

ภาคผนวก 9

เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์

Mettler-Toledo (Thailand) Limited
272 Soi, Sorvithai 4, Bangkapi
Huaykwang, Bangkok 10310
THAILAND
www.mt.com



Accuracy Calibration Certificate

Customer

Company: WATER INDEX & CONSULTANT CO., LTD.
Address: 229/7-8 Soi Charansanitwong 55/1, Charansanitwong Rd., Bang-sor
City: Bangkok
Contact: Nungnuthai Sairat
Zip / Postal: 10700
State / Province: Bangkok
Order Number: 6331978164

Weighing Device

Manufacturer: Mettler-Toledo
Model: MS204TS100
Serial No.: B721237367
Building: Office
Floor: 2
Room: Laboratory
Instrument Type: Weighing Instrument
Asset Number: 300E17
Terminal Model: N/A
Terminal Serial No.: N/A
Terminal Asset No.: N/A

Range	Max. Capacity	Repeatability (g)
1	220 g	0.0001 g

Procedure

Calibration Guideline: EURAMET cp-18 v. 4.0 (11/2015)
Mettler-Toledo Work Instruction: CP1W003/16

This calibration certificate contains measurements for As Found and As Left calibrations.
The sensitivity/span of the weighing instrument was adjusted before As Found and As Left calibrations with a built-in weight.

	Temperature	Humidity
As Found	Start: 26.2 °C End: 26.9 °C	Start: 41.5 % End: 42.4 %
As Left	Start: 26.9 °C End: 26.5 °C	Start: 41.3 % End: 41.3 %

As Found Calibration Date: 25-Aug-2020
As Left Calibration Date: 25-Aug-2020

Issue Date: 16-Aug-2020

Calibrator: Phibawat Kunavalli

Approved Signatory: *[Signature]*

☐ Kasakorn Tassanachaisakul
☐ Santi Jirinyom
☒ Surachet Sukkate

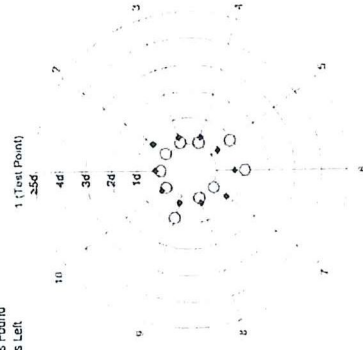
Measurement Results

Repeatability

Test Load: 100 g
As Found
As Left

Position	As Found	As Left
1	99.9998 g	100.0001 g
2	99.9998 g	100.0000 g
3	99.9998 g	100.0001 g
4	99.9998 g	100.0001 g
5	99.9997 g	100.0001 g
6	99.9995 g	100.0000 g
7	99.9995 g	100.0000 g
8	99.9995 g	100.0001 g
9	99.9997 g	100.0001 g
10	99.9990 g	100.0001 g

Standard Deviation	0.00008 g	0.00005 g
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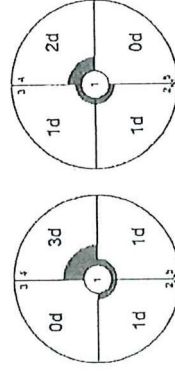
The "g" in the graph represents the readability of the range/interval in which the test was performed.
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9998 g	100.0000 g
2	99.9999 g	100.0001 g
3	99.9998 g	100.0001 g
4	99.9995 g	99.9998 g
5	99.9997 g	100.0000 g

Maximum Deviation	0.0003 g	0.0002 g
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As Found

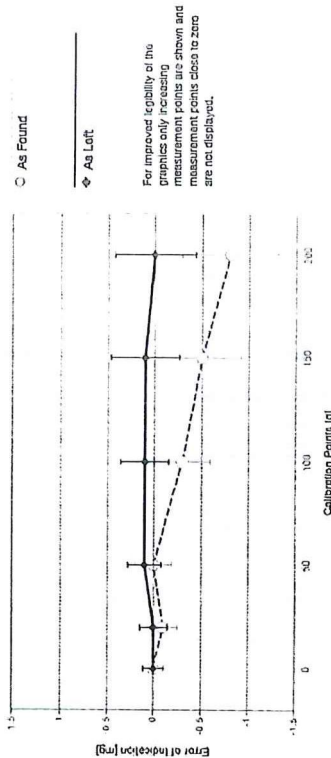
As Left

The "g" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.13 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.14 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.14 mg	2
4	0.5000 g	0.5000 g	0.0000 g	0.14 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.14 mg	2
6	10.0000 g	10.0000 g	0.0000 g	0.15 mg	2
7	20.0000 g	19.9998 g	-0.0001 g	0.15 mg	2
8	50.0000 g	50.0000 g	0.0000 g	0.20 mg	2
9	100.0000 g	99.9997 g	-0.0003 g	0.29 mg	2
10	150.0000 g	149.9995 g	-0.0005 g	0.42 mg	2
11	200.0000 g	199.9992 g	-0.0008 g	0.51 mg	2

As Left	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.11 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.13 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.13 mg	2
4	0.5000 g	0.5000 g	0.0000 g	0.13 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.13 mg	2
6	10.0000 g	10.0000 g	0.0000 g	0.14 mg	2
7	20.0000 g	20.0000 g	0.0000 g	0.15 mg	2
8	50.0000 g	50.0001 g	0.0001 g	0.16 mg	2
9	100.0000 g	100.0001 g	0.0001 g	0.20 mg	2
10	150.0000 g	150.0001 g	0.0001 g	0.37 mg	2
11	200.0000 g	200.0000 g	0.0000 g	0.43 mg	2



