

ภาคผนวก น.

เอกสารสอบเทียบความถูกต้องของเครื่องมือ



Certificate of Calibration

Certificate Number : SPR22020019-1

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Customer : C.T. ENVIRONMENT AND CHEMICAL CO., LTD

9/40-41 M.2 T.Bangkrueang A.Bangkrueang Nonthaburi 11130

Equipment Name : Electronic Balance

Manufacturer : AND

Model : HR-200

Serial Number : 12315081

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$

Received Date : 02 Feb 2022

Relative Humidity : $60\% \pm 20\%$

Calibration Date : 04 Feb 2022

Location of Calibration : On-Site

Recommend Due Date : 04 Feb 2023

Calibration Procedure : SP-CPM-04-01

Date of Issue : 05 Feb 2022

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Navaporn Uengseng

Approved by :

Calibration Officer

(Mr. Worapong Sinthusopa)

Authorized Signatory



Calibration Report

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Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Standard Weight	N/A	-	C02210497	19 Feb 2022
Standard Weight Set	Class E2	B746971965	C02203624	02 Oct 2022

Traceability

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

SPC - SPC Calibration Center Co;Ltd.



Result of Calibration

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Range capacity : 0 to 210 g

Resolution: 0.0001 g

Repeatability (n = 10 number of measurement)

Standard Weight (g)	Standard Deviation
200	0.0000

Departure of indication from nominal Value

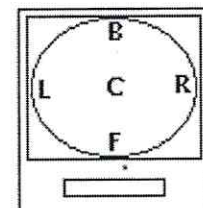
Unit : g

Nominal Value	UUC Reading	Error	Uncertainty (±)
No Load	0.0000	0.0000	0.000058
0.2	0.2001	0.0001	0.000059
0.5	0.5001	0.0001	0.000063
1.0	1.0000	0.0000	0.000063
2.0	2.0000	0.0000	0.000070
5.0	5.0001	0.0001	0.000064
10.0	10.0000	0.0000	0.000071
20.0	20.0000	0.0000	0.000081
50.0	50.0000	0.0000	0.00010
100.0	100.0001	0.0001	0.00016
200.0	200.0000	0.0000	0.00030

Off – Center Loading

Center	50.0000 g
Front	49.9994 g
Back	49.9999 g
Left	49.9994 g
Right	50.0000 g
Maximum difference	0.0006 g

A mass of 50 g was placed to various positions on the pan. The weighing machine reading error obtained is given in table.



Note:

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2$, providing a level of confidence approximately 95%

– End of Certificate –

SP-FM-04-15 REV.C



Certificate of Calibration

Certificate Number : SPR22020019-2

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Customer : C.T. ENVIRONMENT AND CHEMICAL CO., LTD

9/40-41 M.2 T.Bangkrueang A.Bangkrueang Nonthaburi 11130

Equipment Name : pH Meter

Manufacturer : Eutech

Model : pH700

Serial Number : 2055189

ID. Number : N/A

Environmental Conditions

Ambient Temperature : $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$

Received Date : 02 Feb 2022

Relative Humidity : $60\% \pm 20\%$

Calibration Date : 04 Feb 2022

Location of Calibration : On-Site

Recommend Due Date : 04 Feb 2023

Calibration Procedure : SP-CPC-04-01

Date of Issue : 05 Feb 2022

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Navaporn Uengseng

Approved by :

Calibration Officer

(Mr. Worapong Sinthusopa)

Authorized Signatory



Calibration Report

Certificate Number : SPR22020019-2

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Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Standard pH Solution	PH016.L5	Lot No.734191	61218918	07 Mar 2022
Standard pH Solution	PH107.L5	Lot No.743070	61220744	29 Apr 2022
Standard pH Solution	PH020.L5	Lot No.734193	61214484	07 Mar 2022
Documenting Process Calibrator	744	9141008	SPR21080450-4	14 Sep 2022
Super Thermometer with PRT	1575/3850-40-392	58087/100288	PSL-T 0468/64	06 Mar 2022

Traceability

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

C.P.A. Chem - ANAB#AT-1836 (ISO/IEC 17025:2017) and ANAB#AR-1835 (ISO/IEC 17034:2016)

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

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pH Measurement @ 25 °C

Unit : pH

Standard Solution	UUC Reading	Error	Uncertainty (±)
4.01	4.01	0.00	0.012
7.01	7.01	0.00	0.012
10.01	10.01	0.00	0.013

Temperature Measurement

Unit : °C

Standard Value	UUC Reading	Error	Uncertainty (±)
25.0	24.9	-0.1	0.070

(*) Voltage Simulation

Test Point	Standard Applies	UUC Reading	Error	Uncertainty (±)
4.000 pH	177.48 mV	177.6 mV	0.12 mV	0.12 mV
7.000 pH	0.00 mV	0.2 mV	0.20 mV	0.12 mV
10.000 pH	-177.48 mV	-177.2 mV	0.28 mV	0.12 mV

Note:

The result of calibration was found accurate as show on date and place of calibration only.
 This Certificate is not certified for any commercial transaction.
 Calibration Marked (*) "Not ANAB Accredited " in this Certificate have been included for completeness.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -