	0.000006	Y
2mg	*	E2	0.000001	0.002001	0.000002	0.000006	Y
5mg		E2	0.000002	0.005002	0.000002	0.000006	Y
10mg		E2	0.000002	0.010002	0.000003	0.000008	Y
20mg		E2	0.000002	0.020002	0.000003	0.000010	Y
20mg	*	E2	0.000006	0.020006	0.000003	0.000010	Y
50mg		E2	0.000004	0.050004	0.000004	0.000012	Y
100mg		E2	0.000006	0.100006	0.000005	0.000016	Y
200mg		E2	0.000008	0.200008	0.000007	0.000020	Y
200mg	*	E2	0.000006	0.200006	0.000007	0.000020	Y
500mg		E2	-0.000003	0.499997	0.000008	0.000025	Y
1g		E2	0.000011	1.000011	0.000010	0.000030	Y
2g		E2	-0.000003	1.999997	0.000013	0.000040	Y
2g	*	E2	-0.000007	1.999993	0.000013	0.000040	Y
5g		E2	-0.000003	4.999997	0.000017	0.000050	Y
10g		E2	0.000017	10.000017	0.000020	0.000060	Y
20g		E2	0.000027	20.000027	0.000027	0.000080	Y
20g	*	E2	0.000037	20.000037	0.000027	0.000080	Y
50g		E2	0.000000	50.000000	0.000003	0.00010	Y
100g		E2	-0.000001	99.99999	0.000005	0.00016	Y
200g		E2	0.000005	200.000005	0.000010	0.00030	Y
200g	*	E2	0.000006	200.000006	0.000010	0.00030	Y
500g		E2	0.000019	500.000019	0.000027	0.00080	Y
1kg		E2	0.0005	1000.0005	0.0005	0.0016	Y

Note : Asterisk mark "*" denotes weights with marking or bent tip.

The calibration results apply only on the above calibrated item and was found accurate as shown on date and place of calibration.

The associated expanded uncertainty of measurement were estimated at a level of confidence of approximately 95% with a coverage factor of k = 2.

The user should determine the suitability of the weight(s) for its intended use.

Cheng Yu Xiang
Calibration Officer



Schedule

Mettler-Toledo (S) Pte Ltd
1 Clementi Loop
#02-03A
Singapore 129808

Certificate No. : LA-2005-0329-C
Issue No. : 19
Date : 06 November 2023
Expiry of Certificate : 12 June 2026
Page : 1 of 7

FIELD OF TESTING : Calibration and Measurement

MEASURED QUANTITIES/ INSTRUMENT/ RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
MECHANICAL		
1. Weighing Balances and Scales		
On-site calibration	QP-SVC-9-011, Rev.:18 27 May 2019	
<u>Range</u>	<u>Resolution</u>	
0 to 2.1 g	0.000 1 mg	0.030 mg
0 to 5.1 g	0.000 1 mg	0.035 mg
0 to 22 g	0.001 mg	i) Off-center errors 0.06 mg
0 to 52 g	0.001 mg	ii) Hysteresis 0.065 mg
0 to 220 g	0.1 mg	iii) Repeatability 0.2 mg
0 to 220 g	0.01mg	iv) Accuracy and Linearity 0.16 mg
0 to 520 g	0.1 mg	0.5 mg
0 to 1 210 g	0.001 g	<u>Environmental Conditions:</u> 0.002 g
0 to 2 300 g	0.001 g	Temperature : 18 °C to 29 °C 0.006 g
0 to 8 100 g	0.01 g	Relative Humidity : 45 % to 73 % 0.02 g
0 to 10 100 g	0.01 g	Air pressure: 1005 hPa to 1030 hPa 0.02 g
0 to 32 000 g	0.1 g	0.1 g
0 to 150 000 g	0.1 g	0.4 g

Schedule



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MEASURED QUANTITIES/ INSTRUMENT/ RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)																																																																																																																												
2. Weighing Balances and Scales (ACC) On-site calibration	QP-SVC-9-024, Rev.:03 13 September 2019 (Euramet Cg-18)																																																																																																																													
2A. Balance	<u>Uncertainty contributions:</u>																																																																																																																													
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Schedule