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor $k = 2$ which can be larger than 2 according to EURAMET CP-18. The value of the measured lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2	
Weight Set No.: WS38	Date of Issue: 17-Mar-2020
Certificate Number: 106237	Calibration Due Date: 09-Sep-2021
Thermo Hygrometer	
Equipment No.: IN74	Date of Issue: 24-Jun-2020
Certificate Number: 20H1531	Calibration Due Date: 24-Jun-2021

Remarks

FACT adjustment functionally achieved

Value of the built-in weight adjusted

Equipment condition: Good

Next calibration according to customer's procedure

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.



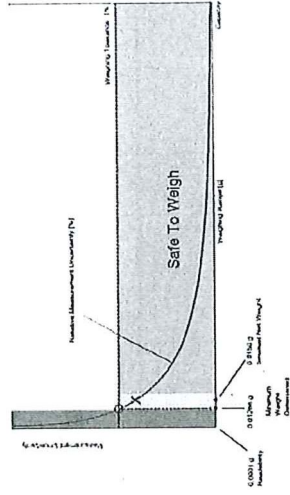
GWP® Certificate

As Found ✓ As Left ✓

The weighing device meets the given process requirements.

The weighing device does not meet the given safety factor requirements.

Tests Performed: ☒ As Found ☒ As Left
Process Requirements
Weighing Tolerance: 1% | Smallest Net Weight: 0.0150 g | Safety Factor: 2
Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. The graph reflects As Left testing, unless only As Found was performed.

Measurement Uncertainty of the Weighing Instrument in Use

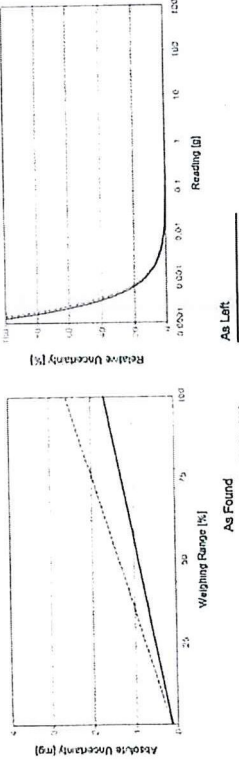
Stated is the expanded uncertainty with $k=2$ in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: $1.5 \cdot 10^{-6} / ^\circ\text{K}$
Temperature range on site for the evaluation of the measurement uncertainty in use: 5 K

Linearization of Uncertainty Equation	
Range	As Found
0 g - 220 g	$U_1 = 0.14 \text{ mg} + 0.0111 \text{ mg/g} \cdot R$
1	$U_1 = 0.13 \text{ mg} + 0.00703 \text{ mg/g} \cdot R$

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)	
Net Indication	As Found
0.0220 g	0.14 mg
0.2200 g	0.14 mg
2.2000 g	0.16 mg
22.0000 g	0.38 mg
220.0000 g	2.8 mg
Relative Uncertainty	As Found
0.64%	0.13 mg
0.065%	0.13 mg
0.0075%	0.15 mg
0.0017%	0.28 mg
0.0012%	1.7 mg
0.00075%	



Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors						
Tolerance	1	2	3	5	10	
0.1%	0.14141 g	0.28283 g	0.42425 g	0.74029 g	1.57300 g	
0.2%	0.07031 g	0.14141 g	0.21331 g	0.35558 g	0.74029 g	
0.5%	0.02803 g	0.05619 g	0.08447 g	0.14141 g	0.28283 g	
1%	0.01400 g	0.02803 g	0.04209 g	0.07031 g	0.14141 g	
2%	0.00700 g	0.01400 g	0.02101 g	0.03500 g	0.07031 g	
5%	0.00280 g	0.00560 g	0.00840 g	0.01400 g	0.02803 g	

Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors						
Tolerance	1	2	3	5	10	
0.1%	0.12739 g	0.25478 g	0.38217 g	0.65362 g	1.30724 g	
0.2%	0.06369 g	0.12739 g	0.19108 g	0.32681 g	0.65362 g	
0.5%	0.02533 g	0.05066 g	0.07599 g	0.13072 g	0.26144 g	
1%	0.01266 g	0.02533 g	0.03799 g	0.06536 g	0.13072 g	
2%	0.00633 g	0.01266 g	0.01899 g	0.03268 g	0.06536 g	
5%	0.00253 g	0.00506 g	0.00759 g	0.01266 g	0.02533 g	

Pass: The determined minimum weight meets the requirement for the smallest net weight.

The determined minimum weight does not meet the safety factor.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with $k = 2$ and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

Measurement Results

Results Summary

Repeatability			
As Found	As Left	Eccentricity	Error of Indication
✓	✓	✓	✓

✓ = Passed

✗ = Failed

⚠ = Safety Factor not met

Repeatability

Test Load: 100 g

Tolerance			
0.1%	0.2%	0.5%	1%
N/A	N/A	N/A	N/A
Control Limit			
N/A			
Std. Deviation			
0.00006 g			
As Found			
Result			
N/A			
As Left			
Std. Deviation			
0.00005 g			
Result			
N/A			

The calculated standard deviation value is below the rounding error of the balances. The 0.1% rule is used for the assessment of this repeatability test and the calculation of the minimum weight.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

Tolerance			
0.1%	0.2%	0.5%	1%
0.0500 g	0.1000 g	0.2500 g	0.5000 g
Control Limit			
0.0003 g			
As Found			
Result			
✓			
As Left			
Std. Deviation			
0.0002 g			
Result			
✓			

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

Attachment to Calibration Certificate:
TH2360-009-092520-ACC-TH
GWP# Certificate

Error of Indication

As Found

Control limits for various weighing tolerances									
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%	10%	20%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20.0000 g	-0.0001 g	0.0100 g	0.0200 g	0.0500 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g	2.5000 g	5.0000 g
100.0000 g	-0.0003 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g	5.0000 g	10.0000 g
150.0000 g	-0.0005 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g	7.5000 g	15.0000 g
200.0000 g	-0.0008 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g	10.0000 g	20.0000 g
Result		✓	✓	✓	✓	✓	✓	✓	✓

As Left

Control limits for various weighing tolerances									
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%	10%	20%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
20.0000 g	0.0000 g	0.0100 g	0.0200 g	0.0500 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g
50.0000 g	0.0001 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g	2.5000 g	5.0000 g
100.0000 g	0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g	5.0000 g	10.0000 g
150.0000 g	0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g	7.5000 g	15.0000 g
200.0000 g	0.0000 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g	10.0000 g	20.0000 g
Result		✓	✓	✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

Certificate Number : CCM-0538-20-C

CERTIFICATE OF CALIBRATION

Customer

Company : WATER INDEX & CONSULTANT CO., LTD.

Address : 2237-3 Soi Chuan Sanit Wong 95/1, Chuan Sanit Wong Road

City : Bangkok, Burghat

Zip/Postal : BANGKOK 10700

Customer ID : 301612380

Work Order No. : 220436957

Device

Object / Equipment : Weights set 1 g - 200 g

Conventional Mass

Serial No. : —

Comment : Recalibration.

Manufacturer : METTLER TOLEDO

Type / Model : F1

ID No. : —

(Provide by customer)

Environment Conditions

Ambient Temperature : (22 ± 2) ° C

Atmospheric Pressure : (1010 ± 10) hPa

Calibration procedure : In-House method : CPM00102 based on OIML R 111-1 : 2004(E)

Relative Humidity : (50 ± 10) %

Mean air density : (1.2 ± 0.3) kg/m³

Date of Receipt : August 24, 2020

Date of Calibration : August 28, 2020

Calibrated By : Gawin Thanathong

Approved by : 

Approved Signatory

☒ Sunida Jiramongkol

☐ Sunchai Sukkato

Date of Issued : August 31, 2020

Measurement results, mass error uncertainty with confidence interval and measurement procedure are listed on the following pages and form part of this certificate

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Device

Object / Equipment :	Weights set 1 g - 200 g	Manufacturer :	METTLER TOLEDO
Calibration :	Conventional Mass	Type / Model :	F1
Serial No. :	—	ID No. :	—
(Provide by customer)			

Data Sheet Conventional Mass Value

Nominal Value	Marking	Conventional Mass	Uncertainty	OIML Error
1 g	14011022	1 g + 0.017 mg	0.030 mg ±	0.10 mg
10 g	14011353	10 g - 0.145 mg	0.060 mg ±	0.20 mg
100 g	11119461	100 g - 0.25 mg	0.16 mg ±	0.5 mg
200 g		200 g - 0.18 mg	0.30 mg ±	1.0 mg

Condition of calibrated object: Weights are in good condition

Result of calibration: ☒ Before Adjustment ☐ After Adjustment

Data Sheet Conventional Mass Value

Nominal Value	Marking	Conventional Mass	Uncertainty	OIML Error
1 g	14011022	1 g + 0.017 mg	0.030 mg ±	0.10 mg
10 g	14011353	10 g - 0.094 mg	0.060 mg ±	0.20 mg
100 g	11119461	100 g - 0.25 mg	0.16 mg ±	0.5 mg
200 g		200 g - 0.18 mg	0.30 mg ±	1.0 mg

Condition of calibrated object: Weights are in good condition

Result of calibration: ☐ Before Adjustment ☒ After Adjustment

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

Device

Object / Equipment :	1/6 gms set 1 g - 200 g	Manufacturer :	METTLER TOLEDO
Calibration :	Conventional Mass	Type / Model :	F1
Serial No. :	—	ID No. :	—
(Provide by customer)			

Calibration Object

Material :	Stainless steel	Density :	(780 ± 10) kg/m ³
Case :	Contained in a wooden and plastic box.		

