

เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์



CERTIFICATE No : 24T1189
REFERENCE No : 72116-7

Certificate of Calibration

EQUIPMENT	:	AUTOClave
MANUFACTURER	:	HIRAYAMA
MODEL	:	HVE-50
SERIAL No	:	30612085166
ID No	:	EQL-155
CONDITION AS RECEIVED	:	USED ITEM
SUBMITTED BY	:	TEST TECH CO., LTD. 30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM, BANGKHUNTHIAN, BANGKOK 10150
CALIBRATED BY	:	CHAICHARN CH.
CALIBRATION DATE	:	09-Feb-24
APPROVED BY	:	
ISSUED DATE	:	12-Feb-24
RECEIVED DATE	:	09-Feb-24

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

Harikul Science Co.,Ltd.
694 Soi Ratchadaniwet 24, Pracharabamphen,
Samsaenok, 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 : 16D105048
Probe : YSI 5010
S/N : 22A100334
ID NO. : EQL-193
Air Temp ref : S/N. F8065C26
Barometric ref : S/N. F8065C26
Water Temp ref : S/N. 11430
Technician : Kittipong M.

CERT No.: HS-U0681

Calibration Date : 22 Sep 23

Submitted by : TEST TECH CO.,LTD.

30,32 Ramall Soi 63, Ramall Road, Samaedam,
Bangkhunthian, Bangkok 10150

Avg Room Temp : 20 °C

Avg Water Temp : 20 °C

Air Pressure : 760.00 mmHg

Salinity : 0 ppt

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)	9.07	(PASS)	-
Measurement 6 (mg/l)	9.08	(PASS)	-
Measurement 7 (mg/l)	9.07	(PASS)	-
Measurement 8 (mg/l)	9.07	(PASS)	-
Measurement 9 (mg/l)	9.07	(PASS)	-
Measurement 10 (mg/l)	9.07	(PASS)	-

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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.

(Kittipong Maekwong)

(Nalerapha Pisatkunchon)



CERTIFICATE No : 24T1189

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Calibration Report

EQUIPMENT : AUTOCALVE
MANUFACTURER : HIRAYAMA
ID NUMBER : EQL-155
RECEIVED DATE : 09-Feb-24
AMBIENT TEMPERATURE : 30°C ± 1°C
MODEL : HVE-50
SERIAL NUMBER : 30612085166
CALIBRATION DATE : 09-Feb-24
RELATIVE HUMIDITY : 53 %RH ± 10 % RH

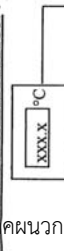
CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BASED ON BS 2646-1:2021 BY COMPARISON WITH CALIBRATED RTD DATA LOGGERS UNDER NO LOAD CONDITION. THE SENSORS WERE PLACED ON FIVE LOCATIONS AS SHOWN IN THE PICTURE. THE SENSOR ON LOCATION 1 AND 2 WERE PLACED IN THE UPPER HALF AND LOWER HALF OF CHAMBER FREE SPACE RESPECTIVELY. THE THIRD SENSOR WAS PLACED WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE INSTRUMENT CHAMBER. SENSOR NUMBER 4 WAS ATTACHED TO THE LOAD TEMPERATURE PROBE, IF FITTED, WITHIN 15 mm OF ITS TIP. SENSOR NUMBER 5 WAS PLACED IN THE CHAMBER DRAIN OR VENT WITHIN 100 mm OF ITS CONNECTION TO THE CHAMBER.

