

**ANALYTICAL BALANCE (DU)**

**Model : XS205 DU**

**Serial No. : 1126323724**



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



## Accuracy Calibration Certificate

### Customer

Company: EASTERN THAI CONSULTING 1992 CO., LTD.  
Address: 683 Moo 11, Sukhaphiban 8 Rd.  
City: Nong Kham, Sriracha  
Zip / Postal: 20230  
State / Province: Chonburi  
Contact: Sasiporn N.  
Order Number: 0331934995-001

### Weighing Device

Manufacturer: Mettler Toledo  
Model: XS205DU  
Instrument Type: Weighing Instrument  
Serial No.: 1126323724  
Asset Number: LABE 05/1  
Building: N/A  
Terminal Model: SAT  
Floor: N/A  
Terminal Serial No.: 1126323724  
Room: Analytical  
Terminal Asset No.: N/A

Range	Max. Capacity	Readability (d)
1	81 g	0.00001 g
2	220 g	0.0001 g

### Procedure

Calibration Guideline:  
METTLER TOLEDO Work Instruction: EURAMET cg-18 v. 4.0 (11/2015)  
CFW003/16

This calibration certificate contains measurements for As Found and As Left calibrations.  
The sensitivity/span of the weighing instrument was adjusted before As Left calibration with an external weight. As Left WS32

Temperature		Humidity	
As Found	Start: 23.1 °C    End: 23.1 °C	Start: 50.5 %    End: 50.5 %	
As Left	Start: 22.4 °C    End: 22.2 °C	Start: 51.5 %    End: 51.3 %	

As Found Calibration Date: 10-Aug-2020  
As Left Calibration Date: 10-Aug-2020  
Issue Date: 19-Aug-2020

Calibrator:

Sathaporn Tabson

Approved Signatory:

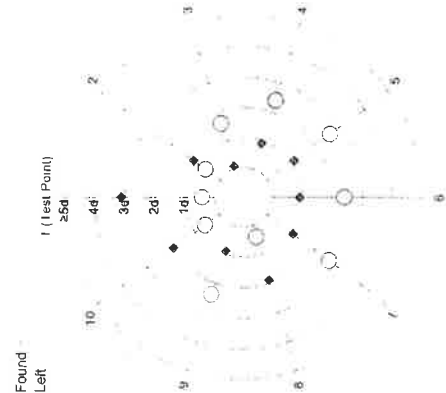
☒ Kussakorn Tassanachaisakul  
☐ Sant Jitpoom  
☒ Sathaporn Tabson

### Measurement Results

#### Repeatability

Test Load: 70 g

	As Found	As Left
1	69.99985 g	70.00003 g
2	69.99984 g	70.00005 g
3	69.99983 g	70.00006 g
4	69.99987 g	70.00007 g
5	69.99982 g	70.00005 g
6	69.99987 g	70.00007 g
7	69.99982 g	70.00005 g
8	69.99985 g	70.00008 g
9	69.99987 g	70.00007 g
10	69.99984 g	70.00008 g
Standard Deviation	0.000020 g	0.000016 g

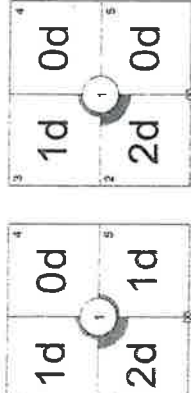


The "d" in the graph represents the readability of the range/interval in which the test was performed.  
The results of this graph are based upon the absolute values of the differences from the mean value.

### Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	99.9998 g	100.0001 g
2	99.9996 g	99.9999 g
3	99.9997 g	100.0000 g
4	99.9998 g	100.0001 g
5	99.9997 g	100.0001 g
Maximum Deviation	0.0002 g	0.0002 g



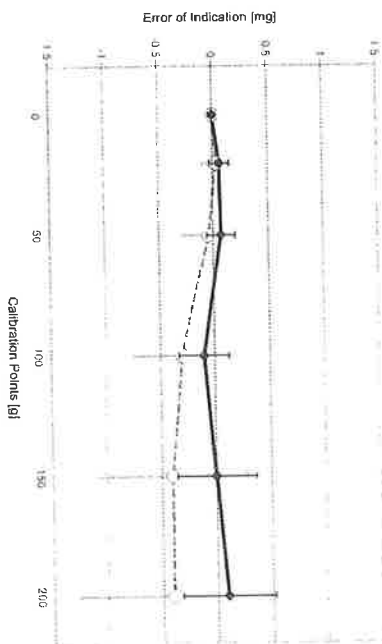
The "d" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

As Found	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.00000 g	0.040 mg	2
2	0.01000 g	0.01002 g	0.00002 g	0.041 mg	2
3	0.10000 g	0.10002 g	0.00002 g	0.042 mg	2
4	1.00000 g	1.00002 g	0.00002 g	0.045 mg	2
5	4.99999 g	5.00000 g	0.00001 g	0.066 mg	2
6	10.00002 g	10.00006 g	0.00004 g	0.086 mg	2
7	19.99998 g	19.99998 g	0.00003 g	0.13 mg	2
8	49.99998 g	49.99995 g	-0.00004 g	0.24 mg	2
9	100.0001 g	99.9998 g	-0.0003 g	0.45 mg	2
10	150.0001 g	149.9997 g	-0.0004 g	0.68 mg	2
11	200.0001 g	199.9997 g	-0.0004 g	0.87 mg	2

As Left

Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.00000 g	0.00000 g	0.032 mg	2
2	0.01000 g	0.00999 g	0.034 mg	2
3	0.10000 g	0.10001 g	0.036 mg	2
4	1.00000 g	1.00002 g	0.042 mg	2
5	4.99999 g	5.00000 g	0.056 mg	2
6	10.00002 g	10.00005 g	0.068 mg	2
7	19.99998 g	20.00001 g	0.088 mg	2
8	49.99998 g	50.00006 g	0.13 mg	2
9	100.0001 g	100.0000 g	0.23 mg	2
10	150.0001 g	150.0001 g	0.36 mg	2
11	200.0001 g	200.0002 g	0.42 mg	2



As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

The uncertainty stated is the expanded uncertainty obtained by multiplying the standard combined uncertainty by the coverage factor  $k=2$  which can be larger than 2 according to EURAMET cg-18. The value of the measurand 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.:	WS32
Certificate Number:	159895
Thermo Hygrometer	
Equipment No.:	IN161
Certificate Number:	20H1089
Date of Issue:	11-May-2020
Calibration Due Date:	11-May-2021

Remarks

FACT adjustment functionally activated  
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.

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:  $1.5 \cdot 10^{-6} / K$

Temperature range on site for the evaluation of the measurement uncertainty in use: 4 K

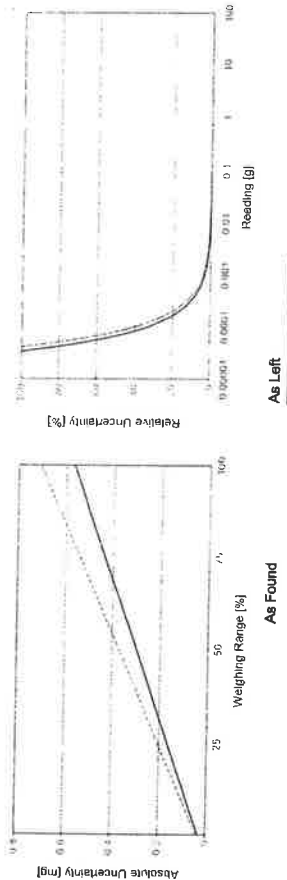
Linearization of Uncertainty Equation

Range	As Found	As Left
1 0 g - 81 g	$U_1 = 0.040 \text{ mg} + 0.00822 \text{ mg/g} \cdot R$	$U_1 = 0.033 \text{ mg} + 0.00659 \text{ mg/g} \cdot R$
2 81 g - 220 g	$U_2 = 0.71 \text{ mg} + 0.00867 \text{ mg/g} \cdot (R - 81 \text{ g})$	$U_2 = 0.57 \text{ mg} + 0.00696 \text{ mg/g} \cdot (R - 81 \text{ g})$

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	As Left
0.00220 g	0.040 mg	0.033 mg
0.02200 g	0.040 mg	0.033 mg
0.22000 g	0.042 mg	0.034 mg
2.20000 g	0.058 mg	0.047 mg
220.0000 g	1.9 mg	1.5 mg
		1.5%
		0.15%
		0.016%
		0.0022%
		0.00070%



The weighing range shown in the absolute uncertainty graph refers to the first interval/range of the device.