Measurement method

The calibration was performed by comparison with the reference weights of the Calibration Center in air by using the substitution weighing method (AEA) on a mass comparator, the conventional mass values were determined. The conventional density of the weights : 8000 kg/m³

The calibration was performed by using Calibration Laboratory's in-house calibration method # CPM001/02

Reference standards instrument :

Instrument	OIML Class	Model	Serial No./Control No.	Certificate No.	Due Date
Substitution weight set METTLER TOLEDO	E1	1 mg - 1 kg JCU02000a	100002		Mar 16, 2021
Mass Comparator		UPT5	105145	TH0200-017-041520-ACC-TH	Apr 13, 2021
Mass Comparator		AUT005	1121320106	TH0200-019-041520-ACC-TH	Apr 13, 2021

Measurement Uncertainty

The given extended measurement uncertainty is the standard uncertainty of the measurement multiplied by an extension factor k = 2, which corresponds to a confidence level of about 95% for a normal distribution. The standard uncertainty was calculated according to the publication "Expression of the uncertainty of measurement in calibration", Doc. EA-4/02, from the components of uncertainty of the reference, of the calibration procedure and environmental conditions as well as of the short-term effects of the measured object. Except calculation the standard uncertainty (due to magnetism) (Uma) in case weight don't accordance with the requirement OIML Recommendations.

Traceability

The measurement is traceable to national standards, which realize the physical units of measurement (SI).
- Swiss Federal Office of Metrology and Accreditation (METAS), through Mettler-Toledo GmbH, Switzerland (SCS032)
- Swiss Federal Office of Metrology and Accreditation (METAS), through Calibration Lab MT-TH Calibration No.0002

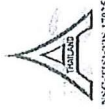
END OF REPORT



CLC
Accredited
ISO/IEC 17025



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Supplement to Calibration Certificate No. Q20071064

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : GRADUATED CYLINDER
MANUFACTURER : WITEG
MODEL / TYPE : 50 ml
SERIAL NO. : N/A [198G62-3]
CLID. NO. : 272001155
JOB CONTROL NO. : 200818071064

CUSTOMER : WATER INDEX & CONSULTANT CO., LTD.

229/7-8 SOI CHARAN SANIT WONG 95/1,

CHARAN SANIT WONG RD., BANG-AOR, BANGPHLAT, BANGKOK 10700

DATE OF RECEIVED : 18 August 2020

DATE OF ISSUED : 27 August 2020

Report of calibration servicing must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Prapaporn Khanchalee

Calibration Engineer

Approved By :

Mongkol Yotsoontorn

Authorized Signatory

27 August 2020

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the

International System of Units (SI)

Certificate No. Q20071064A1

F3-012-04/01-12

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REPORT OF CALIBRATION FOR

NOMENCLATURE : GRADUATED CYLINDER
MANUFACTURER : WITEG
MODEL / TYPE : 50 ml
SERIAL NO. : N/A [198G62-3]
DATE OF CALIBRATION : 21 August 2020

ENVIRONMENT CONDITIONS :

Temperature : (20 ± 2.5) °C Relative Humidity : (50 ± 10) % RH

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-84 based on ASTM E542-01 as calibration guidelines.

The calibration was performed by using Electronic Balance, Thermo-hygrometer, Barometer and

Liquid-in Glass Thermometer maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Barometer, Barigo S/N.001.
2. Electronic Balance, Sartorius Model CPA224S S/N.23908487.
3. Thermo-hygrometer, Izu Model 3-3126 S/N.30760420.
4. Liquid-in Glass Thermometer, Braun S/N. 1.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20020444, Due Date 09 March 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20031363, Due Date 08 April 2021.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018100, Due Date 28 February 2021.
4. The measurements are traceable to International System of Units (SI), through Technology Promotion Association (Thailand-Japan). Certificate No. 201501, Due Date 23 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q20071064

F3-011-04/01-12

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Tel. 02-576-0353-4 Fax: 02-576-2672 www.cal-lab.com Email: info@cal-lab.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The calibration was performed by applied volume to the Device Under Calibration (DUC). The actual volume readings from STD were reported in average of seven times measurements.

CALIBRATION DATA

CORRECTION OF VOLUME

DUC Test point (ml)	Actual volume (ml)	Correction (ml)	Uncertainty \pm (ml)	Coverage factor k
10	10.0903	+0.0903	0.0120	2.00
30	30.1034	+0.1034	0.0180	2.00
50	50.1052	+0.1052	0.0180	2.00

Type of glassware : ☒ to Contain ☐ to Deliver

Note: N/A = No Assignment

This report is valid for the above stated instrument/s only.

Certificate No. Q20071064

F3-011-04/01-12

End of Certificate

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CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : GRADUATED CYLINDER
MANUFACTURER : ISOLAB
MODEL / TYPE : 100 ml
SERIAL NO. : 3133-56
CLID. NO. : 27141910
JOB CONTROL NO. : 200818071065

CUSTOMER : WATER INDEX & CONSULTANT CO., LTD.
229/7-8 SOI CHARAN SANIT WONG 95/1,
CHARAN SANIT WONG RD., BANG-AOR, BANGPHLAT, BANGKOK 10700

DATE OF RECEIVED : 18 August 2020

DATE OF ISSUED : 27 August 2020

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Prapapom Khanchalee
Calibration Engineer

Approved By :

Mongkol Yotsoontorn
Authorized Signatory

27 August 2020

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q20071015A1

F3-012-04/01-12

page 1 of 3





CALIBRATION LABORATORY CO., LTD.
270-11, 14, 55 Soi Prasert Manukit 29 Yeak 4, Prasert Manukit Rd., Ladphrae, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-lab.com Email: cal@cal-lab.com



REPORT OF CALIBRATION FOR

NOMENCLATURE : GRADUATED CYLINDER
MANUFACTURER : ISOLAB
MODEL / TYPE : 100 ml
SERIAL NO. : 3133-56
DATE OF CALIBRATION : 21 August 2020

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-84 based on ASTM E542-01 as calibration guidelines.