2. REFERENCE STANDARD INSTRUMENTS :-

- 1) DATA LOGGER
MODEL : VAL PROBE
SERIAL No : S350.S367.DV35.DN94
CERTIFICATE No : 24T0890
DUE DATE : 26-Jan-25
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDES 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) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



GENERAL INFORMATION

Overall Ambient Temperature around the Chamber variation : 0.5 °C
Autoclave Condition : Normal
Chamber Size (Diameter*H): 30 * 71 cm

CHAMBER PERFORMANCE

Calibrate Point (°C)	Average all Position (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)	Pressure (MPa)	Holding time (min)	Operating Cycle time (min)
115	115.74	0.09	0.11	0.25	0.090	20	60
121	121.59	0.06	0.21	0.28	0.125	20	60

FRONT

TEMPERATURE MEASUREMENT ACCURACY TEST(°C)

Cont Temp		Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	#5	
115	115	115.72	115.74	115.79	115.71	115.71	0.59
121	121	121.59	121.62	121.56	121.58	121.59	0.59

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT OF TEMPERATURE MEASUREMENT ACCURACY TEST EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : THE STABILITY TERM IN THE UNCERTAINTY BUDGET WAS REPLACED BY THE STANDARD REPEATABILITY.

NOTE 3 : LOCATION 3 WAS REFERENCE LOCATION.

NOTE 4 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.
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

CERTIFICATE No : 23T8796
REFERENCE No : 70515-4

Certificate of Calibration

EQUIPMENT : WATER BATH
MANUFACTURER : MEMMERT
MODEL : WNE 45
SERIAL No : L720.0266
ID No : EQL-241
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY

CHAICHARN CH.

CALIBRATION DATE

16-Aug-23

APPROVED BY

ISSUED DATE

16-Aug-23

RECEIVED DATE

16-Aug-23

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



CERTIFICATE No : 23T8796

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Calibration Report

EQUIPMENT	:	WATER BATH
MANUFACTURER	:	MEMMERT
ID NUMBER	:	EQL-241
RECEIVED DATE	:	16-Aug-23
AMBIENT TEMPERATURE	:	25 °C ± 1 °C
	:	RELATIVE HUMIDITY : 50 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

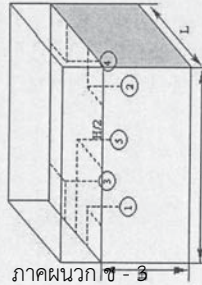
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	2625A	6603614	23T6642	19-Jul-24
- THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE 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) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



PROBE INSTALLATION POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 0.6
Overall Variation of Line Voltage (V) : 3
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 59*35*20 cm

BATH PERFORMANCE

Calibrate Point (°C)	Average All Position Temp. (±°C)	Temperature Stability (±°C)	Radius Uniformity (°C)	Axial Uniformity (°C)	Overall Variation (°C)
83.0	83.09	0.05	0.07	0.05	0.16
92.0	92.13	0.11	0.06	0.06	0.28

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
83.0	83.0	83.08	83.09	83.06	83.11	83.12	0.15
92.0	92.0	92.11	92.13	92.10	92.16	92.16	0.19

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE BATH.

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

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



CERTIFICATE No : 23T6749

REFERENCE No : 69853-3

Certificate of Calibration

EQUIPMENT	:	INCUBATOR
MANUFACTURER	:	MEMMERT
MODEL	:	INB 400
SERIAL No	:	E405.0946
ID No	:	EQL-087
CONDITION AS RECEIVED	:	USED ITEM
SUBMITTED BY	:	TEST TECH CO., LTD.
	:	30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM, BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY

CHAICHARN CH.

CALIBRATION DATE

10-Jul-23

APPROVED BY

ISSUED DATE

17-Jul-23

RECEIVED DATE

10-Jul-23



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

CERTIFICATE No : 23TG749

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Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : INB 400
ID No : EQL-087
RECEIVED DATE : 10-Jul-23
AMBIENT TEMPERATURE : 24 °C ± 1 °C
S/N : E405.0946
CALIBRATION DATE : 10-Jul-23
RELATIVE HUMIDITY : 51 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE 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 THERMOMETER PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