COPY

GWP®



Certificate

As Found

As Left

The weighing device meets the given process requirements.

The weighing device meets the given process requirements.

Tests Performed:

As Found

As Left

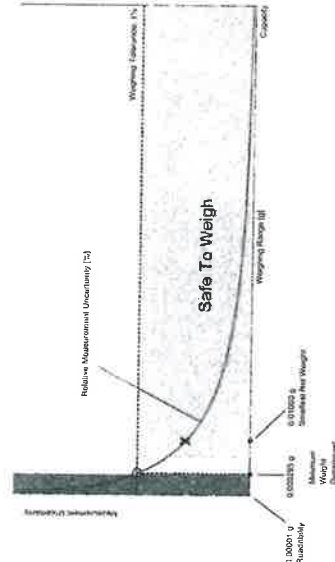
Process Requirements

Weighing Tolerance: 1%

Smallest Net Weight: 0.01000 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.



## Minimum Weight

### As Found Minimum Weight Table

Range 1					
Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.040275 g	0.061224 g	0.122362 g	0.208278 g	0.435202 g
0.2%	0.020055 g	0.040275 g	0.060384 g	0.101955 g	0.208278 g
0.5%	0.008002 g	0.016030 g	0.024085 g	0.040275 g	0.081224 g
1%	0.003998 g	0.008002 g	0.012013 g	0.020055 g	0.040275 g
2%	0.001998 g	0.003998 g	0.005999 g	0.010007 g	0.020055 g
5%	0.000799 g	0.001598 g	0.002398 g	0.003998 g	0.008002 g

The minimum weight table applies to the fine range of the weighing device.

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

### As Left Minimum Weight Table

Range 1					
Minimum weights for different weighing tolerances and safety factors					
Tolerance	Safety Factor				
	1	2	3	5	10
0.1%	0.033149 g	0.066741 g	0.100784 g	0.170282 g	0.352530 g
0.2%	0.016520 g	0.033149 g	0.049889 g	0.083706 g	0.170282 g
0.5%	0.006585 g	0.013207 g	0.019837 g	0.033149 g	0.066741 g
1%	0.003295 g	0.006585 g	0.009899 g	0.016520 g	0.033149 g
2%	0.001647 g	0.003295 g	0.004945 g	0.008260 g	0.016520 g
5%	0.000659 g	0.001318 g	0.001977 g	0.003295 g	0.006585 g

The minimum weight table applies to the fine range of the weighing device.

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

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 "NA" 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	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

- ✓ = Passed  
✗ = Failed  
A = Safety Factor not met

#### Repeatability

Test Load: 70 g

As Found			As Left		
Tolerance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	0.000005 g		✗		✗
0.2%	0.000010 g		✗		✗
0.5%	0.000025 g	0.000020 g	✓	0.000016 g	✓
1%	0.000050 g		✓		✓
2%	0.000100 g		✓		✓
5%	0.000250 g		✓		✓

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

#### Eccentricity

Test Load: 100 g

As Found			As Left		
Tolerance	Control Limit	Deviation	Result	Deviation	Result
0.1%	0.0500 g		✓		✓
0.2%	0.1000 g		✓		✓
0.5%	0.2500 g	0.0002 g	✓	0.0002 g	✓
1%	0.5000 g		✓		✓
2%	1.0000 g		✓		✓
5%	2.5000 g		✓		✓

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

Error of Indication

As Found

Control limits for various weighing tolerances									
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%		
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A		
19.99995 g	0.00003 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g		
49.99999 g	-0.00004 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g		
100.00001 g	-0.00003 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g		
150.00001 g	-0.00004 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g		
200.00001 g	-0.00004 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 g		
Result		✓	✓	✓	✓	✓	✓		✓

As Found

Control limits for various weighing tolerances									
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%		
0.00000 g	0.00000 g	N/A	N/A	N/A	N/A	N/A	N/A		
19.99995 g	0.00006 g	0.01000 g	0.02000 g	0.05000 g	0.10000 g	0.20000 g	0.50000 g		
49.99999 g	0.00007 g	0.02500 g	0.05000 g	0.12500 g	0.25000 g	0.50000 g	1.25000 g		
100.00001 g	-0.00011 g	0.05000 g	0.10000 g	0.25000 g	0.50000 g	1.00000 g	2.50000 g		
150.00001 g	0.00000 g	0.07500 g	0.15000 g	0.37500 g	0.75000 g	1.50000 g	3.75000 g		
200.00001 g	0.00001 g	0.10000 g	0.20000 g	0.50000 g	1.00000 g	2.00000 g	5.00000 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.

Service Date: 2020-08-10  
Document Number: TH4004-011-081020-LABBalanceHR  
EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhaphiban 8 Rd., Nong Kham, Sittachia, Chonburi 20230  
Khun Sasiporn N.

Balance Health Report

System Details			
Device Details			
Device History		Service History	
Instrument in use:	Yes	Last preventive maintenance:	1-3 years
Instrument age:	3-10 years	Last instrument calibration:	1-3 years
Spare parts available:	No	Last minimum weight determination:	1-3 years
Regulations:	ISO		
Process tolerance in %:	1%	Routine testing performed:	No
Smallest sample net weight:	0.01000 g		
Check List			
Environmental Conditions		General & Functional Checks	
Room temperature fluctuation	✓	Levelling	✓
Exposure to direct sun	✓	Cleanliness	✓
Vibrations	✓	Completeness - missing parts see additional remarks	✓
Draft	✓	Settings optimized for operating environment	✓
Dirt or dust	✓	Other - objections noted as additional remarks	—
Static	✓		
Mechanical Component Checks		Electrical Component Checks	
Draft shield	✓	Power supply	✓
Weighing pan position	✓	Sliding door drive	✓
Housing	✓	Internal weight drive	✓
Other - objections noted as additional remarks	—	Display	✓
Other - objections noted as additional remarks		Other - objections noted as additional remarks	
Recommendations			
Measurement Result Quality		Problems Encountered	
Instrument calibration		Uninstall instrument	
Identify safe weighing range		Replace instrument	
GWP verification / risk assessment	Yes	Replace / add parts (see additional remarks)	
Preventive maintenance		Onsite repair	
Perform routine testing with test weights		Repair repair	
User training		Use of accessories (see additional remarks)	
Contact:	Name: Khun Sasiporn N	Position:	Phone: 0960613303
			Email: dc.jee@ect1992.com
Additional Remarks & Recommendations			
Engineer Details			
		Date:	10-Aug-2020
		Name:	Sasiporn Tapsen
		Signature:	

This is not a certificate.

It should not be used to interpret final results for the testing of these devices.

Legend: ✓ Good/Pass    ✗ Needs Attention    ✗ Bad/Fail    — Not Applicable

272 Soi, Sornjais 4, Bangkapi, Huayfawang, Bangkok 10510, THAILAND  
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www.mtl.com





**ANALYTICAL BALANCE**

**Model : SECURA224-1S**

**Serial No. : 0036707137**





ASIA MEDICAL AND AGRICULTURAL LABORATORY  
AND RESEARCH CENTER CO., LTD.

