

ใบรับรองความสามารถ

ห้องปฏิบัติการวิเคราะห์

ที่ อว 0303/13553



ใบรับรองความสามารถห้องปฏิบัติการทดสอบ

ใบรับรองฉบับนี้ให้ไว้เพื่อแสดงว่า

บริษัท เซ็นท์ เอ็นไวร์ จำกัด

เลขที่ 30/29-30 ซอยเสรีไทย 68 ถนนเสรีไทย แขวงมีนบุรี เขตมีนบุรี

กรุงเทพมหานคร 10510

ได้ผ่านการประเมินความสามารถห้องปฏิบัติการทดสอบตามมาตรฐาน ISO/IEC 17025 : 2017

และข้อกำหนดอื่นๆที่เกี่ยวข้อง และเงื่อนไขการรับรองความสามารถห้องปฏิบัติการ

ของสำนักบริหารและรับรองห้องปฏิบัติการ กรมวิทยาศาสตร์บริการ

LABORATORY ACCREDITATION

หมายเลขการรับรองระบบงานที่ ทดสอบ - 0083

BLA-DSS

รายละเอียดการรับรองดังขอบข่ายการรับรองแนบท้าย

ออกให้ ณ วันที่ : 18 กันยายน 2562

หมดอายุ วันที่ : 17 กันยายน 2565

ลงชื่อ

(นางอุมภาพร สุขม่วง)

ประธานกรรมการรับรองระบบงานห้องปฏิบัติการ

สำนักบริหารและรับรองห้องปฏิบัติการ กรมวิทยาศาสตร์บริการ

กระทรวงการอุดมศึกษา วิทยาศาสตร์ วิจัย และนวัตกรรม



ที่ อก ๐๓๑๐(๑)/ ๑๕๐๖๙

กรมโรงงานอุตสาหกรรม

ถนนพระรามที่ ๖ เขตราชเทวี

กรุงเทพมหานคร ๑๐๕๐๐

ณ วันที่ ตุลาคม ๒๕๖๒

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เซ็นท์ เอ็นไวร์ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๐ สิงหาคม ๒๕๖๒

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เซ็นท์ เอ็นไวร์ จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เซ็นท์ เอ็นไวร์ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๗๙ สถานที่ตั้งเลขที่ ๓๐/๒๙-๓๐ ซอยเสรีไทย ๖๘ ถนนเสรีไทย แขวงมีนบุรี เขตมีนบุรี กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เซ็นท์ เอ็นไวร์ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

- | | |
|--------------------------|----------------------------|
| ๑) นางสาวอรสา ชายวงศ์ | ทะเบียนเลขที่ ว-๑๗๙-ค-๓๘๘๕ |
| ๒) นางนภาพร เรืองทินกร | ทะเบียนเลขที่ ว-๑๗๙-ค-๓๘๘๖ |
| ๓) นางสาวกิตติมา ทองรอบ | ทะเบียนเลขที่ ว-๑๗๙-ค-๔๗๓๓ |
| ๔) นางสาวศิริมา จีงพัฒน์ | ทะเบียนเลขที่ ว-๑๗๙-ค-๗๗๔๖ |

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

- | | |
|-----------------------------|----------------------------|
| ๑) นางสาวปิยาภรณ์ อุ่นเสียม | ทะเบียนเลขที่ ว-๑๗๙-จ-๖๕๗๗ |
| ๒) นางสาววราภรณ์ ชัยสิทธิ์ | ทะเบียนเลขที่ ว-๑๗๙-จ-๖๕๗๘ |
| ๓) นางสาวชลลดา สูงปานเขา | ทะเบียนเลขที่ ว-๑๗๙-จ-๖๕๗๙ |
| ๔) นายธนาวุฒิ ศรีชัยมงคล | ทะเบียนเลขที่ ว-๑๗๙-จ-๗๓๐๗ |
| ๕) นายสถาพร เพ็ชเชียว | ทะเบียนเลขที่ ว-๑๗๙-จ-๗๓๐๘ |

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๗ รายการ
ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒๐ กันยายน ๒๕๖๕ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นายศิริระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๐๐๒

โทรสาร ๐ ๒๓๕๔ ๓๒๐๘ ๐ ๒๓๕๔ ๓๔๑๕

**TEMPERATURE
CONTROLLER ENCLOSURES**NSC-TISI-TIS 17025
CALIBRATION 018**Report No. : MC 2009727**

Page 1 of 3

Customer : Saint Envir Co., Ltd.
30/29-30 Soi, Sareethai 68, Sareethai Rd., Minburi, Minburi, BKK 10510.