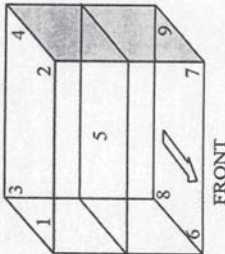
2. REFERENCE STANDARD INSTRUMENTS :-

- 1) DATA LOGGER WITH RTD
2) REFERENCE TEMPERATURE PROBES
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE 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) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 1
Overall Line Voltage (V) variation : 3
Instrument Condition : Normal
Chamber Size (W*L*H): 40*33*40 cm



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CHAMBER PERFORMANCE

Calibrate Point (°C)	Average All Location (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
44.0	43.96	0.06	0.54	0.71
55.0	55.00	0.05	0.58	0.79
58.0	57.96	0.06	0.69	0.81

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	#5	#6	#7	#8	#9	
43.5	43.5	43.72	43.78	43.73	43.75	44.22	43.86	44.17	44.06	44.34	0.36
54.5	54.5	54.75	54.78	54.76	54.75	55.30	54.83	55.27	55.07	55.47	0.36
57.5	57.5	57.67	57.74	57.62	57.67	58.28	57.86	58.28	58.11	58.38	0.36

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2: LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

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



Metrology
SCI ECO Services Company Limited
33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110, Thailand.
Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100
Bangkok Tel : +668 9205 6851 , +669 8247 2360
Website : www.scleco.co.th E-Mail : calibrate@scg.com

Certificate No. T240070

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cooling Room)
Manufacturer : -
Model : -
Serial No. : -
Customer Code : EQL-I67
ID No. : T1447A1
Customer : Test Tech Co.,Ltd
30, 32 Rama II Soi 63, Rama II Rd., Samaedam,
Bangkhunthian Bangkok 10150
Customer Location : LABORATORY FLOOR 3
Date of Receipt : 12 January 2024
Calibrated By : Sujjar Naknakred (Site Calibration Manager)
Approved By : / Boonchai Suriyawong (Site Calibration Manager)
Date of Issue : 24 JAN 2024

The uncertainties are for a confidence probability of approximately 95%.

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 units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metro



Metrology

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhohi, Saraburi 18110, Thailand.



NSC-TISI-TIS 17025
CALIBRATION 0244

Certificate No. T240070

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Calibration Report

Equipment : Chamber (Cooling Room)

Date of Calibration : 16 January 2024

Environment : Temperature : 19.4-24.1 °C

Line Voltage : 221.3-226.1 V

Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN161-TN170	T230773	10 April 2024
TC	TYPE T	TN161-TN170	T230773	10 April 2024
DATA LOGGER	34970A	T149	T230773	10 April 2024

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant - Hour 37 Minute At 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

() without adjustment (X) after adjustment

Approved By



Approved By



Metrology

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhohi, Saraburi 18110, Thailand.

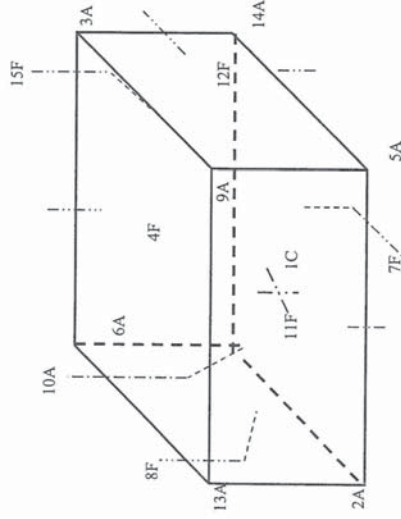


NSC-TISI-TIS 17025
CALIBRATION 0244

Certificate No. T240070

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Calibration Report



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

1C =	TN161
2A =	TN162
3A =	TN163
4F =	TN164
5A =	TN165
6A =	TN166
7F =	TN167
8F =	TN168
9A =	TN169
10A =	TN170

11F =	TN161
12F =	TN162
13A =	TN163
14A =	TN164
15F =	TN165



Metrology

SCI ECO Services Company Limited

33/2 Moo 3, T. Banpa, A. Kaengkhoei, Saraburi 18110, Thailand.