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Email: cl@amarc.co.th



NSC-TIS-17025  
CALIBRATION 0152

Page 1 of 4

Certificate No. : 20-013729  
Sample code : 20-04615-002

## CERTIFICATE OF CALIBRATION

**Customer** : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Siriracha, Chonburi 20230

**Location of calibration** : EASTERN THAI CONSULTING 1992 CO., LTD.  
(Analytical Balance Room)

**Equipment** : ELECTRONIC BALANCE

**Manufacturer** : SARTORIUS

**Model** : SECURA224-1S

**Serial No.** : 0036707137

**ID No.** : LABE 05/2

**Date of Receipt** : 12 February 2020

**Date of Calibration** : 12 February 2020

**Calibrated by** Mr. Nuttapat Timula  
**Scientist**

**Date of Issue** : 17 February 2020

**Approved by** ( Mr. Somchai Neampunt )

**Signed for Director**

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

FM-CL-017

Rev.04

Effective Date 09/11/15



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NSC-TIS-17025  
CALIBRATION 0152

Page 2 of 4

Certificate No. : 20-013729  
Sample code : 20-04615-002

## REPORT OF CALIBRATION

**Equipment** : ELECTRONIC BALANCE

**Manufacturer** : SARTORIUS

**Model** : SECURA224-1S

**Capacity** : Max 220 g

**Resolution** : 0.0001 g

**Serial No.** : 0036707137

**ID No.** : LABE 05/2

### Result of Calibration :

#### 1. Test weight and repeatability of reading

Repeatability is a measure of the ability of a balance to supply the same result in repetitive weighings with one and the same load under the same measurement condition. The measurement of the repeatability must include both the balance specifications and the ambient (vibration, fluctuating air current/temperature/humidity, etc.) Operator handling of the balance is also included in the standard deviation.

Unit : g	Range : 220	<input checked="" type="checkbox"/> Before adjustment	<input checked="" type="checkbox"/> After adjustment
Nominal value	100	200	100
Standard weight	99.99997	199.99997	99.99997
Average reading of indicator	99.99999	200.00000	100.00000
Standard deviation	0.00005	0.00005	0.00005
Range : -		<input type="checkbox"/> Before adjustment	<input type="checkbox"/> After adjustment
Nominal value	-	-	-
Standard weight	-	-	-
Average reading of indicator	-	-	-
Standard deviation	-	-	-

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FM-CL-064

Rev.02

Effective Date 09/11/15



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Email: c@amarc.co.th



NSC-TS1715 17025  
CALIBRATION 0152

Certificate No. : 20-013729

Sample code : 20-04615-002

Page 3 of 4

## REPORT OF CALIBRATION

### Result of Calibration :

#### 2. Sensitivity or value of a scale division

Change in the output variable of a measuring instrument divided by the associated change in the input variable.

Unit : g	Range :	Test Point	Sensitivity, S	Test Point	Sensitivity, S
Range : 220					
0			0.8984		
100			0.8984		
200			0.8984		

#### 3. Departure of indication from nominal value, Linearity

Unit : g	Nominal Value	Standard Value	Average Reading of Indicator	Correction Value	Expanded Uncertainty	Coverage Factor (k)
Unload*	0.0000000	0.0000	0.0000	0.0000	0.000094	2.01
0.01	0.0100017	0.0100	0.0000	0.0000	0.000094	2.01
0.1	0.0999994	0.1000	0.0000	0.0000	0.000094	2.01
1	1.0000161	1.0000	0.0000	0.0000	0.000095	2.01
2	2.0000028	2.0000	0.0000	0.0000	0.000095	2.01
5	5.0000012	5.0000	0.0000	0.0000	0.000096	2.01
10	10.000009	10.0000	0.0000	0.0000	0.000097	2.01
20	19.999991	20.0000	0.0000	0.0000	0.00011	2.01
50	49.999971	50.0000	0.0000	0.0000	0.00012	2.01
100	99.99997	100.0000	0.0000	0.0000	0.00017	2.00
200	199.99997	200.0000	0.0000	0.0000	0.00028	2.00

The result expanded uncertainty of measurement  $U$  is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k$ , which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

#### Remarks

\* Calibrations marked "Not Accredited" in this Certificate have been included for completeness.

*Handwritten signature*  
**COPY**



ASIA MEDICAL AND AGRICULTURAL LABORATORY  
AND RESEARCH CENTER CO., LTD.  
(Head Office) 361/361/1-4 Soi Ladprao 122, (Mahachulalongkornrajavidyalaya) Road, Phaholueyong, Bangkok, Thailand 10310 Tel:(66) 2-934-2381-3 Fax:(66) 2-934-0661  
Email: c@amarc.co.th



NSC-TS1715 17025  
CALIBRATION 0152

Certificate No. : 20-013729

Sample code : 20-04615-002

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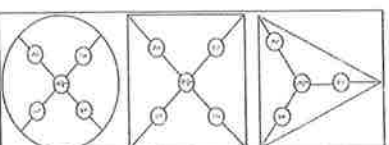
## REPORT OF CALIBRATION

### Result of Calibration :

#### 4. Eccentric or off-centre loading

Deviation of the measurement value through off - center (eccentric) loading. The corner load increases with the weight of the load and its removal from the center of the pan support.

Weighting pan	<input checked="" type="radio"/> Circle <input type="radio"/> Triangular <input type="radio"/> Rectangular	Test weight : 50
Unit : g		
Range	220	
Position	Reading of indicator	Reading of indicator
1	50.0000	-
2	49.9999	-
3	49.9999	-
4	49.9999	-
5	49.9999	-
6	50.0000	-
Maximum difference	0.0001	-



#### Condition of Calibration

##### 1. Ambient Conditions :

- Temperature 27.1°C to 27.4°C, Relative Humidity 55.3% to 56.2%, Air pressure 1012.3 hPa to 1013.3 hPa and air density 1.17 kg m<sup>-3</sup>

##### 2. Calibration Method : WI-CL-004 base on UKAS LAB 14 : 2015

##### 3. Reference standard instrument :

##### Instrument

Class

ID No.

Certificate No.

Due date

1) Standard Weight 1 tpy to 1 kg E2 LB-WE-49 20-003628 13 January 2021

4. This result of calibration was found accurate as shown on date and place of calibration only.

5. This certification is traceable to the International System of Unit maintained at : -

- Through the reference standard laboratory of Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

( Instrument number 1).

6. Condition of Calibration item : Normal

End of Report

*Handwritten signature*  
**COPY**

**AUTOCLAVE**

**Model : FLS-1000**

**Serial No. : 55169083**







CRYSTAL CALIBRATION SALES AND SERVICE CO., LTD.  
45/48 Soi Salathammassop31, Salathammassop Rd.,  
Salathammassop, Thaweewatthana, Bangkok 10170 Thailand  
Tel : 0-2408-8474-5 Fax : 0-2408-8477 Email : info@crystalcal.com www.crystalcal.com



## CERTIFICATE OF CALIBRATION

Issue Date

: 22 September 2020

Customer Name

: Eastern Thai Consulting 1992 Co.,Ltd.  
683 Moo 11, Sukhaphiban 8, Tambol Nongkham,  
Siracha District, Chonburi 20230, Thailand.

Date of Received

: 18 September 2020

Date of Calibration

: 18 September 2020

Instrument Details

: Description : Autoclave  
Manufacturer : TOMY  
Model : FLS-1000  
Serial No. : 55169083  
ID No. : N/A  
Resolution : 1 °C  
Location : Service Room

Calibration Method

: This instrument was calibrated by insert Temperature data logger into the chamber of autoclave according to calibration procedure CWI-T-12 in-house methods based on BS 2646 : 1993 part 5 clause 3.1

Environmental Conditions

Temperature	Minimum	26.8 °C	Maximum	28.4 °C
Humidity	Minimum	56 %	Maximum	62 %
Line Voltage	Minimum	230.2 VAC	Maximum	231.7 VAC

Traceability of Measurement

: This certificate of calibration documents the traceability to national standard, which realize the unit of measurement according to the International system of Units (SI) and The temperature scale in use at this laboratory is The International Temperature scale of 1990.

Calibrated by

: Mr. Wuttinun Yindeepot  
Calibration Engineer

Approved by

( Mr. Thichakorn Srisupob )  
Technical Manager

This certificate may not be reproduced other than in full except with the prior written approval of Crystal Calibration Sales and Service Co., Ltd.

Crystal Calibration Sales and Service Co., Ltd.