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<p>2B. Scale</p> <table border="0"> <thead> <tr> <th><u>Range</u></th> <th><u>Resolution</u></th> <th></th> </tr> </thead> <tbody> <tr><td>> 10kg ... ≤ 15kg</td><td>0.1 g</td><td>0.19 g</td></tr> <tr><td>> 15kg ... ≤ 20kg</td><td>0.1 g</td><td>0.19 g</td></tr> <tr><td>> 20kg ... ≤ 30kg</td><td>0.1 g</td><td>0.20 g</td></tr> <tr><td>> 30kg ... ≤ 40kg</td><td>0.1 g</td><td>0.25 g</td></tr> <tr><td>> 40kg ... ≤ 50kg</td><td>0.1 g</td><td>0.26 g</td></tr> <tr><td>> 50kg ... ≤ 60kg</td><td>0.1 g</td><td>0.28 g</td></tr> <tr><td>> 60kg ... ≤ 64kg</td><td>0.1 g</td><td>0.29 g</td></tr> <tr><td>> 64kg ... ≤ 150kg</td><td>1 g</td><td>1.6 g</td></tr> <tr><td>> 150kg ... ≤ 300kg</td><td>1 g</td><td>2.8 g</td></tr> <tr><td>> 300kg ... ≤ 600kg</td><td>10 g</td><td>38 g</td></tr> <tr><td>> 600kg ... ≤ 1000kg</td><td>10 g</td><td>180 g</td></tr> </tbody> </table>	<u>Range</u>	<u>Resolution</u>		> 10kg ... ≤ 15kg	0.1 g	0.19 g	> 15kg ... ≤ 20kg	0.1 g	0.19 g	> 20kg ... ≤ 30kg	0.1 g	0.20 g	> 30kg ... ≤ 40kg	0.1 g	0.25 g	> 40kg ... ≤ 50kg	0.1 g	0.26 g	> 50kg ... ≤ 60kg	0.1 g	0.28 g	> 60kg ... ≤ 64kg	0.1 g	0.29 g	> 64kg ... ≤ 150kg	1 g	1.6 g	> 150kg ... ≤ 300kg	1 g	2.8 g	> 300kg ... ≤ 600kg	10 g	38 g	> 600kg ... ≤ 1000kg	10 g	180 g		
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<p>3. Piston Operated Devices (Ex)</p> <p>Accuracy and Precision Test In-house only</p>	<p>QP-SVC-9-018, Rev.: 13 09 May 2022</p>																																					
<p>3A Single & Multi-Channel Air Displacement (Type A), (Ex)</p> <table border="0"> <thead> <tr> <th><u>Range</u></th> <th></th> </tr> </thead> <tbody> <tr><td>0uL < V ≤ 2uL</td><td>0.0044 µl</td></tr> <tr><td>2uL < V ≤ 10uL</td><td>0.0057 µl</td></tr> <tr><td>10uL < V ≤ 20uL</td><td>0.016 µl</td></tr> <tr><td>20uL < V ≤ 50uL</td><td>0.027 µl</td></tr> <tr><td>50uL < V ≤ 100uL</td><td>0.034 µl</td></tr> <tr><td>100uL < V ≤ 200uL</td><td>0.082 µl</td></tr> <tr><td>200uL < V ≤ 300uL</td><td>0.085 µl</td></tr> <tr><td>300uL < V ≤ 1000uL</td><td>0.16 µl</td></tr> <tr><td>1000uL < V ≤ 1200uL</td><td>0.34 µl</td></tr> <tr><td>1200uL < V ≤ 2000uL</td><td>0.67 µl</td></tr> <tr><td>2000uL < V ≤ 10 000uL</td><td>1.1 µl</td></tr> <tr><td>10 000uL < V ≤ 20 000uL</td><td>4.6 uL</td></tr> </tbody> </table>	<u>Range</u>		0uL < V ≤ 2uL	0.0044 µl	2uL < V ≤ 10uL	0.0057 µl	10uL < V ≤ 20uL	0.016 µl	20uL < V ≤ 50uL	0.027 µl	50uL < V ≤ 100uL	0.034 µl	100uL < V ≤ 200uL	0.082 µl	200uL < V ≤ 300uL	0.085 µl	300uL < V ≤ 1000uL	0.16 µl	1000uL < V ≤ 1200uL	0.34 µl	1200uL < V ≤ 2000uL	0.67 µl	2000uL < V ≤ 10 000uL	1.1 µl	10 000uL < V ≤ 20 000uL	4.6 uL												
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MEASURED QUANTITIES/ INSTRUMENT/ RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
3B Single Channel, Positive Displacement Type D (Ex) <u>Range</u> 0uL < V ≤ 10uL 10uL < V ≤ 25uL 25uL < V ≤ 50uL 50uL < V ≤ 100uL 100uL < V ≤ 250uL 250uL < V ≤ 500uL 500uL < V ≤ 1000uL		0.0019 uL 0.018 uL 0.027 uL 0.039 uL 0.098uL 0.17 uL 0.20 uL
3C Multiple Type Delivery Systems (Ex) <u>Range</u> 0uL < V ≤ 2uL 2uL < V ≤ 10uL 10uL < V ≤ 20uL 20uL < V ≤ 100uL 100uL < V ≤ 200uL 200uL < V ≤ 1 000uL 1 000uL < V ≤ 5 000uL 5 000uL < V ≤ 10 000uL 10 000uL < V ≤ 50 000uL		0.0087 uL 0.017 uL 0.018 uL 0.023 uL 0.11 uL 0.19 uL 0.48 uL 0.92 4.70 uL
3D Single Channel, Repetitive (Ex) <u>Range</u> 0uL < V ≤ 10uL 10uL < V ≤ 20uL 20uL < V ≤ 100uL 100uL < V ≤ 200uL 200uL < V ≤ 1 000uL 1 000uL < V ≤ 2 000uL		0.0019 uL 0.0023 uL 0.0077 uL 0.023 uL 0.091 uL 0.18 uL
3E Bottle Top Dispenser (Ex) <u>Range</u> 0mL < V ≤ 5mL 5mL < V ≤ 10mL 10mL < V ≤ 12.5mL 12.5mL < V ≤ 25mL 25mL < V ≤ 50mL 50mL < V ≤ 100mL		1.9 uL 2.1 uL 7.1 uL 10 uL 13 uL 17 uL
3F Bottle Top Burette (Ex) <u>Range</u> 0mL < V ≤ 25mL		2.4uL