Reference Job No. : 20-2019 Received Date : 10 August 2020

Description : Incubator

Manufacturer : Pattana Intercool Model : PT-2SYP(N)

Serial No. : 30100073 ID. No. : LEQ 007

Marking : Additionally for the purpose of identification by this laboratory a label marked with this report number (MC 2009727) has been attached to the case.

Method : In-House calibration procedure MWI-T-027 this method is reference to TLAS G-20 "Temperature Controlled Enclosures".

Location of Calibration : Saint Envir Co., Ltd. ; Laboratory.

Environmental Conditions : Ambient Temperature : (35.1 to 35.5) °C
Relative Humidity : (38.0 to 46.0) %

Date of Calibration : 10 August 2020 Date of Issue : 11 August 2020

Checked by :

Thanagorn
Thanagorn Limchaicharoen
(Calibration Supervisor)

Approved by :

Aittipong
Aittipong Kanjanawasit
(Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the condition 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 units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full*expect with the prior written approval of the issuing laboratory.

Continuation of Report No. : MC 2009727

Page 2 of 3

The Reference Standard :

Description	Report No.	Serial No.	Due date
Data Acquisition/Switch Unit With Thermocouple Type " T " ID. No.27/1 to 27/9	MC 2000111	MY44020009	3 January 2021

This certificate is traceable to the international system of units maintained at:

- Master Calibration Co., Ltd.

1. Calibration Procedure:

This Instrument was calibration according to TLAS G-20 by comparison with calibrated thermocouple type T under no load condition. The Thermocouples were placed on nine points and located one thermocouple in each of the eigh corners of the chamber and was away from the each wall of 5 cm to 10 cm. And placed the ninth thermocouple within 2.5 cm of the geometric center of the chamber.

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 or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.

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

Overall Variation - The Difference of the maximum and minnum measured temperatures throughout observation.

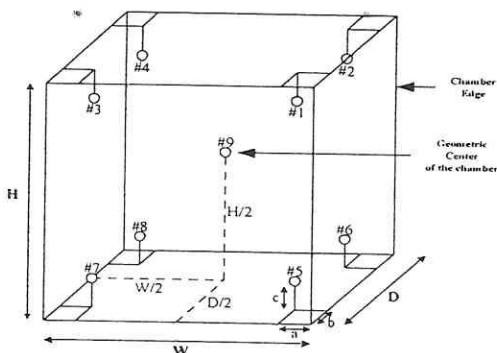


Figure 1 : Sensor Installation Location

Overall Ambient Temperature around the Chamber variation : 1.0 °C

Overall Line Voltage variation : 0.1 V

Chamber Size (W*H*D) : 110 cm x 140 cm x 60 cm

Checked by : *Thanagorn*

Continuation of Report No. : MC 2009727

Page 3 of 3

2. Result of calibration :

This Chamber Reading From : Digital Thermometer, Manufacturer : SHIMAX, Model : MAC 3D

Temperature Measurement Accuracy Test

Indicating Temperature * (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. #9	
20.0	22.7	23.1	20.3	20.3	19.8	19.7	19.9	20.0	20.0	0.60

Chamber Characterization Result

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
20.0	20.0	0.38	3.45	3.9

3. Uncertainty of Measurement

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

This report will certify of the calibrated equipment only.

End of Calibration Report

Checked by :



NSC-TISI-TIS 17025
CALIBRATION 0183**TEMPERATURE
CONTROLLER ENCLOSURES****Report No. : MC 2101872**

Page 1 of 3



Customer : Saint Envir Co., Ltd.

30/29-30 Soi, Sareethai 68, Sareethai Rd., Minburi, Minburi, BKK 10510.

Reference Job No. : 21-0346 Received Date : 19 February 2021

Description : Oven

Manufacturer : Memmert Model : UM 500

Serial No. : b502.0642 ID. No. : LEQ 013

Marking : Additionally for the purpose of identification by this laboratory a label marked with this report number (MC 2101872) has been attached to the case.

Method : In-House calibration procedure MWI-T-033 this method is reference to TLAS G-20 "Temperature Controlled Enclosures".

Location of Calibration : Saint Envir Co., Ltd. ; Lab Saint Envir.

Environmental Conditions : Ambient Temperature : (27.0 to 29.1) °C

Relative Humidity : (47.0 to 48.9) %

Date of Calibration : 19 February 2021 Date of Issue : 20 February 2021

Checked by :

Thanagorn
Thanagorn Limchaicharoen
(Calibration Supervisor)

Approved by :

Aittipong
Aittipong Karjanawasit
(Technical Manager)**The uncertainties are for a confidence probability of approximately 95%**

This certificate is issued in accordance with the condition 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 units 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 issuing laboratory.