45/48 Salathammassop 31, Salathammassop Rd., Salathammassop, Thaweewatthana, Bangkok 10170

Phone : 0-2408-8474 Fax : 0-2408-8477 http://www.crystalcal.com Email : info@crystalcal.com



PAGE 1/3



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Tel : 0-2408-8474-5 Fax : 0-2408-8477 Email : info@crystalcal.com www.crystalcal.com



## CERTIFICATE OF CALIBRATION

Issue Date

: 22 September 2020

Certificate No. : 20-962-001

Work Order No. : 20/962

### Details of Calibration

#### 1. Reference Standards Instrument

Instrument	Model	Serial No.	Certificate No.	Due Date
Temperature Data Logger Type RTD	HTTemp140	R14466	19-719-001	26 October 2020
	HTTemp140	R14467	19-719-002	26 October 2020
	HTTemp140	R14469	19-719-003	26 October 2020

#### 2. Certificate traceable

: This certificate traceable to The International System of Unit refer to  
Crystal Calibration Sales and Service Co., Ltd., NAC Calibration No. 0260

#### 3. Condition of Item

: Used

#### 4. Calibration site

: On-site

#### 5. Result of Calibration

: Without Adjustment

#### 6. Evaluate Condition

: Time Constant : 15 Minutes At cal. point 121 °C

#### 7. Calibration note

: Calibration process record temperature data at sterilization time

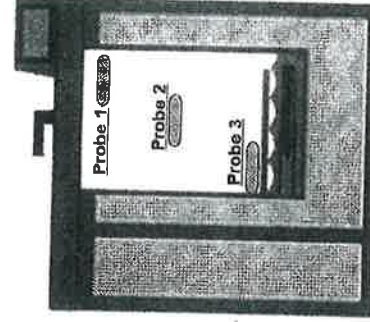
: The results reported in this certificate refer to the condition of instrument on the process into the steady state of chamber

#### 8. Sensors Installation Diagram

: Probe 1 : Installation Attached to the load temperature probe, within 20 mm

: Probe 2 : Installation in the half of upper the Chamber autoclave

: Probe 3 : Installation in the Chamber drain, within 100 mm



Position Diagrams

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## CERTIFICATE OF CALIBRATION

Issue Date : 22 September 2020

Certificate No. : 20-962-001  
Work Order No. : 20/962

### Result of Temperature Distribution and Performance Check

Table 1 : Reporting of Temperature within chamber autoclaves

Calibration point (°C)	Sterilization time (Minutes)	Average Measured Temperature (°C) @ Sensor No.			Uncertainty ± (°C)
		#1	#2	#3	
121	15	121.89	121.91	121.91	0.75

Table 2 : Reporting of Characterization within chamber autoclaves

Indicator Set point (°C)	Indicator Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall variation (°C)
	MAX	MIN	Average			
121	122	122	122	0.11	0.04	0.09

### Note:

Temperature Data Logger has setting interval time is 5 seconds per record data

The measured temperature data readout by software "Madgetech Data Logger Software"

The quoted uncertainty include "Stability" and Loading effect (20% of Temp Uniformity)"

Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the bath under steady state conditions.

Overall Variation - The difference of the maximum and minimum measured temperatures throughout observation time.

Indicating Temperature - the average reading of indicating device that forms the integral part of the enclosure.

This result of calibration was found accurate as shown on date and place of calibration only.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k=2$  providing a level of confidence of approximately 95%.

-END-

PAGE 3/3

**BOD INCUBATOR**

**ID No. : LABE 19/1**







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http://www.amarc.co.th  
Email: c@amarc.co.th

NSC-TIS-TIS 17025  
CALIBRATION 0152

Certificate No. : 20-006363  
Sample code : 20-02165-001

Page 1 of 4

## CERTIFICATE OF CALIBRATION

Customer : EASTERN THAI CONSULTING 1992 CO.,LTD  
683 Moo 11, Sukhapiban 8 Rd, Nongkham,  
Sriracha, Chonburi 20230

Location of calibration : EASTERN THAI CONSULTING 1992 CO.,LTD  
(Laboratory)

Equipment : Temperature controlled enclosures  
(Incubator)

Manufacturer : N/A

Model : E811.0306

Serial No. : N/A

ID No. : LABE 19/1

Date of receipt : 21 January 2020

Date of calibration : 21 January 2020

Calibrated by : Mr. Weerayut Chaichuay  
Scientist

Date of issue : 27 January 2020

Approved by ( Mr. Somchai Neampunt )

Signed for Director

*[Signature]*

The uncertainties are for a confidence probability of approximately 95%

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.  
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

Certificate No. : 20-006363  
Sample code : 20-02165-001

Page 2 of 4

## REPORT OF CALIBRATION

Equipment : Temperature controlled enclosures (Incubator)  
Manufacturer : N/A  
Serial No. : N/A  
Resolution : 0.1 °C  
Model : E811.0306  
ID No. : LABE 19/1

### Condition of calibration

#### 1 Environment

1.1 Ambient temperature : Maximum 28.5 °C ; Minimum 26.4 °C  
1.2 Relative humidity : Maximum 52.3 % ; Minimum 45.8 %  
1.3 Line voltage supplied : Maximum 224.3 VAC ; Minimum 220.5 VAC

#### 2 Calibration method

- TLAS-G-20 : Guidelines for calibration and checks of temperature controlled enclosures

#### 3 Reference standard instrument

Instrument	Model	ID No.	Certificate No.	Due date
Data acquisition with sensor (RTD-PH100)	34972A	LB-DA-12 (RTD-168, RTD-169, RTD-170, RTD-171, RTD-172, RTD-173, RTD-174, RTD-175, RTD-176)	19-044419	06 June 2020

4 This certificate is traceable to the international system of unit (SI Unit)

- The measurement is traceable to CIMM (Nation legal metrological verification institute (SI Units) through Thailand Institute of Scientific and Technological Research through Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

5 This result of calibration was found accurate as shown on date and place of calibration only.

6 Condition of calibration item : Normal

*[Signature]*



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Email: ci@amarc.co.th



NSC-TIS-115 17025  
CALIBRATION 0152

Certificate No. : 20-006363  
Sample code : 20-02165-001

Page 3 of 4

## REPORT OF CALIBRATION

Equipment : Temperature controlled enclosures (incubator)  
Manufacturer : N/A Model : E811.0306  
Serial No. : N/A ID No. : LABE 19/1  
Resolution : 0.1 °C

### Results of calibration

#### 1. Reporting of temperature

Calibration point (°C)	Controller Temp.(°C)	Indicating Temp.(°C)	Measured temperature (°C) at spread locations									Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9 <sup>AW</sup>		
20	20.0	20.0	19.55	19.69	19.42	19.36	19.83	20.14	19.71	19.93	20.07	0.32	2.00

#### 2. Characterization result

Calibration point (°C)	Controller temperature (°C)	Indicating temperature (°C)	Temperature stability (°C)	Temperature uniformity (°C)	Overall variation (°C)
20	20.0	20.0	0.17	0.77	0.94

Full

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NSC-TIS-115 17025  
CALIBRATION 0152

Certificate No. : 20-006363  
Sample code : 20-02165-001

Page 4 of 4

## REPORT OF CALIBRATION

### Results of calibration

#### Note

- Sensor installation locations
  - All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
- The reference sensor is preferably located of the geometric center of the chamber.
- Interior dimensions approx of chamber  
W = 60 cm ; D = 70 cm ; H = 124 cm
- Air valve or fresh air level : Off
- Fan level : Open

5 The quoted uncertainty exclude " Overall variation "

6 The quoted uncertainty include " Stability of chamber and loading effect in chamber at 20% of uniformity "

7 Temperature uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

8 Temperature stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

9 Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.