The calibration was performed by using Electronic Balance, Thermo-hygrometer, Barometer and

Liquid-in Glass Thermometer maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Barometer, Barigo S/N.001.
2. Electronic Balance, AND Model GF-600 S/N.14637938.
3. Thermo-hygrometer, Izuza Model 3-3126 S/N.30760420.
4. Liquid-in Glass Thermometer, Brannan S/N. 1.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20020444, Due Date 09 March 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018099, Due Date 27 February 2021.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018100, Due Date 28 February 2021.
4. The measurements are traceable to International System of Units (SI), through Technology Promotion Association (Thailand-Japan). Certificate No. 201501, Due Date 23 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02:2013)".

Certificate No. Q20071065

F3-011-04/01-12

page 2 of 3



CALIBRATION LABORATORY CO., LTD.
270-11, 14, 55 Soi Prasert Manukit 29 Yeak 4, Prasert Manukit Rd., Ladphrae, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-lab.com Email: cal@cal-lab.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The calibration was performed by applied volume to the Device Under Calibration (DUC). The actual volume readings from STD were reported in average of seven times measurements.

CALIBRATION DATA

CORRECTION OF VOLUME

DUC Test point (ml)	Actual volume (ml)	Correction (ml)	Uncertainty \pm (ml)	Coverage factor k
10	10.447	-0.447	0.013	2.00
50	50.442	-0.442	0.018	2.00
100	100.463	-0.463	0.035	2.00

Type of glassware : ☒ to Contain ☐ to Deliver

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q20071065

F3-011-04/01-12

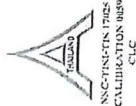
page 3 of 3





CALIBRATION LABORATORY CO., LTD.

210-11-14, 55 Soi Prasert Manukit 25 Yeak 4, Prasert Manukit Rd., Ladprao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-lab.com Email: info@cal-lab.com



Supplement to Calibration Certificate No. Q20071066

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VOLUMETRIC FLASK
MANUFACTURER : ISOLAB
MODEL / TYPE : 50 ml
SERIAL NO. : G17217-12
CLID. NO. : 272001156
JOB CONTROL NO. : 200818071066

CUSTOMER : WATER INDEX & CONSULTANT CO., LTD.

229/7-3 SOI CHARAN SANIT WONG 95/1,

CHARAN SANIT WONG RD., BANG-AOR, BANGPHLAT, BANGKOK 10700

DATE OF RECEIVED : 18 August 2020

DATE OF ISSUED : 27 August 2020

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Praporn Khanchalee

Calibration Engineer

[Signature]

Approved By :

Mongkol Yasoontorn

Authorized Signatory

27 August 2020

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q20071066A1

F3-012-04/01-12

page 1 of 3



calibration



CALIBRATION LABORATORY CO., LTD.

210-11-14, 55 Soi Prasert Manukit 25 Yeak 4, Prasert Manukit Rd., Ladprao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-lab.com Email: info@cal-lab.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : VOLUMETRIC FLASK
MANUFACTURER : ISOLAB
MODEL / TYPE : 50 ml
SERIAL NO. : G17217-12
DATE OF CALIBRATION : 21 August 2020

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 2.5) ^\circ\text{C}$

Relative Humidity : $(50 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-88 based on ASTM E542-01 as calibration guidelines.

The calibration was performed by using Electronic Balance, Thermo-hygrometer, Barometer and Liquid-in Glass Thermometer maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Barometer, Barigo SN. (01).
2. Electronic Balance, Sartorius Model CPA224S SN.25908487.
3. Thermo-hygrometer, Iwata Model 3-3126 SN.30760420.
4. Liquid-in Glass Thermometer, Brannan SN. 1.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20020414, Due Date 09 March 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20031303, Due Date 08 April 2021.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018100, Due Date 28 February 2021.
4. The measurements are traceable to International System of Units (SI), through Technology Promotion Association (Thailand-Japan). Certificate No. 201501, Due Date 23 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q20071066

F3-011-04/01-12

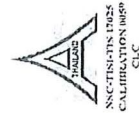
page 2 of 3



calibration



CALIBRATION LABORATORY CO., LTD.
270-11, 14, 55 Soi Prasert Manukul 29 Yeak 4, Prasert Manukul Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-lab.com E-mail: info@cal-lab.com



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The calibration was performed by applied volume to the Device Under Calibration (DUC). The actual volume readings from STD were reported in average of seven times measurements.

CALIBRATION DATA

CORRECTION OF VOLUME

DUC Test point (ml)	Actual volume (ml)	Correction (ml)	Uncertainty \pm (ml)	Coverage factor k
50	49.9860	-0.0140	0.0120	2.00

Type of glassware : ☒ to Contain ☐ to Deliver

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q20071066
F3-011-04/01-12

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CALIBRATION LABORATORY CO., LTD.
270-11, 14, 55 Soi Prasert Manukul 29 Yeak 4, Prasert Manukul Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-lab.com E-mail: info@cal-lab.com



CERTIFICATE OF CALIBRATION

Supplement to Calibration Certificate No. Q20071067

FOR

NOMENCLATURE : VOLUMETRIC FLASK
MANUFACTURER : WITEG
MODEL / TYPE : 100 ml
SERIAL NO. : 173618-2
CLID. NO. : 272001157
JOB CONTROL NO. : 200818071067