Continuation of Report No. : MC 2101872

Page 2 of 3

The Reference Standard :

Description	Report No.	Serial No.	Due date
Data Acquisition/Switch Unit	MC 2016022	MY44020009	3 January 2022
With Thermocouple Type " T " ID. No.25/1 to 25/3 and 25/5 to 25/10			

This certificate is traceable to the international system of units maintained at:

- Master Calibration Co., Ltd.

1. Calibration Procedure:

This Instrument was calibration according to TLAS G-20 by comparison with calibrated thermocouple type T under no load condition. The Thermocouples were placed on nine points and located one thermocouple in each of the eigh corners of the chamber and was away from the each wall of 5 cm to 10 cm. And placed the ninth thermocouple within 2.5 cm of the geometric center of the chamber.

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 or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.

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

Overall Variation - The Difference of the maximum and minmum measured temperatures throughout observation.

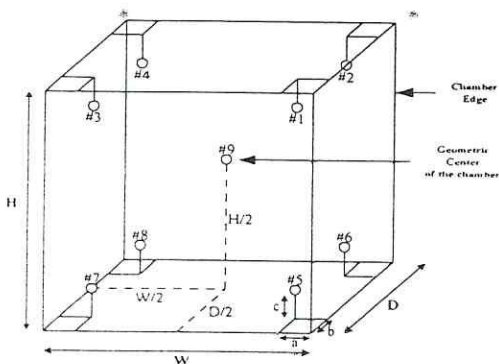


Figure 1: Sensor Installation Location

Overall Ambient Temperature around the Chamber variation : 0.9 °C

Overall Line Voltage variation : 0.0 V

Chamber Size (W*H*D) : 56 cm x 48 cm x 40 cm

Checked by : *Thanagorn*

Continuation of Report No. : MC 2101872

Page 3 of 3

2. Result of calibration :**Temperature Measurement Accuracy Test**

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. #9	
180*	180.3	179.5*	180.5	180.3	*178.6	179.6	180.0*	180.2	179.8*	1.0

Chamber Characterization Result

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
As Mark 180	180	0.3	1.4	2.3

3. Uncertainty of Measurement

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

This report will certify of the calibrated equipment only.

End of Calibration Report

Checked by : *Thanagorn*

SINGLE-PAN ELECTRONIC BALANCE



Report No. : MC 2101871

Page 1 of 3



Customer : Saint Envir Co., Ltd.
30/29-30 Soi Sareethai 68, Sareethai Rd., Minburi, Minburi, BKK 10510.

Reference Job No. : 21-0346 Received Date : 19 February 2021
Description : Electronic Balance Type : Top-loading
Manufacturer : Mettler Toledo Model : AB204-S
Capacity : 220 g Resolution : 0.0001 g
Serial No. : 1128261643 ID. No. : LEQ 019
Marking : Additionally for the purpose of identification by this laboratory a label marked with this report number (MC 2101871) has been attached to the case.
Method : In-house calibration procedure MWI-F-001 this method is reference to UKAS Publication ref: LAB 14 : 2015 "Calibration of weighing machines".
Location of Calibration : Saint Envir Co., Ltd.; St-Control Room.
Environmental Conditions : Ambient Temperature : (24.2 to 24.5) °C
Relative Humidity : (61.8 to 62.3) %
Air pressure : 1015 mbar
Date of Calibration : 19 February 2021 Date of Issue : 22 February 2021

Checked by :

Pakorn H.

Pakorn Huadsoonthon

(Calibration Engineer)

Approved by :

Aittipong

Aittipong Kanjanawasit

(Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the condition 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 units 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 issuing laboratory.

Continuation of Report No. : MC 2101871

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The Reference Standard :

Description	Report No.	Serial No.	Due date
Standard weight set	C02201551	158801	16 June 2022
Standard weight set	C02201554	124947/00	16 June 2022

This certificate is traceable to the international system of units maintained at :

SPC Calibration Center Co., Ltd.

Result of calibration:**1. General Condition**

As agreed with customer, the calibration range of the balance as shown in these results was carried out.