10 Measured temperature - the average reading of standards at any positions or locations.

11 Indicating temperature - the average reading of indicating device that forms the integral part of the enclosure.

12 Calibration results without adjustment.

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

End of report

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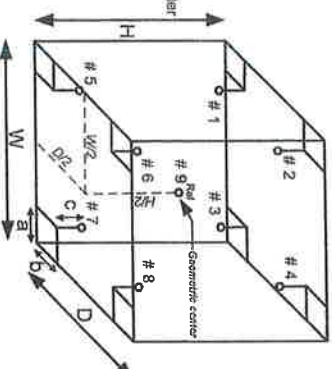


Figure: Example of sensor installation locations

**BOD INCUBATOR**

**ID No. : LABE 19/2**





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Email: ci@amarc.co.th



NSC-TIS-17025  
CALIBRATION 0152

Certificate No. : 20-006364

Sample code : 20-02165-002

Page 1 of 4

## CERTIFICATE OF CALIBRATION

### Customer

: EASTERN THAI CONSULTING 1992 CO.,LTD  
683 Moo 11, Sukhapiban 8 Rd, Nongkham,  
Sriracha, Chonburi 20230

### Location of calibration

: EASTERN THAI CONSULTING 1992 CO.,LTD  
(Laboratory)

### Equipment

: Temperature controlled enclosures  
(Incubator)

### Manufacturer

: N/A

### Model

: N/A

### Serial No.

: S540040277

### ID No.

: LABE 19/2

### Date of receipt

: 21 January 2020

### Date of calibration

: 21 January 2020

### Calibrated by

Mr. Weerayut Chaichuay

Scientist

Approved by

( Mr. Somchai Neampunt )

### Date of issue

: 27 January 2020

Signed for Director

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

PM-CI-017

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Effective Date: 09/11/15



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NSC-TIS-17025  
CALIBRATION 0152

Certificate No. : 20-006364

Sample code : 20-02165-002

Page 2 of 4

## REPORT OF CALIBRATION

Equipment : Temperature controlled enclosures (Incubator)

Manufacturer : N/A

Model : N/A

Serial No. : S540040277

ID No. : LABE 19/2

Resolution : 0.1 °C

### Condition of calibration

#### 1 Environment

1.1 Ambient temperature : Maximum 28.5 °C ; Minimum 26.4 °C  
1.2 Relative humidity : Maximum 52.3 % ; Minimum 45.8 %  
1.3 Line voltage supplied : Maximum 224.2 VAC ; Minimum 220.5 VAC

#### 2 Calibration method

- TLAS-G-20 : Guidelines for calibration and checks of temperature controlled enclosures

#### 3 Reference standard instrument

Instrument	Model	ID No.	Certificate No.	Due date
Data acquisition with sensor (RTD-PH100)	34972A	LB-DA-12 (RTD-166, RTD-159, RTD-160, RTD-161, RTD-162, RTD-163, RTD-164, RTD-165, RTD-166)	19-044419	06 June 2020

4 This certificate is traceable to the international system of unit (SI Unit)

- The measurement is traceable to CIMM (Nation legal metrological verification institute (SI Units) through Thailand Institute of Scientific and Technological Research through Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

5 This result of calibration was found accurate as shown on date and place of calibration only.

6 Condition of calibration item : Normal

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PM-CL-018

Rev.07

Effective Date: 09/11/15





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NSC-7151-T15 17025  
CALIBRATION 01512

Certificate No. : 20-006364  
Sample code : 20-02165-002

Page 3 of 4

## REPORT OF CALIBRATION

Equipment : Temperature controlled enclosures (Incubator)  
Manufacturer : N/A Model : N/A  
Serial No. : S540040277 ID No. : LABE 19/2  
Resolution : 0.1 °C

### Results of calibration

#### 1. Reporting of temperature

Calibration point (°C)	Controller Temp.(°C)	Indicating Temp.(°C)	Measured temperature (°C) at spread locations									Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9 <sub>Ref</sub>		
20	20.0	20.0	19.56	19.62	19.37	19.51	20.43	20.45	20.44	20.47	20.08	0.31	2.00

#### 2. Characterization result

Calibration point (°C)	Controller temperature (°C)	Indicating temperature (°C)	Temperature stability (°C)	Temperature uniformity (°C)	Overall variation (°C)
20	20.0	20.0	0.14	0.79	1.25

End of report

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NSC-7151-T15 17025  
CALIBRATION 0152

Certificate No. : 20-006364  
Sample code : 20-02165-002

Page 4 of 4

## REPORT OF CALIBRATION

### Results of calibration

#### Note

- Sensor installation locations  
1.1 All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
- The reference sensor is preferably located of the geometric center of the chamber.
- Interior dimensions approx of chamber  
W = 60 cm ; D = 70 cm ; H = 124 cm
- Air valve or fresh air level : Off
- Fan level : Open
- The quoted uncertainty exclude " Overall variation "
- The quoted uncertainty include " Stability of chamber and loading effect in chamber at 20% of uniformity "
- Temperature uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.
- Temperature stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
- Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation time.
- Measured temperature - the average reading of standards at any positions or locations.
- Indicating temperature - the average reading of indicating device that forms the integral part of the enclosure.
- Calibration results without adjustment.

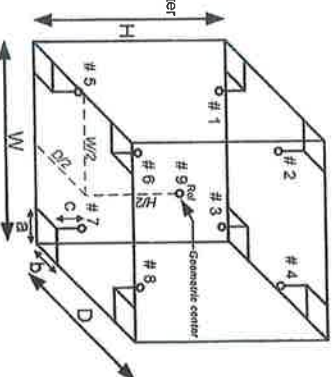


Figure : Example of sensor installation locations

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

End of report

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**DO**

**Model : YSI 5000**

**Serial No. : 17H104512**





CERT.No.: HS-Q062L

Calibration Date : 23 Dec 19

Submitted by : Eastern Thai Consulting 1992 Ltd.,Co.

Saha Group Industrial Park 999 Moo.11 Nongkham,

Siracha, Chonburi 20230

Avg Room Temp : 20 °C

Avg Water Temp : 20 °C

Air Pressure : 760.00 mmHg

Salinity : 0 ppt

Harikul Science Co.,Ltd.  
694 Soi Ratchadaniwet 24, Pracharatbamphen,  
Samsaenrok, HuaiKhwang, Bangkok 10310  
Tel: 0-2274-2456 Fax: 0-2274-2443  
Email: info@harikul.com www.harikul.com  
Certificate of Calibration

Model : YSI 5000  
S/N : 17H104512  
Probe : YSI 5010  
S/N : 17J100003  
ID NO. :  
Air Temp ref : S/N. E00522  
Barometric ref : S/N. E00522  
Water Temp ref : S/N. 11431

Technician : Chaiwut P.

Calibration Details			
Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.07	(PASS)	-
Measurement 2 (mg/l)	9.07	(PASS)	-
Measurement 3 (mg/l)	9.08	(PASS)	-
Measurement 4 (mg/l)	9.07	(PASS)	-
Measurement 5 (mg/l)	9.07	(PASS)	-
Measurement 6 (mg/l)	9.08	(PASS)	-
Measurement 7 (mg/l)	9.08	(PASS)	-
Measurement 8 (mg/l)	9.08	(PASS)	-
Measurement 9 (mg/l)	9.08	(PASS)	-
Measurement 10 (mg/l)	9.08	(PASS)	-
Mean Measurement	9.08	mg/l	-
Inaccuracy	0.01	mg/l	-
Overall Status	(PASS)		
Manufacturer Specification			
Accuracy = +/- 0.02 mg/l			

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.

Umasi 4

Technician Signature

*Supreecha Su.*  
Laboratory Manager





**Hot Air Oven**

**Model : UM 400**

**Serial No. : 900982**





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NSC-TISI-TIS 17025  
CALIBRATION 0152

Certificate No. : 20-075502  
Sample code : 20-25851-001

Page 1 of 4

## CERTIFICATE OF CALIBRATION

**Customer** : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd,  
Nongkham, Sriracha, Chonburi 20230

**Location of calibration** : EASTERN THAI CONSULTING 1992 CO., LTD.  
(Hot Lab)

**Equipment** : Temperature controlled enclosures  
(Hot air oven)

**Manufacturer** : Memmert

**Model** : UM 400

**Serial No.** : 900982

**ID No.** : LABE 17/1

**Date of receipt** : 17 August 2020

**Date of calibration** : 17 August 2020

**Calibrated by** Mr. Weerayut Chaichuay  
Scientist

**Date of issue** : 21 August 2020

**Approved by** ( Mr. Somchai Neamput )  
Signed for Director

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

FM-CL-017

Rev.04

Effective Date: 09/11/15



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NSC-TISI-TIS 17025  
CALIBRATION 0152

Certificate No. : 20-075502  
Sample code : 20-25851-001

Page 2 of 4

## REPORT OF CALIBRATION

**Equipment** : Temperature controlled enclosures (Hot air oven)

**Manufacturer** : Memmert

**Serial No.** : 900982

**Resolution** : 0.1 °C

**Model** : UM 400

**ID No.** : LABE 17/1

### Condition of calibration

#### 1 Environment

1.1 Ambient temperature : Maximum 28.4 °C ; Minimum 27.5 °C

1.2 Relative humidity : Maximum 50.2 % ; Minimum 43.7 %

1.3 Line voltage supplied : Maximum 221.3 VAC ; Minimum 220.1 VAC

#### 2 Calibration method

- TLAS-G-20 : Guidelines for calibration and checks of temperature controlled enclosures

### 3 Reference standard instrument

Instrument	Model	ID No.	Certificate No.	Due date
Data Acquisition With Sensor (RTD-PH00)	34972A	LB-DA-08 (RTD-198, RTD- 200, RTD-201, RTD-202, RTD-203, RTD-204, RTD- 205, RTD-206, RTD-207)	20-023938	10 March 2021

4 This certificate is traceable to the international system of unit (SI Unit)

- The measurement is traceable to CIMM (Nation legal metrological verification institute; SI Units) through Thailand Institute of Scientific and Technological Research through Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.