NSC-TS-17025
CALIBRATION 0244

Certificate No. T240070

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Calibration Report

Measurement Results:

Calibration Point	Average Standard Reading at each position (°C)									
	TN161	TN162	TN163	TN164	TN165	TN166	TN167	TN168	TN169	TN170
3	3.17	3.11	3.11	3.33	2.94	3.06	2.95	3.17	2.86	2.59
	TN161	TN162	TN163	TN164	TN165					
	2.74	2.95	2.75	2.95	2.85					

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Chamber (Cooling Room)		Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)
	Min , Max	Average				
3.0	2.9 , 3.1	3.0	2.97	0.29	0.64	0.80
						2.00

* The quoted uncertainty exclude " uniformity "

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By, _____



CERTIFICATE No : 23T8798
REFERENCE No : 70515-6

Certificate of Calibration

EQUIPMENT : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL : UFE 500
SERIAL No : G508.0791
ID No : EQL-128
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEADAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 11-Sep-23

APPROVED BY : 
ISSUED DATE : 15-Sep-23
RECEIVED DATE : 11-Sep-23

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



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



NSC-TS-17025
CALIBRATION 0244



Cert. No.: 23H2216
Page.: 2 of 2

Result of Calibration:-
Function: Humidity Measurement Without Adjustment

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	30.1	30.0	-0.1	1.5
25.0	40.1	39.0	-1.1	1.5
25.0	50.1	49.0	-1.1	1.7
25.0	60.0	59.0	-1.0	1.7
25.0	75.2	75.5	0.3	1.8

Result of Calibration:-
Function: Temperature Measurement Without Adjustment

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
15.046	15.0	-0.046	0.72
19.975	20.0	0.025	0.72
25.022	25.0	-0.022	0.72
30.000	30.0	0.000	0.72

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor $k = 2.00$, providing confidence level approximately 95%.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 24M150
Page : 1 of 2

Equipment : Standard Weight
Manufacturer : LS
Model :
Serial No. :
ID No. : EQL-121
Condition As-Received: Used Item
Received Date: 18 January 2024
Calibration Date: 26 January 2024

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.

Reference: 2401-0593DN
Submitted by: TEST TECH CO.,LTD. (Head Office)

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 10) %

Atmospheric Pressure: 1017.0 hPa

Procedure used: Calibration were conducted using calibration procedure CP-M06 according to OIML R111-1 Edition 2004 (E).

30, 32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkhunthian, Bangkok 10150

Condition of this result of calibration

1. Reference standards instruments :

Instrument

1) Standard weight Set (E2) YCS31-712-00 50202965 MM-0109-22 11 Jul 2024

2. This certificate is not certified for any commercial transaction.

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

4. This Certificate is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suwat Wuttichareonmongkol
Issue Date : 29 January 2024

Approved Signatory :

[] Sura Suwanasri

[] Sorapong Koomkainam

a 1185882

B 0333471



Cert No.: 24M150
Page: 2 of 2

Result of calibration

Without adjustment

Nominal Value	Marking	Conventional mass	Uncertainty of Measurement (±)	Maximum Permissible error (±)
50 g	None	50.00001 g	0.10 mg	0.30 mg

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 %.

-000-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 24M151
Page : 1 of 2

Equipment :

Standard Weight

Manufacturer :

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.

Model :

Serial No.:

ID No.: EQL-258

Condition As-Received: Used Item

Received Date: 18 January 2024

Calibration Date: 26 January 2024

Reference:

2401-0593DN

Submitted by: TEST TECH CO.,LTD. (Head Office)

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 10) %

Atmospheric Pressure: 1016.7 hPa

30, 32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkhunthian, Bangkok 10150

Procedure used:

Calibration were conducted using calibration procedure CP-M06 according to OIML R111-1 Edition 2004 (E).

Condition of this result of calibration

1. Reference standards instruments :

Instrument

Model

Serial No.

Certificate No.

Due Date

1) Standard weight Set (E2)

YCS31-712-00

50202965

MM-0109-22

11 Jul 2024

2. This certificate is not certified for any commercial transaction.

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

4. This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suwat Wuthicharnmongkol
Issue Date : 29 January 2024

Approved Signatory :

[] Sura Suwanmasri

[] Sorapong Koonkainam



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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NSC-TS1-TS1703
CALIBRATION 008

Certificate of Calibration

Certificate No. : 23M1557

Page : 1 of 2

Equipment: Standard Weight
Manufacturer: -
Model: -
Serial No.: M 0030/11
ID No.: EQL-139
Condition As-Received: Used Item
Received Date: 10 August 2023
Calibration Date: 17 August 2023

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.

Submitted by: TEST TECH CO.,LTD. (HEAD Office)

Reference: 2308-0284DN

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Atmospheric Pressure: 1006.2 hPa

30, 32 Rama II Soi 63, Rama II Rd.,

Samaedam, Bangkhunthian, Bangkok 10150

Procedure used: Calibration were conducted using in-house calibration procedure CP-M01 according to comparison method against standard weights on the basis of weightings at an average air density of 1.2 kg/m³ and a temperature of 23.7 °C material density of weight is 8000 kg/m³.

Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Weight Set (E2)	73336	20026	MM-0018-22	28 Feb 2024

2.This certificate is not certified for any commercial transaction.

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

4.This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Thapakorn Thammachai
Issue Date : 17 August 2023

Approved Signatory :

Sura Suwanasri

[] Sorapong Koomkainam

Cert No.: 23M1557

Page: 2 of 2

Result of calibration Without adjustment

Nominal Value	Conventional mass	Uncertainty of Measurement (±)	Maximum Permissible error (±)
2 g	2.000018 g	0.040 mg	0.12 mg

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 %.

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Certificate of Calibration

Certificate No.: 23M1558
Page: 1 of 2

Equipment: Standard Weight
Manufacturer: Mettler Toledo
Model: -
Serial No.: 11119459
ID No.: EQL-149
Condition As-Received: Used Item
Received Date: 10 August 2023
Calibration Date: 17 August 2023

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.

Reference: 2308-0284DN
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Atmospheric Pressure: 1005.75 hPa
Submitted by: TEST TECH CO.,LTD. (HEAD Office)
30, 32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkhunthian, Bangkok 10150

Procedure used: Calibration were conducted using in-house calibration procedure CP-M01 according to comparison method against standard weights on the basis of weighings at an average air density of 1.2 kg/m³ and a temperature of 23.7 °C material density of weight is 8000 kg/m³.

Condition of this result of calibration

1.Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Weight Set (E2)	73336	20026	MM-0018-22	28 Feb 2024

2.This certificate is not certified for any commercial transaction.

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

4.This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by: Thapakorn Thammachai
Issue Date: 17 August 2023

Approved Signatory:

✓ Sura Suwanasri
[] Sorapong Koomkainam

B 0322292



Cert No.: 23M1558
Page: 2 of 2

Result of calibration Without adjustment

Nominal Value	Conventional mass	Uncertainty of Measurement (±)	Maximum Permissible error (±)
20 g	20.000008 g	0.080 mg	0.25 mg

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 %.

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Certificate of Calibration

Certificate No. : 24T880
Page : 1 of 2

Equipment : Digital Thermometer With Sensor
Manufacturer : Testo
Model : 926
Serial No. : 5609280110250914
ID No. : EQL-058
Condition As-Received: Used Item
Received Date: 04 April 2024
Calibration Date: 11 April 2024
Reference: 2404-0204DN
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

Submitted by: TEST TECH CO.,LTD. (Head Office)

30, 32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkokthian, Bangkok 10150

Procedure used: Calibration were conducted using in-house calibration procedure CP-T01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Black Stack Thermometer	1580	8C454	231600	30 May 2024
2) PRT Scanner Module	2582	A01303	231600	30 May 2024
3) Industrial Platinum Resistance Thermometer	5627	739433	231600	30 May 2024
4) Industrial PRT Probe	5627A	979442	231600	30 May 2024

2.The certificate is valid only to the item calibrated on date and place of calibration.

3.This Certification is traceable to the International System of Unit maintained through:-

-Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

Calibrated by : Anuchit Pangchata
Issue Date : 24 April 2024

Approved Signatory

() Chatchawan Khunpluek
(✓) Wanlop Larpkum

B 0339284



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Certificate of Calibration

Certificate No. : 23T475
Page : 1 of 2

Equipment : Digital Thermometer With Sensor
Manufacturer : Testo
Model : 926
Serial No. : 33824123/004
ID No. : EQL-138
Condition As-Received: Used Item
Received Date: 09 March 2023
Calibration Date: 20 March 2023
Reference: 2303-0314DN
Ambient Temperature: (25 ± 3) °C
Relative Humidity: (50 ± 20) %

Submitted by: TEST TECH CO.,LTD. (HEAD Office)

30, 32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkokthian, Bangkok 10150

Procedure used: Calibration were conducted using in-house calibration procedure CP-T01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Thermometer	1529	A7A609	221274	17 Oct 2023
2) Industrial Platinum Resistance Thermometer	5627-12	571970	221274	17 Oct 2023
3) Industrial Platinum Resistance Thermometer	5627	824304	221274	17 Oct 2023

2.The certificate is valid only to the item calibrated on date and place of calibration.

3.This Certification is traceable to the International System of Unit maintained at:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Sataporn Mulkamsee
Issue Date : 23 March 2023

Approved Signatory

() Chatchawan Khunpluek
(✓) Wanlop Larpkum

B 0310381



CERTIFICATE No : 23T7717
REFERENCE No : 70152-1

Certificate of Calibration

EQUIPMENT : LIQUID IN GLASS THERMOMETER
MANUFACTURER : PRECISION
MODEL : N/A
SERIAL No : 8925
ID No : EQL-103
RESOLUTION : 0.1 °C
TYPE : TOTAL IMMERSION
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHARUKIT L.
CALIBRATION DATE : 15-Aug-23
APPROVED BY : [REDACTED]
ISSUED DATE : 15-Aug-23
RECEIVED DATE : 08-Aug-23

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

Cert. No.: 23T475
Page: 2 of 2

Result of Calibration:-
Function: Temperature measurement
This equipment was connected with Thermocouple Type T ID No. EQL-138

Immersion Depth (mm.)	Standard Temperature (°C)	UUC* Reading (°C)	Without Adjustment	
			Error (°C)	Uncertainty of Measurement (±°C)
150	2.9962	2.6	-0.3962	0.24
150	35.0051	34.8	-0.2051	0.24
150	36.0061	35.8	-0.2061	0.24
150	36.9974	36.8	-0.1974	0.24
150	41.5051	41.4	-0.1051	0.24
150	43.9973	43.9	-0.0973	0.24
150	55.0047	55.0	-0.0047	0.25
150	169.9960	170.4	0.4040	0.55

UUC* : Unit Under Calibration
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%.

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QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, 1 Laksong, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584
www.qcalibration.com

CERTIFICATE No : 23T7717

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : LIQUID IN GLASS THERMOMETER
MANUFACTURER : PRECISION
MODEL : N/A
ID No :
RESOLUTION : 0.1 °C
RECEIVED DATE : 08-Aug-23
AMBIENT TEMPERATURE : 23 °C ± 3 °C
SERIAL NUMBER : 8925
TYPE : TOTAL IMMERSION
CALIBRATION DATE : 15-Aug-23
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	23T3927	08-Mar-24
2) SPRT PROBE	5614	636626	23T3927	08-Mar-24
3) PRECISION BATH	7320	A21105	22T13199	14-Dec-23
4) PRECISION BATH	CTR-40	A68155	22T13198	09-Dec-23