CUSTOMER : WATER INDEX & CONSULTANT CO., LTD.
2797-3 SOI CHARAN SANIT WONG 95/1,
CHARAN SANIT WONG RD., BANG-AOR, BANGPHLAT, BANGKOK 10700

DATE OF RECEIVED : 18 August 2020 DATE OF ISSUED : 27 August 2020
Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Praporn Khanchalee

Calibration Engineer



Approved By :

Mongkol Yotsoontorn

Authorized Signatory

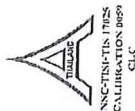
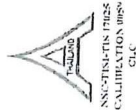
27 August 2020

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q20071067A1
F3-012-04/01-12

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REPORT OF CALIBRATION

FOR

NOMENCLATURE : VOLUMETRIC FLASK
MANUFACTURER : WITEG
MODEL / TYPE : 100 ml
SERIAL NO. : 173618-2
DATE OF CALIBRATION : 21 August 2020

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. W1-305-88 based on ASTM E542-01 as calibration guidelines.

The calibration was performed by using Electronic Balance, Thermo-hygrometer, Barometer and

Liquid-in Glass Thermometer maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Barometer, Barigo S/N.001.
2. Electronic Balance, Sartorius Model CPA224S S/N.23908487.
3. Thermo-hygrometer, Ixua Model 3-3126 S/N.30760420.
4. Liquid-in Glass Thermometer, Brannan S/N. 1.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20020444, Due Date 09 March 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20031363, Due Date 08 April 2021.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018100, Due Date 28 February 2021.
4. The measurements are traceable to International System of Units (SI), through Technology Promotion Association (Thailand-Japan). Certificate No. 201501, Due Date 23 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 N:2013)"

Certificate No. Q20071067

FS-011-04/01-12

page 2 of 3



id:calibration

CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The calibration was performed by applied volume to the Device Under Calibration (DUC). The actual volume readings from STD were reported in average of seven times measurements.

CALIBRATION DATA

CORRECTION OF VOLUME

DUC Test point (ml)	Actual volume (ml)	Correction (ml)	Uncertainty \pm (ml)	Coverage factor k
100	99.9434	-0.0516	0.0190	2.00

Type of glassware : ☒ to Contain ☐ to Deliver

This report is valid for the above stated instrument's only.

End of Certificate

Certificate No. Q20071067

FS-011-04/01-12

page 3 of 3



id:calibration



CALIBRATION LABORATORY CO., LTD.
210-11, 14, 55 Soi Prasert Manukit 25 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-lab.co.th E-mail: cal@cal-lab.co.th



Supplement to Calibration Certificate No. Q20071068

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : VOLUMETRIC FLASK
MANUFACTURER : WITEG
MODEL / TYPE : 1000 ml
SERIAL NO. : 175618-2
CLID. NO. : 272001158
JOB CONTROL NO. : 200818071068

CUSTOMER : WATER INDEX & CONSULTANT CO., LTD.

229/7-3 SOI CHARAN SANIT WONG 95/1,

CHARAN SANIT WONG RD., BANG-AOR, BANGPHLAT, BANGKOK 10700

DATE OF RECEIVED : 18 August 2020

DATE OF ISSUED : 27 August 2020

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Praporn Khanchalee

Calibration Engineer

Approved By :

Mongkol Yasoontorn

Authorized Signatory

27 August 2020

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q20071068A1

F3-012-04/01-12

page 1 of 3



CALIBRATION LABORATORY CO., LTD.

210-11, 14, 55 Soi Prasert Manukit 25 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-lab.co.th E-mail: cal@cal-lab.co.th



REPORT OF CALIBRATION FOR

NOMENCLATURE : VOLUMETRIC FLASK
MANUFACTURER : WITEG
MODEL / TYPE : 1000 ml
SERIAL NO. : 175618-2
DATE OF CALIBRATION : 21 August 2020

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 2.5) ^\circ\text{C}$

Relative Humidity : $(50 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-88 based on ASTM E542-01 as calibration guidelines.

The calibration was performed by using Electronic Balance, Thermo-hygrometer, Barometer and

Liquid-in Glass Thermometer maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Barometer, Barigo S/N.001.
2. Electronic Balance, Sartorius Model CPA3202S S/N.23908511.
3. Thermo-hygrometer, Isuzu Model 3-3126 S/N.30760420.
4. Liquid-in Glass Thermometer, Brannan S/N. 1.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20030444, Due Date 09 March 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20034622, Due Date 21 April 2021.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018100, Due Date 28 February 2021.
4. The measurements are traceable to International System of Units (SI), through Technology Promotion Association (Thailand-Japan). Certificate No. 201501, Due Date 23 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q20071068

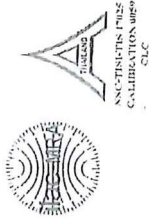
F3-011-04/01-12

page 2 of 3





CALIBRATION LABORATORY CO., LTD.
210-11, 41, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-576-0353-4 Fax. 02-576-2672 www.cal-lab.co.th Email: info@cal-lab.co.th



CALIBRATION LABORATORY CO., LTD.
210-11, 41, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-576-0353-4 Fax. 02-576-2672 www.cal-lab.co.th Email: info@cal-lab.co.th



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The calibration was performed by applied volume to the Device Under Calibration (DUC). The actual volume readings from STD were reported in average of seven times measurements.

CALIBRATION DATA

CORRECTION OF VOLUME

DUC Test point (ml)	Actual volume (ml)	Correction (ml)	Uncertainty \pm (ml)	Coverage factor k
1000	999.81	-0.19	0.14	2.00

Type of glassware : ☒ to Contain ☐ to Deliver

This report is valid for the above stated instrument/s only.

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : MEASURING PIPEPTE
MANUFACTURER : WITEG
MODEL / TYPE : 5 ml
SERIAL NO. : 184G62-10
CLD. NO. : 272001159
JOB CONTROL NO. : 200818071069

CUSTOMER : WATER INDEX & CONSULTANT CO., LTD.
2197-8 SOI CHARAN SANIT WONG 95/1,
CHARAN SANIT WONG RD., BANG-AOR, BANGPHLAT, BANGKOK 10700

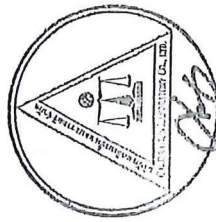
DATE OF RECEIVED : 16 August 2020

DATE OF ISSUED : 27 August 2020

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Prapaporn Khanchalee
Calibration Engineer



Approved By :

Mongkol Yorsontorn
Authorized Signatory

27 August 2020

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q20071068

F3-011-04/01-12



page 3 of 3

Certificate No. Q20071069 A1

F3-012-04/01-12



page 1 of 3



CALIBRATION LABORATORY CO., LTD.
210-11, 14, 55 Soi Prasert Manukit 29 Yeak 4, Prasert Manukit Rd., Ladprao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email: sale@cal-laboratory.com



NSC-TIN-TEN 17025
CALIBRATION ITEM
CLC

REPORT OF CALIBRATION FOR

NOMENCLATURE : MEASURING PIPETTE
MANUFACTURER : WITEG
MODEL / TYPE : 5 ml
SERIAL NO. : 184G62-10
DATE OF CALIBRATION : 20 August 2020

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-89 based on ASTM E542-01 as calibration guidelines.

The calibration was performed by using Electronic Balance, Thermo-hygrograph, Barometer and

Liquid-in Glass Thermometer maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Barometer, Barigo S/N.001.
2. Electronic Balance, Sartorius Model CPA224S S/N.23908487.
3. Thermo-hygrograph, Isuzu Model 3-3126 S/N.3.0760420.
4. Liquid-in Glass Thermometer, Braunan S/N. 1.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20020444, Due Date 09 March 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20031363, Due Date 08 April 2021.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018100, Due Date 28 February 2021.
4. The measurements are traceable to International System of Units (SI), through Technology Promotion Association (Thailand-Japan). Certificate No. 201501, Due Date 23 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q20071069

F3-011-04/01-12

page 2 of 3



edcalibration



CALIBRATION LABORATORY CO., LTD.
210-11, 14, 55 Soi Prasert Manukit 29 Yeak 4, Prasert Manukit Rd., Ladprao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email: sale@cal-laboratory.com



NSC-TIN-TEN 17025
CALIBRATION ITEM
CLC

CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The calibration was performed by applied volume to the Device Under Calibration (DUC). The actual volume readings from STD were reported in average of seven times measurements.

CALIBRATION DATA

CORRECTION OF VOLUME

DUC Test point (ml)	Actual volume (ml)	Correction (ml)	Uncertainty \pm (ml)	Coverage factor k
1.5	1.4989	-0.0011	0.0028	2.00
3.5	3.4947	-0.0053	0.0029	2.00
5	4.9878	-0.0122	0.0029	2.00

Type of glassware : ☐ to Contain ☒ to Deliver

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q20071069

F3-011-04/01-12

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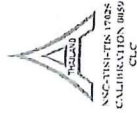


edcalibration



CALIBRATION LABORATORY CO., LTD.

210-11-14-55 Soi Prasert Manukul 25 Yeak 4, Prasert Manukul Rd., Ladprao, Bangkok 10230
Tel. 02-578-0354-4 Fax: 02-578-2672 www.calibration.co.th Email: info@calibration.co.th



Supplement to Calibration Certificate No. Q20071070

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : MEASURING PIPETTE
MANUFACTURER : WITEG
MODEL / TYPE : 10 ml
SERIAL NO. : 185G63-10
CLID. NO. : 272001160
JOB CONTROL NO. : 200818071070

CUSTOMER : WATER INDEX & CONSULTANT CO., LTD.

2297-8 SOI CHARAN SANIT WONG 95/1,

CHARAN SANIT WONG RD., BANG-AOR, BANGPHLAT, BANGKOK 10700

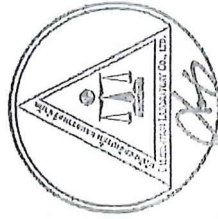
DATE OF RECEIVED : 18 August 2020

DATE OF ISSUED : 27 August 2020

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Prapaporn Khanchalee
Calibration Engineer



Approved By :

Mongkol Yoonsoorn
Authorized Signatory

27 August 2020

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q20071070A1

F3-012-04/01-12

page 1 of 3



calibration



CALIBRATION LABORATORY CO., LTD.