5 This result of calibration was found accurate as shown on date and place of calibration only.

6 Condition of calibration item : Normal

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Rev.07

Effective Date: 09/11/15

Certificate No. : 20-075502  
Sample code : 20-25851-001

Page 3 of 4

## REPORT OF CALIBRATION

Equipment : Temperature controlled enclosures (Hot air oven)  
Manufacturer : Memmert  
Serial No. : 900982  
Resolution : 0.1 °C

Model : UM 400  
ID No. : LABE 17/1

### Results of calibration

#### 1. Reporting of temperature

Calibration point (°C)	Controller Temp.(°C)	Indicating Temp.(°C)	Measured temperature (°C) at spread locations									Uncertainty ± (°C)	Coverage factor k
			# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9		
85	85.8	85.8	84.98	84.91	84.49	84.61	84.81	84.81	84.85	84.76	84.86	0.40	2.00
104	104.8	104.8	104.31	104.21	103.66	103.81	104.09	104.10	104.16	104.00	104.15	0.47	2.00
180	180.5	180.5	180.69	180.49	179.07	179.44	180.43	180.23	180.49	179.35	180.38	0.51	2.00

#### 2. Characterization result

Calibration point (°C)	Controller temperature (°C)	Indicating temperature (°C)	Temperature stability (°C)	Temperature uniformity (°C)	Overall variation (°C)
85	85.8	85.8	0.06	0.40	0.59
104	104.8	104.8	0.05	0.53	0.74
180	180.5	180.5	0.10	1.35	1.79

*Indist.*

**COPY**

Certificate No. : 20-075502  
Sample code : 20-25851-001

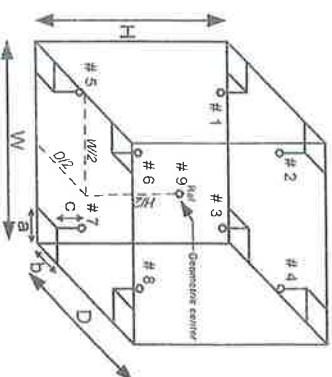
Page 4 of 4

## REPORT OF CALIBRATION

### Results of calibration

#### Note

- Sensor installation locations
- All sensors at any corners or walls should be positioned 5 cm (a x b x c) from the wall.
- The reference sensor is preferably located of the geometric center of the chamber.



- The quoted uncertainty exclude " Overall variation "
- The quoted uncertainty include " Stability of chamber and loading effect in chamber at 20% of uniformity "

- Temperature uniformity - the maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

- Temperature stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.
- Overall variation - the difference of the maximum and the minimum measured temperatures throughout observation.
- Measured temperature - the average reading of standards at any positions or locations.
- Indicating temperature - the average reading of indicating device that forms the integral part of the enclosure.
- Calibration results without adjustment.

The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

End of report

*Indist.*

**COPY**

**LIQUID-IN-GLASS THERMOMETER**

**Model : Total Immersion**

**Serial No. : 43560**





QUALITY CALIBRATION CO.,LTD.  
235 Petchkasem 63/2 Road, Laksong, Bangkok, Bangkok 10160  
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584  
www.qcalibration.com



CERTIFICATE No : 20T10824  
REFERENCE No : 59073-1

PAGE : 1 OF 2

## Certificate of Calibration

EQUIPMENT : LIQUID IN GLASS THERMOMETER  
MANUFACTURER :  
MODEL : PRECISION  
RESOLUTION : 0 °C TO 100 °C  
SERIAL No : 43560  
ID No : LABE16/1  
RESOLUTION : 0.1 °C  
TYPE : TOTAL IMMERSION  
CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : EASTERN THAI CONSULTING 1992 COMPANY LIMITED  
999 MOO.11 NONGKHAM, SRIRACHA, CHONBURI  
20230

CALIBRATED BY : CHARUKIT L.  
CALIBRATION DATE : 04-Nov-20  
APPROVED BY :  
ISSUED DATE : 04-Nov-20  
RECEIVED DATE : 27-Oct-20

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THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF  
QUALITY CALIBRATION CO., LTD.



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www.qcalibration.com

CERTIFICATE No : 20T10824

PAGE : 2 OF 2

## Calibration Report

EQUIPMENT : LIQUID IN GLASS THERMOMETER  
MANUFACTURER :  
MODEL : PRECISION  
ID No : 0 °C TO 100 °C  
RESOLUTION : LABE16/1  
RECEIVED DATE : 0.1 °C  
AMBIENT TEMPERATURE : 27-Oct-20  
SERIAL NUMBER : 43560  
TYPE : TOTAL IMMERSION  
CALIBRATION DATE : 04-Nov-20  
RELATIVE HUMIDITY : 50 %RH ± 20 %RH

### CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BASED ON ASTM E77:1992 BY COMPARISON WITH STANDARD PLATINUM RESISTANCE THERMOMETER (SPRT) INTO LIQUID BATH TEMPERATURE CONTROLLER. THE TEMPERATURE SCALE USED WAS BASED ON ITS-90.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD THERMOMETER	1502	77964	2013461	13-Mar-21
2) SPRT PROBE	5614	636626	2013461	13-Mar-21
3) PRECISION BATH	CTR-40	A68155	19T12224	11-Dec-20

3. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON DATE AND PLACE OF CALIBRATION ONLY.  
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND).

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

STANDARD READING (°C)	UUC* READING (°C)	IMMERSION DEPTH (mm)	CORRECTION (°C)	EMERGENT STEM TEMPERATURE (°C)	UNCERTAINTY OF MEASUREMENT (±°C)
-0.008	0.0	57	-0.008	N/A	0.090
25.003	25.0	165	0.003	N/A	0.090
50.008	50.0	270	0.008	N/A	0.090

UUC\* : UNIT UNDER CALIBRATION

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

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**pH Meter**

**Model : SevenCompact<sup>TM</sup> pH/Ion Meter S220**

**Serial No. : B448305208**



Certificate Number CCP-0464-20

## Calibration Certificate SevenCompact™ pH/Ion Meter S220

### Customer

Company EASTERN THAI CONSULTING 1992 CO., LTD.

Address 683 Moo 11, Sukhaphiban 8 Rd.,

Nongkham, Sriracha

CHONBURI 20230

E0072

Customer ID number

Customer representative คุณสุภากร นาคพันธ์

Request No.

\*SV2004230030\*

Agreement No.

SCL15030023R\_4

### Instrument

Type

SevenCompact™ S220

Internal identification

LABE 11/4

Instrument Serial Number

B448305208

Firmware version

1.20.06

### Technical specifications

Measuring Range -1999.9 ... 1999.9 mV

Resolution 0.1 mV

Limit of Error  $\pm 0.2$  mV

-2.000 ... 20.000 pH

0.001 pH

 $\pm 0.002$  pH

Temperature range MTC -30.0 ... 130.0 °C

Temperature range ATC -5.0 ... 130.0 °C

Resolution 0.1 °C

Limit of Error  $\pm 0.1$  °C

### Procedure Statement

METTLER TOLEDO Certification SOP (Doc. No. 3002/577) will be used as referring documentation to adjust and certify the instrument indicated in the "Type" and "Serial number" section. The measurement results of this certification were obtained at ambient conditions.

