

ภาคผนวก น.

เอกสารสอบเทียบความถูกต้องของเครื่องมือ



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**ASIA MEDICAL AND AGRICULTURAL LABORATORY
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NSC-TISI-TIS 17025
CALIBRATION 0152

Certificate No. : 20-011360
Sample code : 20-03817-001

Page 1 of 4

CERTIFICATE OF CALIBRATION

Customer : C.T. ENVIRONMENT AND CHEMICAL CO., LTD
9/40-41 Moo 2 Bangkooveang,
A.Bangkruai, Nonthaburi 11130

Location of calibration : C.T. ENVIRONMENT AND CHEMICAL CO., LTD
(Laboratory Room)

Equipment : ELECTRONIC BALANCE

Manufacturer : AND

Model : HR-200

Serial No. : 12315081

ID No. : N/A

Date of Receipt : 04 February 2020

Date of Calibration : 04 February 2020

Calibrated by Mr. Somwang Sangdee
Scientist

Approved by (Mr. Somchai Neampunt)
Signed for Director

Date of Issue : 07 February 2020

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)



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REPORT OF CALIBRATION

Equipment : ELECTRONIC BALANCE
Manufacturer : AND
Model : HR-200
Capacity : Max 210 g
Resolution : 0.0001 g
Serial No. : 12315081
ID No. : N/A

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 : 210

☒ Before adjustment

☒ After adjustment

☐ No adjustment

☒ Adjustment

Nominal value	100	200	100	200
Standard weight	99.99993	200.00000	99.99993	200.00000
Average reading of indicator	100.0042	200.0089	100.0001	200.0000
Standard deviation	0.00011	0.00013	0.00011	0.00012

Unit : -	Range : -	<input type="checkbox"/> Before adjustment	<input type="checkbox"/> After adjustment		
<input type="checkbox"/> No adjustment	Nominal value	-	-	-	-
<input type="checkbox"/> Adjustment	Standard weight	-	-	-	-
	Average reading of indicator	-	-	-	-
	Standard deviation	-	-	-	-

Signature



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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 : 210

Range : -

Test Point	Sensitivity, S	Test Point	Sensitivity, S
0	1.0992	-	-
100	0.9993	-	-
200	0.9993	-	-

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	0.00014	2.10
0.2	0.1999994	0.2001	-0.0001	0.00014	2.10
0.5	0.4999962	0.5001	-0.0001	0.00014	2.10
1	1.0000053	1.0001	-0.0001	0.00014	2.10
2	2.0000034	2.0001	-0.0001	0.00014	2.10
5	4.9999975	5.0001	-0.0001	0.00014	2.10
10	10.000001	10.0000	0.0000	0.00014	2.10
20	19.999974	19.9999	0.0001	0.00014	2.09
50	49.999963	50.0001	-0.0001	0.00015	2.06
100	99.99993	100.0001	-0.0002	0.00019	2.02
200	200.00001	200.0001	-0.0001	0.00029	2.01

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

Remark

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



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Sample code : 20-03817-001

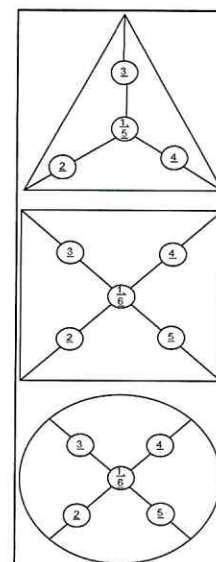
REPORT OF CALIBRATION

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.

<div> <input checked="" type="radio"/> Circle <input type="radio"/> Triangular <input type="radio"/> Rectangular </div>			Test weight : 50 Unit : g	
Weighing pan				
Range	210			
Position	Reading of indicator	Reading of indicator		
1	49.9998	-		
2	49.9999	-		
3	50.0001	-		
4	49.9999	-		
5	49.9998	-		
6	49.9998	-		
Maximum difference	0.0003	-		



Condition of Calibration

1. Ambient Conditions :

- Temperature 25.3°C to 26.1°C, Relative Humidity 51.9% to 61.0%, Air pressure 1013.2 hPa to 1014.1 hPa and air density 1.17 kg.m⁻³

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 mg to 5 g	E2	LB-WE-04	19-045195	01 June 2020
2) Standard Weight 10 g	E2	LB-WE-42	19-045199	02 June 2020
3) Standard Weight 20 g	E2	LB-WE-43	19-045200	02 June 2020
4) Standard Weight 50 g	E2	LB-WE-45	19-045202	02 June 2020
5) Standard Weight 50 g	E2	LB-WE-45	19-045202	02 June 2020
6) Standard Weight 100 g	E2	LB-WE-46	19-045203	02 June 2020
7) Standard Weight 200 g	E2	LB-WE-47	19-045204	02 June 2020

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 to 7).