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE 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)
20.013	20.0	140	0.013	N/A	0.10
25.010	25.0	160	0.010	N/A	0.10
41.508	41.5	230	0.008	N/A	0.10
44.505	44.5	240	0.005	N/A	0.10
45.003	45.0	245	0.003	N/A	0.10
49.999	50.0	265	-0.001	N/A	0.10

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



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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Certificate of Calibration

Certificate No. : 23H2216
Page : 1 of 2

Equipment : Dial Thermo-Hygrometer
Manufacturer: Barigo
Model :
Serial No. :
ID No. : EQL-064

Condition As-Received: Used Item

Received Date: 12 October 2023

Calibration Date: 17 October 2023
to 20 October 2023

Reference: 2310-0447/DN

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

Submitted by: TEST TECH CO.,LTD. (HEAD Office)

30, 32 Rama II Soi 63, Rama II Rd.,
Samaedam, Bangkhunthian, Bangkok 10150

Procedure used: Calibration were conducted using in-house calibration procedure CP-H02 according to comparison with standard chilled mirror sensor for humidity measurement function and comparison with standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Handheld Thermometer With Sensor	1523	3240076	23I305	15 Mar 2024
2) Dew Point Hygrometer	Optidew 401	164756	TH-0158-22	13 Dec 2023

2.The certificate is valid only to the item calibrated on date and place of calibration.

3.This Certification is traceable to the International System of Unit maintained through:-

-Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Surasit Phansudnoi
Issue Date : 26 October 2023

Approved Signatory

[] Ponthipha Tameyakul
[x] Viporn Tantiyawutti

B 0327545



CERTIFICATE No : 23T7718
REFERENCE No : 70152-2

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT	:	LIQUID IN GLASS THERMOMETER
MANUFACTURER	:	PRECISION
MODEL	:	G13004
SERIAL No	:	N/A
No	:	EQL-111
RESOLUTION	:	1 °C
TYPE	:	TOTAL IMMERSION
CONDITION AS RECEIVED	:	USED ITEM
SUBMITTED BY	:	TEST TECH CO., LTD. 30,32 RAMA II SOI 63, RAMA II RD., SAMAEADAM, BANGKHUNTHIAN, BANGKOK 10150
CALIBRATED BY	:	CHARUKIT L.
CALIBRATION DATE	:	15-Aug-23
APPROVED BY	:	
ISSUED DATE	:	15-Aug-23
RECEIVED DATE	:	08-Aug-23

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

F-G010 REV 03



Result of Calibration:-
Function: Humidity Measurement Without Adjustment

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	30.1	30.0	-0.1	1.5
25.0	40.1	39.0	-1.1	1.5
25.0	50.1	49.0	-1.1	1.7
25.0	60.0	59.0	-1.0	1.7
25.0	75.2	75.5	0.3	1.8

Result of Calibration:-
Function: Temperature Measurement Without Adjustment

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
15.046	15.0	-0.046	0.72
19.975	20.0	0.025	0.72
25.022	25.0	-0.022	0.72
30.000	30.0	0.000	0.72

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by coverage factor $k = 2.00$, providing confidence level approximately 95%.

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CERTIFICATE No : 23T7718

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : LIQUID IN GLASS THERMOMETER
MANUFACTURER : PRECISION
MODEL : G13004
ID No : EQL-111
RESOLUTION : 1 °C
RECEIVED DATE : 08-Aug-23
AMBIENT TEMPERATURE : 23 °C ± 3 °C
SERIAL NUMBER : N/A
TYPE : TOTAL IMMERSION
CALIBRATION DATE : 15-Aug-23
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 23T3927 08-Mar-24
2) SPRT PROBE 5614 636626 23T3927 08-Mar-24
3) PRECISION BATH 7320 A21105 22T13199 14-Dec-23
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE 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)
115.013	115.0	120	0.013	N/A	0.15
120.998	121.0	124	-0.002	N/A	0.15

UUC* : UNIT UNDER CALIBRATION

1. 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