COPY

Certificate Number CCP-0464-20

### Certification Tools

Certified digital voltmeter

Manufacturer GOSSEN METRAWATT

Control No. ANA77

Serial number ZD1740

Certificate number ESG191286

Due date June 27, 2020

Certified Temperature Resistors

Manufacturer METTLER TOLEDO / ME-5130241

Control No. IN143

Serial number A185

Certificate number 43422

Due date October 14, 2020

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# METTLER TOLEDO

Certificate Number **CCP-0464-20**

## Certification Measurements

pH/mV Sensor Input	Designation	Certified value	Measured value	Max. Tolerance	Passed / Failed
	-1900 mV	-1900.0 mV	-1900.1 mV	0.2 mV	Passed
	-1000 mV	-1000.0 mV	-1000.0 mV	0.2 mV	Passed
	-500 mV	-500.0 mV	-500.1 mV	0.2 mV	Passed
	-180 mV	-180.0 mV	-180.0 mV	0.2 mV	Passed
	0 mV	0.0 mV	0.0 mV	0.2 mV	Passed
	180 mV	180.0 mV	180.0 mV	0.2 mV	Passed
	500 mV	500.0 mV	500.0 mV	0.2 mV	Passed
	1000 mV	1000.0 mV	1000.0 mV	0.2 mV	Passed
	1900 mV	1900.0 mV	1900.0 mV	0.2 mV	Passed

Temperature Sensor Input	Designation	Nominal value	Measured value	Max. Tolerance	Passed / Failed
	NTC 30 KΩ, 0 °C	0.0 °C	0.0 °C	0.1 °C	Passed
	NTC 30 KΩ, 25 °C	25.0 °C	25.0 °C	0.1 °C	Passed
	NTC 30 KΩ, 50 °C	50.0 °C	50.0 °C	0.1 °C	Passed
	NTC 30 KΩ, 75 °C	75.0 °C	75.0 °C	0.1 °C	Passed
	NTC 30 KΩ, 100 °C	100.0 °C	100.0 °C	0.1 °C	Passed
	PT1000, 0 °C	0.0 °C	0.0 °C	0.1 °C	Passed
	PT1000, 25 °C	25.0 °C	25.0 °C	0.1 °C	Passed
	PT1000, 50 °C	50.0 °C	50.0 °C	0.1 °C	Passed
	PT1000, 75 °C	75.0 °C	75.0 °C	0.1 °C	Passed
	PT1000, 100 °C	100.0 °C	100.0 °C	0.1 °C	Passed

## Summary of Certification

Certification of instrument

Passed

The instrument referred to in this certificate has fulfilled the criteria of the certification. This is indicated by the notation Passed in the column above.

Remarks

Certification of the instrument was performed by

Name Khomsan Praeung

Function Service Engineer

Place Laboratory

Calibration Date: April 24, 2020

Signature ELECTRONIC SIGNATURE

COPY

Mettler-Toledo (Thailand) Limited

METTLER TOLEDO

## Performance Test

Control No. CCE-0464-20/1

Company:

EASTERN THAI CONSULTING 1992 CO., LTD.

Address:

683 Moo 11, Sukhapiban 8 Rd, Nongkharn, Sriracha

CHONBURI 20230

Work Order No.: \*SV2004230030\*

pH Electrode

Inlab Expert Pro-ISM

S/N: 9423159

Type:

Certified standards used

Standard 1:	Type:	pH Buffer	Manufacturer: METTLER TOLEDO	Exp. date:
		Nominal value: pH ( 25.00 °C):	4.01	Jun-20
				Lot No.: 1D169A

Standard 2:	Type:	pH Buffer	Manufacturer: METTLER TOLEDO	Exp. date:
		Nominal value: pH ( 25.00 °C):	7.00	Oct-20
				Lot No.: 1D299D

Standard 3:	Type:	pH Buffer	Manufacturer: METTLER TOLEDO	Exp. date:
		Nominal value: pH ( 25.00 °C):	9.21	May-20
				Lot No.: 1D122E

Test equipment:	Type:	pH Meter	Manufacturer:	METTLER TOLEDO	Cal date:	24-Apr-2
	S/N:	B448305208	No. of certificate:	CCP-0464-20	Model:	S220

Adjustment

Set Calibration Buffer		B2: (25 °C) 7.00, 4.01, 9.21					
Select Calibration Mode		3-Point calibration		2-Point calibration		2-Point calibration	
3-Point Calibration		°C	pH	°C	pH	°C	pH
	Cal 1	ATC	22.4	7.00	---	---	---
	Cal 2	ATC	22.7	4.01	---	---	---
	Offset (mV)		6.7	---	---	---	---
	Slope % (or mV/pH)		98.7	---	---	---	---
	Cal 3	ATC	22.4	9.21	---	---	---
	Slope % (or mV/pH)		100.0	---	---	---	---

Measurements

Before adjustment				After adjustment			
Buffer Values	Measured	Difference	Buffer Values	Measured	Difference	Buffer Values	Measured
pH	°C	pH	pH	°C	pH	pH	pH
4.01	ATC	4.03	0.02	4.00	21.5	ATC	4.00
7.01	ATC	7.02	0.01	7.01	22.0	ATC	7.02
9.23	ATC	9.23	0.00	9.24	21.9	ATC	9.24
							0.00

Remarks: The difference result of calibrated electrode should be within +/- 0.05 pH

Place:

Laboratory Khomsan Praeung

Calibration Date: April 24, 2020

Service Specialist:

Khomsan Praeung

Signature

Electronic Signature

This is an original document, copies are not released by METTLER TOLEDO

Page 1 of 1

**STANDARD WEIGHT 50 g**





ASIA MEDICAL AND AGRICULTURAL LABORATORY  
AND RESEARCH CENTER CO., LTD.

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http://www.amarc.co.th Email: cl@amarc.co.th



NSC-TIS-17025  
CALIBRATION 0152

Page 1 of 3

Certificate No. : 19-045373

Sample code : 19-15155-001

## CERTIFICATE OF CALIBRATION

Customer

: EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

Location of calibration

: Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.  
(Calibration Laboratory)

Equipment

: STANDARD WEIGHT 50 g

Manufacturer

: METTLER TOLEDO

Class

: F1

Serial No.

: N/A

ID No.

: LABE 10/1

Date of Receipt

: 30 May 2019

Date of Calibration

: 03 June 2019

Calibrated by

Mr. Somwang Sangdee  
Scientist

Date of Issue

: 06 June 2019

Approved by ( Mr. Somchai Neampunt )  
Signed for Director

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

FM-CL-017

Rev 04



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NSC-TIS-17025  
CALIBRATION 0152

Certificate No. : 19-045373

Sample code : 19-15155-001

Page 2 of 3

## REPORT OF CALIBRATION

Equipment :

STANDARD WEIGHT 50 g

Manufacturer :

METTLER TOLEDO

Class

F1

Serial No. :

N/A

ID No. :

LABE 10/1

### Result of Calibration :

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20°C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup> which it balances in air of a reference density ( $\rho_a$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	Maximum Permissible Error, OIML Class F1 $\pm$ (mg)	ID No.
50 g	-0.317	49.999683 g	0.10	0.30	LABE 10/1

The result expanded uncertainty of measurement  $U$  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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

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Certificate No. : 19-045373

Page 3 of 3

Sample code : 19-15155-001

## REPORT OF CALIBRATION

### Condition of Calibration

1. Ambient Conditions : Temperature  $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ , Relative humidity  $50\% \pm 10\%$  and air density  $1.19 \text{ kg/m}^3$

2. Calibration Method : Direct comparison weighing according to OIML R111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 50 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference Standard Instrument

Instrument : Class

ID. No.

Certificate No.

Due date

1) STANDARD WEIGHT 1 mg to 1 kg E2

LB-WE-57

B634921863

11 August 2019

5. This certification is traceable to the International System of Unit maintained at : -

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland ( instrument number 1).

6. Condition of Calibration item : Normal

End of Report

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**STANDARD WEIGHT 100 g**





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NSC-TIS-17025  
CALIBRATION 0152

Page 1 of 3

Certificate No. : 19-045374

Sample code : 19-15155-002

## CERTIFICATE OF CALIBRATION

Customer

: EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Siracha, Chonburi 20230

Location of calibration

: Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.  
(Calibration Laboratory)

Equipment

: STANDARD WEIGHT 100 g

Manufacturer

: N/A

Class

: N/A

Serial No.

: N/A

ID No.

: LABE 10/2

Date of Receipt

: 30 May 2019

Date of Calibration

: 03 June 2019

Calibrated by

Mr. Somwang Sangdee

Scientist

Approved by ( Mr. Somchai Neampunt )

Signed for Director

Date of Issue : 06 June 2019

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)

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NSC-TIS-17025  
CALIBRATION 0152

Certificate No. : 19-045374

Sample code : 19-15155-002

Page 2 of 3

## REPORT OF CALIBRATION

Equipment :

STANDARD WEIGHT 100 g

Manufacturer :

N/A

Class

N/A

Serial No. :

N/A

ID No. :

LABE 10/2

### Result of Calibration :

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20°C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup> which it balances in air of a reference density ( $\rho_0$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation (mg)	Conventional Mass	Expanded Uncertainty (mg)	ID No.
100 g	-0.24	99.99976 g	0.16	LABE 10/2

The result expanded uncertainty of measurement  $U$  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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003

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MSC-TISI-TIS 17025  
CALIBRATION 0152

Certificate No. : 19-045374

Page 3 of 3

Sample code : 19-15155-002

## REPORT OF CALIBRATION

### Condition of Calibration

1. Ambient Conditions : Temperature  $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ , Relative humidity  $50\% \pm 10\%$  and air density  $1.19 \text{ kg/m}^3$

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 100 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference standard instrument

Instrument

Class

ID. No.

Certificate No.

Due date

1) STANDARD WEIGHT 1 mg to 1 kg E2 LB-WE-57 B634921863

11 August 2019

5. This certification is traceable to the International System of Unit maintained at : -

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration Item : Normal

End of Report

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STANDARD WEIGHT 50 g





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NSC-TIS-TIS 17025  
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 1 of 3

## CERTIFICATE OF CALIBRATION

**Customer** : EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11, Sukhapiban 8 Rd., Nongkham,  
Sriracha, Chonburi 20230

**Location of calibration** : Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.  
(Calibration Laboratory)

**Equipment** : STANDARD WEIGHT 50 g

**Manufacturer** : N/A

**Class** : N/A

**Serial No.** : N/A

**ID No.** : LABE 10/4

**Date of Receipt** : 25 June 2019

**Date of Calibration** : 06 July 2019

**Calibrated by** : Mr. Somwang Sangdee  
Scientist

**Date of Issue** : 16 September 2019

**Approved by** : ( Mr. Somchai Neampunt )  
Signed for Director

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

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Asia Medical and Agricultural Laboratory and Research Center Co., Ltd. (AMARC)



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Email: ci@amarc.co.th



NSC-TIS-TIS 17025  
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Certificate No. : 19-053921/1

Sample code : 19-17930-002

Page 2 of 3

## REPORT OF CALIBRATION

**Equipment** : STANDARD WEIGHT 50 g

**Manufacturer** : N/A

**Class** : N/A

**Serial No.** : N/A

**ID No.** : LABE 10/4

**Result of Calibration** : Without adjustment

Conventional value of the result of weighing in air. For a weight taken at a reference temperature ( $t_{ref}$ ) of 20 °C, the conventional mass is the mass of a reference weight of a density ( $\rho_{ref}$ ) of 8000 kg.m<sup>-3</sup> which it balances in air of a reference density ( $\rho_0$ ) of 1.2 kg.m<sup>-3</sup>

Description	Deviation (mg)	Conventional		Expanded Uncertainty (mg)	ID No.
		Mass			
50 g	-0.060	#REF!	g	0.10	LABE 10/4

The result expanded uncertainty of measurement  $U$  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%. The standard uncertainty of measurement has been determined in accordance with UKAS M3003.

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ASIA MEDICAL AND AGRICULTURAL LABORATORY  
AND RESEARCH CENTER CO., LTD.

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ISO 9001:2015  
CALIBRATION 0152

Supersede to Calibration Certificate No. 19-053921

Page 3 of 3

Certificate No. : 19-053921/1

Sample code : 19-17930-002

## REPORT OF CALIBRATION

### Condition of Calibration

1. Ambient Conditions : Temperature  $20^{\circ}\text{C} \pm 1.5^{\circ}\text{C}$ , Relative humidity  $50\% \pm 10\%$  and air density  $1.19 \text{ kg/m}^3$

2. Calibration Method : WI-CL-007 base on OIML R 111-1 : 2004(E)

3. Description of Calibrated Item :

Type and Nominal Value : Standard Weight 50 g

Shape : Cylindrical weight with knob

Case : Wood Box

4. Reference standard instrument

Instrument	Class	ID. No.	Certificate No.	Due date
------------	-------	---------	-----------------	----------

1) STANDARD WEIGHT 1 mg to 1 kg	E2	LB-WE-57	B634921863	11 August 2019
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5. This certification is traceable to the International System of Unit maintained at : -

- Through the reference standard laboratory of Mettler-Toledo GmbH, 8606 Greifensee, Switzerland (Instrument number 1).

6. Condition of Calibration item : Normal

End of Report

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**STANDARD WEIGHT 100 g**





# THAI CALIBRATION SERVICES CO., LTD.

19/8 Moo 9 Soi Railing 30 Puttamonthon 5 Rd., Sampran, Nakornpatom 73210  
Tel. 0-3439-7682-5 Fax: 0-3439-7687  
www.thaical.com E-mail : info@thaical.com, lab@thaical.com



NSC-TISI-TIS 17025  
CALIBRATION 0189

## CALIBRATION CERTIFICATE

Certificate No.M1806053S

page 1 of 2

### Customer

EASTERN THAI CONSULTING 1992 CO., LTD.  
683 Moo 11 Sukhapibarn 8 Rd.,  
Nongkham, Sriracha, Chonburi 20230

### Equipment

Standard weight  
Sartorius  
100 g

### Type

Stainless steel  
61M1956-2

### Place of calibration

Mass calibration laboratory

### Ambient temperature

(22.7 ± 0.1) °C

### Relative humidity

(49.1 ± 0.2) %

### Atmospheric pressure

(1007.4 ± 0.1) hPa

### Received date

07-Jun-2018

### Date of calibration

09-Jun-2018

### Date of issue

09-Jun-2018

### Condition of the artifacts

Good conditions

Calibrated By :

Chonlatee Pongwatvisanon  
Technician

Approved By :

Somwang Wongduang  
Approved Signatory

This calibration certificate may not be reproduced other than in full,  
except with the prior written approval of the head of TCS calibration laboratory.

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CALIBRATION 0189

## CALIBRATION CERTIFICATE

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page 2 of 2

### Calibration method

This instrument was calibrated by using in-house calibration work instruction no TCS-WI-22.  
The calibration procedure was carried out according to the OIML R 111-1 Edition 2004 (E)  
The calibration was performed by direct comparison with standard weight reference density 8,000 kg/m<sup>3</sup> reference temperature of 20 °C and air density of 1.2 kg/m<sup>3</sup> of the same nominal using substitution weighing method.

### Condition of reference standard instrument

Instrument Model  
1 Standard weight set 1 mg to 2 kg

Serial No.  
22229943

Certificate No.  
MM-0077-16

Due-date  
13 Jul 2019

### Traceability of the reference standard weight

This certificate is traceable to SI unit through Mass Laboratory Mechanical Metrology Department  
National Institute of Metrology (Thailand), which the capabilities are included in Appendix C of CIPM MRA.

### Measurement results

Nominal value	Marking	Conventional mass	Uncertainty	MPE Class E2	Serial No.
100 g	none	100 g ± 0.351 mg	± 0.050 mg	± 0.16 mg	80425411

Note : According to OIML-R111, the weight 100 g exceed the maximum permissible error of class E<sub>2</sub>

### Uncertainty of measurement

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% (confidence level).

This report will certify of the calibrated equipment only.

-- End --