6. Condition of Calibration item : Normal

End of Report



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NSC-TISI-TIS 17025
CALIBRATION 0152

Certificate No. : 20-012121
Sample code : 20-04101-001

Page 1 of 3

CERTIFICATE OF CALIBRATION

Customer : C.T. ENVIRONMENT AND CHEMICAL CO., LTD.
9/40-41 Moo 2 Bangkooveang, A. Bangkuai,
Nonthaburi 11130

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

Equipment : pH Meter

Manufacturer : EUTECH INSTRUMENTS

Model : pH 700

Serial No. : 2055189

ID No. : N/A

Date of Receipt : 05 February 2020

Date of Calibration : 07 February 2020

Calibrated by Mr.Anupong Lakawin
Scientist

Approved by (Mr. Somchai Neampunt)
Signed for Director

Date of Issue : 13 February 2020

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.

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NSC-TISI-TIS 17025
CALIBRATION 0152

Certificate No. : 20-012121
Sample code : 20-04101-001

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REPORT OF CALIBRATION

Equipment : pH Meter Resolution : 0.01 pH ; 0.1 mV (± 199.9 mV),
Manufacturer : EUTECH INSTRUMENTS 1 mV (beyond ± 200 mV)
Serial No. : 2055189 Model : pH 700
Range : -2.00 pH to 16.00 pH ; ± 2000 mV ID No. : N/A

Condition of calibration

1 Environment

- 1.1 Ambient temperature : $25.0^{\circ}\text{C} \pm 2.5^{\circ}\text{C}$
1.2 Relative humidity : $55.0\% \pm 15.0\%$

- 2 Calibration method : - In house method WI-CL-019 : based on direct measurement by using standard voltage calibrator and using certified reference material (CRM)

3 Reference standard / Certified Reference Material

Instrument	Code No.	Certificate No.	Due Date
3.1 Voltage Calibrator	LB-AMC-01	19E4028	15 October 2020
3.2 Digital Thermometer	LB-TH-33	19-096299	17 November 2020
Certified Reference Material	Lot. No.	Certificate No.	Expire Date
3.3 Buffer Solution pH 4.006	C02632	1398	14 June 2021
3.4 Buffer Solution pH 7.000	C02606	1371	27 February 2021
3.5 Buffer Solution pH 10.009	C02626	1392	24 May 2021

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

- 4.1 Instrument No. 3.1 through Technology Promotion Association (Thailand-Japan)
4.2 Instrument No. 3.2 through Asia Medical and Agricultural Laboratory and Research Center Co., Ltd.
4.3 Buffer Solution No. 3.3 traceable to Danish Fundamental Metrology (Certified Reference Material from DFM Certificate Nr. CRM-P1090 and DFM Certificate Nr. CRM-P1091)
4.4 Buffer Solution No. 3.4 traceable to Danish Fundamental Metrology (Certified Reference Material from DFM Certificate Nr. CRM-P1091 and Certificate Nr. CRM-P1086)
4.5 Buffer Solution No. 3.5 traceable to Danish Fundamental Metrology (Certified Reference Material from DFM Certificate Nr. CRM-P1085-A and Certificate Nr. CRM-P1087)

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

6 Condition of Calibration item : Normal *L. L.*



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CALIBRATION 0152

Certificate No. : 20-012121

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Sample code : 20-04101-001

REPORT OF CALIBRATION

Equipment : pH Meter Resolution : 0.01 pH ; 0.1 mV (± 199.9 mV),
Manufacturer : EUTECH INSTRUMENTS 1 mV (beyond ± 200 mV)
Serial No. : 2055189 Model : pH 700
Range : -2.00 pH to 16.00 pH ; ± 2000 mV ID No. : N/A

Results of calibration

Part 1. DC Voltage measurement

pH Meter Serial No : 2055189

Nominal Value pH	Applied DC Voltage mV	Average indicator reading		Uncertainty mV	Coverage factor <i>k</i>
		mV	pH		
0	414.113	414	0.00	± 0.59	2.00
4	177.477	177.6	4.00	± 0.083	2.00
7	0.000	0.1	7.00	± 0.083	2.00
10	-177.477	-177.4	10.00	± 0.083	2.00
14	-414.113	-414	14.00	± 0.59	2.00

Part 2 : Performance of electrode system

Electrode Manufacturer : EUTECH INSTRUMENTS Model : N/A

Electrode Serial No : 35580

Three-Point Calibration at pH4, pH7 and pH10

Percent Slope : 99.5 at pH 4 and 7 , Percent Slope 97.5 at pH 7 and 10

Standard Buffer Solution pH (@ 25 °C)	Average indicator reading		Error Value pH	Uncertainty pH	Coverage factor <i>k</i>
	pH	mV			
4.006	4.01	185.8	0.004	± 0.0096	2.00
7.000	7.01	9.9	0.010	± 0.0098	2.00
10.009	10.01	-163.2	0.001	± 0.0092	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

End of report