Pre-adjustment check : The correction to the balance reading before adjustment at load 200 g
was found to be 0.0003 g

Adjustment : Yes (sensitivity adjustment)

2. Repeatability of Reading

Nominal Value g	Standard Deviation of reading g	Maximum difference between successive readings g
100	0.00005	0.0001
200	0.00005	0.0001

3. Departure from Nominal Value (Sensitivity)

Nominal Value g	Correction g	Uncertainty (± mg)	Coverage Factor k
0.01	0.0000	0.088	2.09
0.1	0.0000	0.088	2.09
1	0.0000	0.089	2.09
2	0.0000	0.089	2.09
5	-0.0001	0.089	2.07
10	-0.0001	0.091	2.07
20	-0.0001	0.10	2.05
50	-0.0001	0.11	2.05
100	-0.0001	0.16	2.00
120	-0.0001	0.19	2.00
150	-0.0003	0.39	2.00
200	-0.0003	0.32	2.00

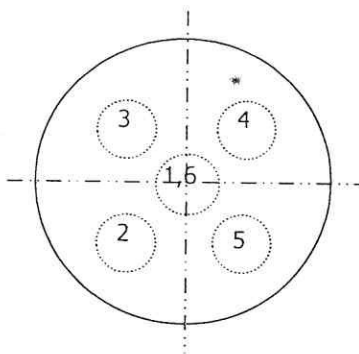
Checked by : Pakorn H.

Continuation of Report No. : MC 2101871

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4. Off-Centre Loading

A mass of approximately 100 g was placed and moved to various positions on the pan.
The balance error readings from the centre obtained are given in the table.



units = g					
Position 1	Position 2	Position 3	Position 4	Position 5	Position 6
100.0002	100.0002	100.0003	100.0005	100.0004	100.0002

Maximum difference from the centre : 0.0003 g

* This calibration report do not cover the effect that is happen from sensitivity drift.

5. Uncertainty of Measurement.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor k as listed, providing a level of confidence of approximately 95 %.

This report will certify of the calibrated equipment only.

End of Calibration Report

Checked by : Pakorn H.



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484




Cert.No.: 20CH1149

Page.: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : Seven Multi
Serial No. : 1228145259
ID No. : LEQ 020
Condition As-Received: Used Item
Received Date : 5 August 2020
Calibration Date : 10 August 2020
Reference : 2008-0141WN-1
Submitted by : Saint Envir Co.,Ltd.
30/29-30 Soi Sareethai 68,
Sareethai Rd., Minburi, Bangkok 10510
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 : based on direct measurement by
using standard voltage calibrator and
certified reference material (CRM)
- CP-CH8 : based on comparison technique by
comparison with reference standard thermometer
Calibrated by : Warakorn Lernagtrakul

Approved by :


Approved Signatory

- () Pornthippa Tameyakul
(✓) Malee Butkruea
() Saithip Meangmai

Issue Date : 13 August 2020

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 Equipment Calibration and Testing Services.

A 0017922



Cert.No.: 20CH1149

Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument :-

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>
1) Document Process Calibrator	753	43160066	130RC092	20E1369	15 Apr 2021
2) Ref. Standard Thermometer	1523	2188080	130RC044	19I1510	27 Nov 2020

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

- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	699313	16 July 2022
pH 6.985	CPA chem	693947	12 June 2021
pH 10.008	CPA chem	693946	21 June 2021

3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results**Function : mV Measurement****Performing standard curve by Fluke at pH (4,7,10)**

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: 1228145259	4.000	177.48	177.4	4.000	0.058	2.00
	7.000	0.00	0.0	6.999	0.058	2.00
	10.000	-177.48	-177.5	10.001	0.058	2.00

Male

a 1013674



Cert.No.: 20CH1149

Page.: 3 of 3

Calibration Results**Function : pH Measurement**

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (\pm)	Coverage factor k
pH Electrode S/N.: 9195991	4.008	4.01	175	0.0051	2.05
	*6.985	6.99	4	* 0.0074	2.00
	10.008	10.01	-169	0.013	2.00

Function : Temperature Measurement**(*) Without adjustment**

This equipment was connected with Temperature Probe;

- Model : InLab Expert Pro
- Serial No. : 9195991

Dimension of probe;

- Length : 120 mm.
- Diameter : 12 mm.
- Immersion Depth : 110 mm.

Calibration Point ($^{\circ}\text{C}$)	Standard Temperature ($^{\circ}\text{C}$)	UUC* Reading ($^{\circ}\text{C}$)	Error ($^{\circ}\text{C}$)	Uncertainty of measurement (\pm $^{\circ}\text{C}$)	Coverage factor k
23.0	23.003	23.1	0.097	0.20	2.00
25.0	25.001	25.1	0.099	0.20	2.00
27.0	27.004	27.1	0.096	0.20	2.00

Remark : - UUC* = Unit Under Calibration

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

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**TEMPERATURE
CONTROLLER ENCLOSURES**NSC-TISI-TIS 17025
CALIBRATION 0183**Report No. : MC 2009728**

Page 1 of 3

Customer : Saint Envir Co., Ltd.

