



Metrological Center

SCI ECO Services Company Limited

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Certificate No. T202108

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Incubator)

Manufacturer : -

Model : -

Serial No. : -

Customer Code : EQL-166

ID No. : T1792A4

Customer : Test Tech Co.,Ltd

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

Bangkhunthian Bangkok 10150

Customer Location : BOD Room

Date of Receipt : 23 September 2020

Calibrated By : Watcharapon Sangtong (Technician)

Approved By :  / Sujjar Naknakred (Site Calibration Manager)

Date of Issue : 02 OCT 2020

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 Metrological Center.

Certificate No. T202108

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Calibration Report

Equipment : Chamber (Incubator)
Date of Calibration : 28 September 2020
Environment : Temperature : 24.7-25.1 °C
 Line Voltage : 221.4-230.2 V
 Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 13 resistance thermometer detectors into its chamber , the other one resistance thermometer detector 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
RTD	100 ohm	29-(CH1-10)	T192677	12 November 2020
RTD	100 ohm	28-(CH1-10)	T192677	12 November 2020
DATA LOGGER	34970A	T151	T192677	12 November 2020

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 2 Hour - Minute At 20 °C

Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max

☐ Close

☒ Not Available

5. Adjustment :

(X) without adjustment

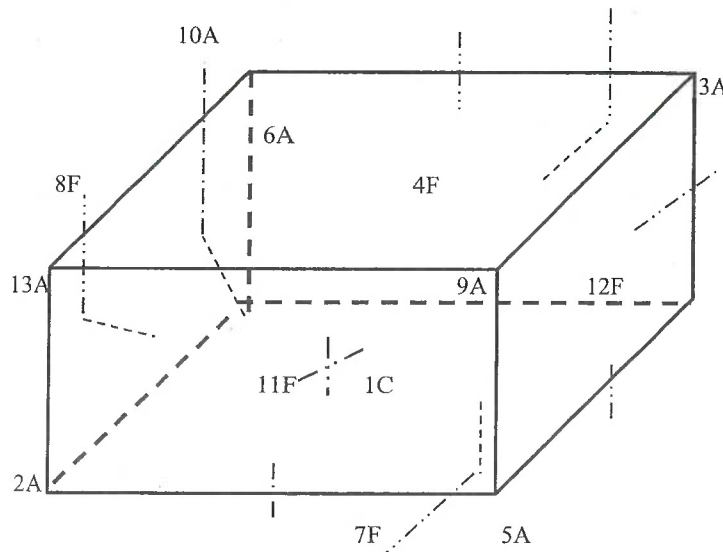
() after adjustment

Approved By. 

Certificate No. T202108

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Calibration Report



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

1C = 29-CH1	12F = 28-CH2
2A = 29-CH2	13A = 28-CH3
3A = 29-CH3	
4F = 29-CH4	
5A = 29-CH5	
6A = 29-CH6	
7F = 29-CH7	
8F = 29-CH8	
9A = 29-CH9	
10A = 29-CH10	
11F = 28-CH1	

Approved By. 

Certificate No. T202108

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Calibration Report

Measurement Results :

Average Standard Reading at each position (°C)										
Calibration Point	29-CH1	29-CH2	29-CH3	29-CH4	29-CH5	29-CH6	29-CH7	29-CH8	29-CH9	29-CH10
20	20.52	19.92	20.25	20.11	20.14	20.14	20.06	19.70	20.12	20.08
	28-CH1	28-CH2	28-CH3							
	19.82	20.00	19.79							

Chamber (Incubator)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
	Min , Max	Average					
20.0	-	20.0	20.05	0.10	0.58	0.39	2.02

* The Acuoted 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 : 20T2238
REFERENCE No : 56115-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF160
SERIAL No : D518.0082
ID No : EQL-205
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 : PRASERT D.
CALIBRATION DATE : 09-Mar-20

APPROVED BY : PONGSAK J.
ISSUED DATE : 10-Mar-20
RECEIVED DATE : 09-Mar-20



QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkai, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 20T2238

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : IF160
ID No : EQL-205
RECEIVED DATE : 09-Mar-20
AMBIENT TEMPERATURE : 27 °C ± 1 °C
S/N : D518.0082
CALIBRATION DATE : 09-Mar-20
RELATIVE HUMIDITY : 53 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

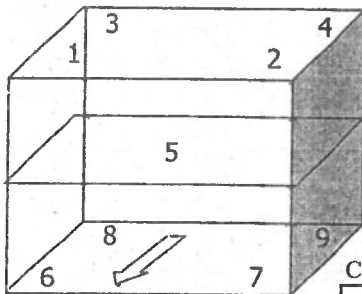
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND 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.

REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	HYDRA 2635A	6635300	19T6773	13-Jul-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) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



FRONT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 1

Overall Line Voltage (V) variation : 5

Instrument Condition : Normal

Chamber Size (W*L*H): 56*40*72 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Average All Locations (±°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	35.01	0.04	0.25	0.33
36.0	36.0	36.12	0.04	0.29	0.34
41.5	41.5	41.54	0.03	0.38	0.40

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
35.0	35.0	34.87	34.90	34.85	34.88	35.15	35.09	35.10	35.17	35.07	0.25
36.0	36.0	35.96	36.00	35.94	35.97	36.27	36.21	36.23	36.29	36.18	0.25
41.5	41.5	41.37	41.39	41.30	41.37	41.72	41.63	41.68	41.71	41.63	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



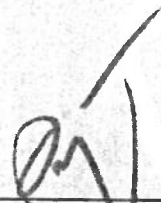
CERTIFICATE No : 20T9165
REFERENCE No : 58577-2

PAGE : 1 OF 2

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 : PRASERT P.
CALIBRATION DATE : 14-Sep-20

APPROVED BY : 
PONGSAK J.
ISSUED DATE : 15-Sep-20
RECEIVED DATE : 14-Sep-20



QUALITY CALIBRATION CO.,LTD.

235 Petchkasem 63/2 Road, Laksong, Bangkai, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 20T9165

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : INCUBATOR
MANUFACTURER : MEMMERT
MODEL : INB 400
ID No : EQL-087
RECEIVED DATE : 14-Sep-20
AMBIENT TEMPERATURE : 26 °C ± 1 °C
S/N : E405.0946
CALIBRATION DATE : 14-Sep-20
RELATIVE HUMIDITY : 48 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

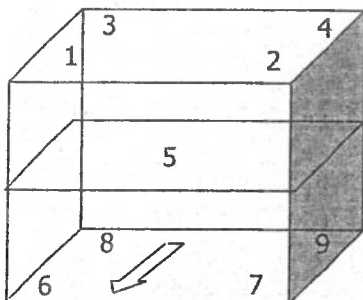
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND 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 :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	HYDRA 2635A	6635300	20T7221	11-Jul-21

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) THROUGH QUALITY CALIBRATION CO.,LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



FRONT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 4
Overall Line Voltage (V) variation : 6
Instrument Condition : Normal
Chamber Size (W*L*H): 40*33*40 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Indicating Temperature (°C)	Average All Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
43.5	43.5	44.11	0.20	0.55	0.99
54.5	54.5	55.10	0.19	0.61	0.95

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
43.5	43.5	43.92	43.85	43.89	43.81	44.26	44.25	44.49	44.23	44.33	0.36
54.5	54.5	54.91	54.87	54.77	54.82	55.31	55.30	55.48	55.19	55.27	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

Certificate No. T202102

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Certificate of Calibration

Equipment : Chamber (Oven)**Manufacturer** : Memmert**Model** : UFE 500**Serial No.** : G512.2005**Customer Code** : EQL-161**ID No.** : T6125A3**Customer** : Test Tech Co.,Ltd

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

Bangkhunthian Bangkok 10150

Customer Location : Solids Room 301**Date of Receipt** : 23 September 2020**Calibrated By** : Sujjar Naknakred (Site Calibration Manager)**Approved By** :  / Boonchai Suriyawong (Site Calibration Manager)**Date of Issue** : 01 OCT 2020

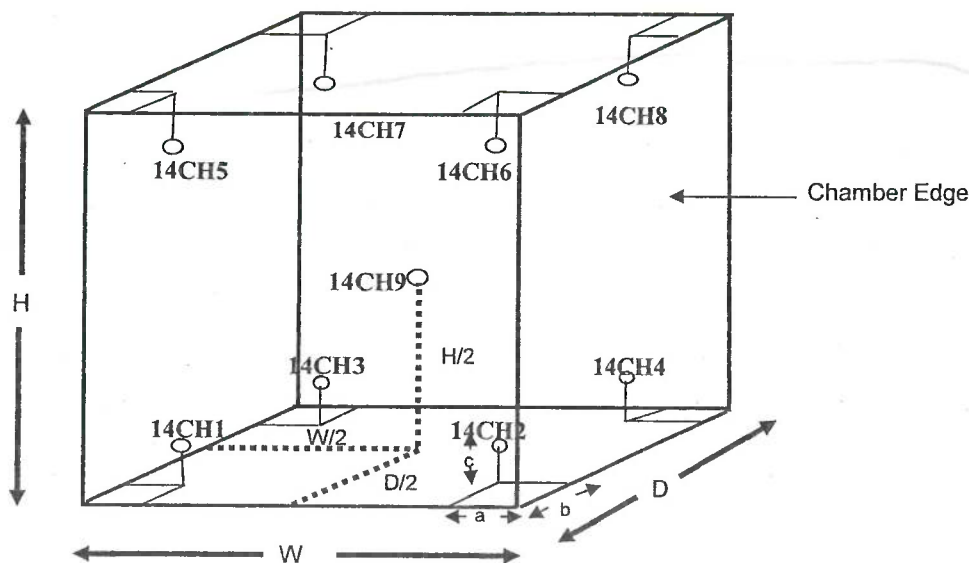
The uncertainties are for a confidence probability of approximately 95%.