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MEASURED QUANTITIES/ INSTRUMENT/ RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
4. Standard Weights (Lab) (Class F and below) In-house calibration <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	QP-SVC-9-020, Rev.: 07, 19 September 2019	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

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MEASURED QUANTITIES/ INSTRUMENT/ RANGE TO BE CALIBRATED	METHOD	CALIBRATION AND MEASUREMENT CAPABILITY (CMC*)
5. Standard Weights (Lab) (Class E2 ONLY) In-house calibration <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	QP-SVC-9-020, Rev.: 07, 19 September 2019	0.001 mg 0.002 mg 0.002 mg 0.002 mg 0.002 mg 0.002 mg 0.002 mg 0.003 mg 0.004 mg 0.005 mg 0.006 mg 0.010 mg 0.016 mg 0.019 mg 0.020 mg 0.02 mg 0.05 mg 0.13 mg 0.30 mg 0.50 mg
6. Standard Weights (IND) (Class M2 and below) In-house calibration <u>Range</u> 1000 kg	WI-SVC-MAS-001, Rev.:00 02 August 2016	0.06 kg

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

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Approved Signatories:

Mr Lee Yong Yee · For all items
Mr Chua Wen Feng · For all items
Mr James Ng · For items 1 & 2B
Mr Antonius Christian · For items 1 & 2A
Mr Sun Xueyang · For items 3, 4, 5 & 6

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.