30/29-30 Soi, Sareethai 68, Sareethai Rd., Minburi, Minburi, BKK 10510.

Reference Job No. : 20-2019

Received Date : 10 August 2020

Description : Refrigerator

Manufacturer : Sanhui

Model : SD2DC70

Serial No. : 1186

ID. No. : LEQ 024

Marking : Additionally for the purpose of identification by this laboratory a label marked with this report number (MC 2009728) has been attached to the case.

Method : In-House calibration procedure MWI-T-027 this method is reference to TLAS G-20 "Temperature Controlled Enclosures".

Location of Calibration : Saint Envir Co., Ltd. ; Laboratory.

Environmental Conditions : Ambient Temperature : (35.1 to 35.5) °C

Relative Humidity : (38.0 to 46.0) %

Date of Calibration : 10 August 2020

Date of Issue : 11 August 2020

Checked by :

Thanagorn
Thanagorn Limchaicharoen
(Calibration Supervisor)

Approved by :

Aittipong
Aittipong Kanjanawasit
(Technical Manager)**The uncertainties are for a confidence probability of approximately 95%**

This certificate is issued in accordance with the condition 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 units 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 issuing laboratory.

Continuation of Report No. : MC 2009728

Page 2 of 3

The Reference Standard :

Description	Report No.	Serial No.	Due date
Data Acquisition/Switch Unit With Thermocouple Type " T " ID. No.25/1 to 25/9	MC 2000111	MY44020009	3 January 2021

This certificate is traceable to the international system of units maintained at:

- Master Calibration Co., Ltd.

1. Calibration Procedure:

This Instrument was calibration according to TLAS G-20 by comparison with calibrated thermocouple type T under no load condition. The Thermocouples were placed on nine points and located one thermocouple in each of the eight corners of the chamber and was away from the each wall of 5 cm to 10 cm. And placed the ninth thermocouple within 2.5 cm of the geometric center of the chamber.

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 or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady state conditions. The reference sensor should preferably be located at the geometric center of the chamber.

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

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

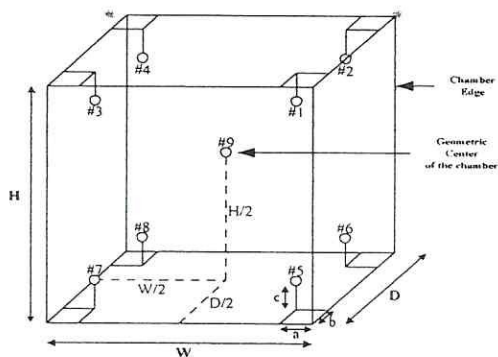


Figure 1 : Sensor Installation Location

Overall Ambient Temperature around the Chamber variation : 1.2 °C

Overall Line Voltage variation : 0.1 V

Chamber Size (W*H*D) : 48 cm x 30 cm x 38 cm

Checked by : *Thamgam*

Continuation of Report No. : MC 2009728

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2. Result of calibration :

This Chamber Reading From : Digital Thermometer, Manufacturer : SHIMAX, Model : MAC5A

Temperature Measurement Accuracy Test

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. #9	
4.0	3.4	3.2	3.1	3.2	4.8	5.1	2.9	3.2	3.3	0.59

Chamber Characterization Result

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
4.0	4.0	0.21	1.93	2.6

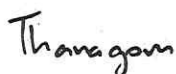
3. Uncertainty of Measurement

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

This report will certify of the calibrated equipment only.

End of Calibration Report

Checked by :



CERT.No.: HS-R020G

Calibration Date : 1 Jul 20

Submitted by : SAINT ENVIR CO.,LTD

30/29-30 Soi. Seri Thai 68, Seri Thai Rd.,

Minburi, Bangkok 10510

Avg Room Temp : 20 °C

Avg Water Temp : 20 °C

Air Pressure : 760.00 mmHg

Salinity : 0 ppt

Model : YSI 5000

S/N : 08J100943

Probe : YSI 5010

S/N : 18D100709

ID NO. : -

Air Temp ref : S/N. E00522

Barometric ref : S/N. E00522

Water Temp ref : S/N. 11431

Technician : Kittipong M.

Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.09	(PASS)	-
Measurement 2 (mg/l)	9.08	(PASS)	-
Measurement 3 (mg/l)	9.08	(PASS)	-
Measurement 4 (mg/l)	9.08	(PASS)	-
Measurement 5 (mg/l)	9.09	(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.



Technician Signature



Laboratory Manager