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Certificate No. T202102

Calibration Report

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Remark :

Internal Dimensions of Chamber : W (Width) = 56 cm. , H(Height)=48 cm. and D(Depth)=40 cm.
 Size of Installed Standard sensor number 14CH1 to number 14CH8 : a = 5 cm. , b = 5 cm. and c = 5 cm.
 Size of Installed Standard sensor number 14CH9 : W/2=56 cm./2 , H/2=48 cm./2 and D/2=40 cm./2

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)								
	14CH1	14CH2	14CH3	14CH4	14CH5	14CH6	14CH7	14CH8	14CH9
104	104.60	104.65	103.58	103.56	104.12	104.21	103.79	103.76	104.15
120	120.55	121.15	119.29	119.32	120.01	120.07	119.54	119.54	119.89
140	140.57	141.26	139.07	139.15	140.30	140.05	139.44	139.42	139.66
150	150.59	151.17	148.96	149.04	150.41	150.02	149.37	149.35	149.53
180	180.45	181.89	178.55	178.45	180.87	179.59	179.16	178.89	179.04

Chamber (Oven)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (± °C)	Uniformity (°C)	Uncertainty (± °C)	Coverage Factor k
	Min , Max	Average					
104.0	-	104.0	104.05	0.11	0.85	0.44	2.00
120.0	-	120.0	119.93	0.18	1.67	0.58	2.00
140.0	-	140.0	139.88	0.15	1.97	0.62	2.00
150.0	-	150.0	149.83	0.16	2.07	0.64	2.00
180.0	-	180.0	179.65	0.25	3.32	0.90	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. *[Signature]*

Certificate No. T202103

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Certificate of Calibration

Equipment : Chamber (Oven)**Manufacturer** : Memmert**Model** : UF 110**Serial No.** : B414.0764**Customer Code** : EQL-169**ID No.** : T1788A4**Customer** : Test Tech Co.,Ltd

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

Bangkhunthian Bangkok 10150

Customer Location : Solids Room 301**Date of Receipt** : 23 September 2020**Calibrated By** : Sujjar Naknakred (Site Calibration Manager)**Approved By** :  / Boonchai Suriyawong (Site Calibration Manager)**Date of Issue** : 01 OCT 2020

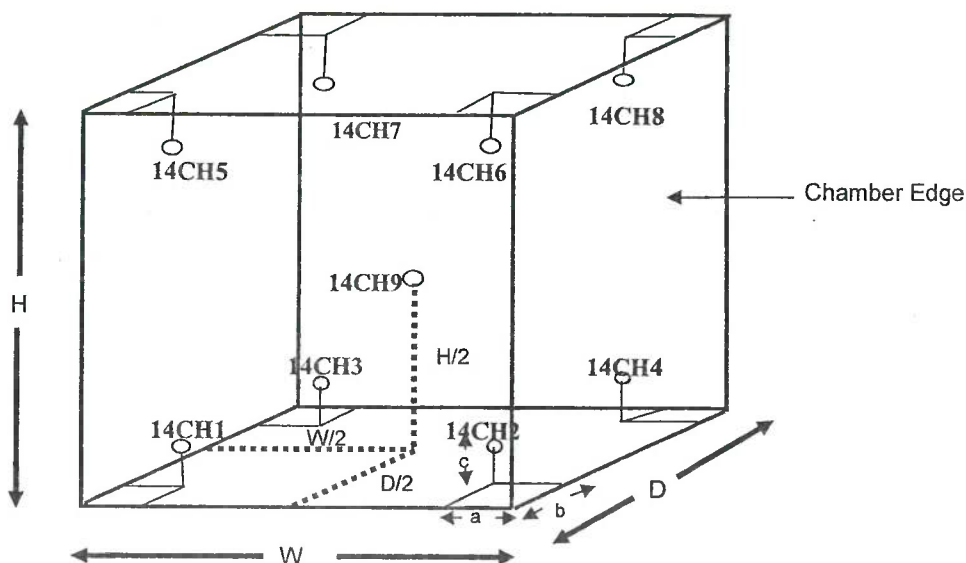
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Certificate No. T202103

Page 3 of 3

Calibration Report



Remark :

Internal Dimensions of Chamber : W (Width) = 56 cm. , H(Height)=48 cm. and D(Depth)=40 cm.

Size of Installed Standard sensor number 14CH1 to number 14CH8 : a = 5 cm. , b = 5 cm. and c = 5 cm.

Size of Installed Standard sensor number 14CH9 : W/2=56 cm./2 , H/2=48 cm./2 and D/2=40 cm./2

Measurement Results

Calibration Point	Average Standard Reading at each position (°C)								
	14CH1	14CH2	14CH3	14CH4	14CH5	14CH6	14CH7	14CH8	14CH9
104	103.65	104.32	103.91	104.40	103.48	103.95	104.10	104.09	104.02
180	178.77	179.87	179.31	180.65	178.91	181.60	180.13	179.65	179.67

Chamber (Oven)			Temperature Distribution				
Setting (°C)	Reading (°C)		Average (°C)	Stability (±°C)	Uniformity (°C)	Uncertainty (±°C)	Coverage Factor k
	Min , Max	Average					
104.0	103.9 , 104.1	104.0	103.99	0.18	0.79	0.49	2.00
180.0	179.9 , 180.1	180.0	179.84	0.27	2.19	0.72	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. 