210-11-14-55 Soi Prasert Manukul 25 Yeak 4, Prasert Manukul Rd., Ladprao, Bangkok 10230
Tel. 02-578-0354-4 Fax: 02-578-2672 www.calibration.co.th Email: info@calibration.co.th



REPORT OF CALIBRATION

FOR

NOMENCLATURE : MEASURING PIPETTE
MANUFACTURER : WITEG
MODEL / TYPE : 10 ml
SERIAL NO. : 185G63-10
DATE OF CALIBRATION : 20 August 2020

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 2.5) ^\circ\text{C}$

Relative Humidity : $(50 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-89 based on ASTM E542-01 as calibration guidelines.

The calibration was performed by using Electronic Balance, Thermo-hygrometer, Barometer and Liquid-in Glass Thermometer maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Barometer, Barigo SN(C01).
2. Electronic Balance, Sartorius Model CPA224S SN:23908487.
3. Thermo-hygrometer, Isonu Model 3-3126 SN:30750420.
4. Liquid-in Glass Thermometer, Brannan SN: 1.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20020444, Due Date 09 March 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20031563, Due Date 08 April 2021.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018100, Due Date 28 February 2021.
4. The measurements are traceable to International System of Units (SI), through Technology Promotion Association (Thailand-Japan). Certificate No. 201501, Due Date 23 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor which complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2013)"

Certificate No. Q20071071

F3-011-04/01-12

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calibration



CALIBRATION LABORATORY CO., LTD.
210-114, 55 Soi Prasert Manukit 28 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-lab.co.th Email: info@cal-lab.co.th



CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The calibration was performed by applied volume to the Device Under Calibration (DUC) . The actual volume readings from STD were reported in average of seven times measurements.

CALIBRATION DATA

CORRECTION OF VOLUME

DUC Test point (ml)	Actual volume (ml)	Correction (ml)	Uncertainty \pm (ml)	Coverage factor k
3.5	3.5090	+0.0090	0.0029	2.00
5	5.0045	+0.0045	0.0029	2.00
7	7.0008	+0.0008	0.0039	2.00
10	9.9963	-0.0037	0.0039	2.00

Type of glassware : ☐ to Contain ☒ to Deliver

This report is valid for the above stated instrument/s only.

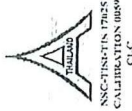
End of Certificate

Certificate No. Q20071070
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CALIBRATION LABORATORY CO., LTD.
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Supplement to Calibration Certificate No. Q20071071

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : MEASURING PIPETTE
MANUFACTURER : WITEG
MODEL / TYPE : 25 ml
SERIAL NO. : 186-G19-10
CLID. NO. : 272001161
JOB CONTROL NO. : 200818071071

CUSTOMER : WATER INDEX & CONSULTANT CO., LTD.

219/7-3 SOI CHARAN SANIT WONG 95/1.

CHARAN SANIT WONG RD., BANG-AOR, BANGPHLAT, BANGKOK 10700

DATE OF RECEIVED : 18 August 2020

DATE OF ISSUED : 27 August 2020

Report of calibration screening must not be taken in part. Except complete. Without the approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Prapaporn Khanchalee

Calibration Engineer

Approved By :

Mongkol Yotsoontorn

Authorized Signatory

27 August 2020

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q20071071A1

F3-012-04/01-12

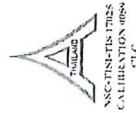
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edcalibration



CALIBRATION LABORATORY Co., LTD.
210-11, 14, 55 Soi Praset Manukit 29 Yeak 4, Praset Manukit Rd., Ladphrao Bangkok 10230
Tel. 02-578-0353-4 Fax 02-578-2672 www.cal-lab.com E-mail: sales@cal-lab.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : MEASURING PIPETTE
MANUFACTURER : WITEG
MODEL / TYPE : 25 ml
SERIAL NO. : 186-G19-10
DATE OF CALIBRATION : 20 August 2020

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 2.5) ^\circ\text{C}$ Relative Humidity : $(50 \pm 10) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-89 based on ASTM E542-01 as calibration guidelines.
The calibration was performed by using Electronic Balance, Thermo-hygrometer, Barometer and Liquid-in Glass Thermometer maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Barometer, Barigo S/N.001.
2. Electronic Balance, Sartorius Model CFA224S S/N.23908487.
3. Thermo-hygrometer, Isera Model 3-3126 S/N.30760420.
4. Liquid-in Glass Thermometer, Brannan S/N. 1.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20020444, Due Date 09 March 2021.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20031363, Due Date 08 April 2021.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q20018100, Due Date 28 February 2021.
4. The measurements are traceable to International System of Units (SI), through Technology Promotion Association (Thailand-Japan). Certificate No. 201501, Due Date 23 April 2021.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02:2013)"

Certificate No. Q20071071

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CONDITION OF CALIBRATION ITEM : GOOD

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The calibration was performed by applied volume to the Device Under Calibration (DUC). The actual volume readings from STD were reported in average of seven times measurements.

CALIBRATION DATA

CORRECTION OF VOLUME

DUC Test point (ml)	Actual volume (ml)	Correction (ml)	Uncertainty \pm (ml)	Coverage factor k
10	10.0042	+0.0042	0.0039	2.00
20	20.0068	+0.0068	0.0066	2.00
25	25.0108	+0.0108	0.0066	2.00

Type of glassware : ☐ to Contain ☒ to Deliver

This report is valid for the above stated instruments only.

End of Certificate

Certificate No. Q20071071

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