



# Metrological Center

## SCI ECO Services Company Limited

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Website : www.scieco.co.th E-Mail : calibrate@scg.co.th



Certificate No. T202108

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## 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%.

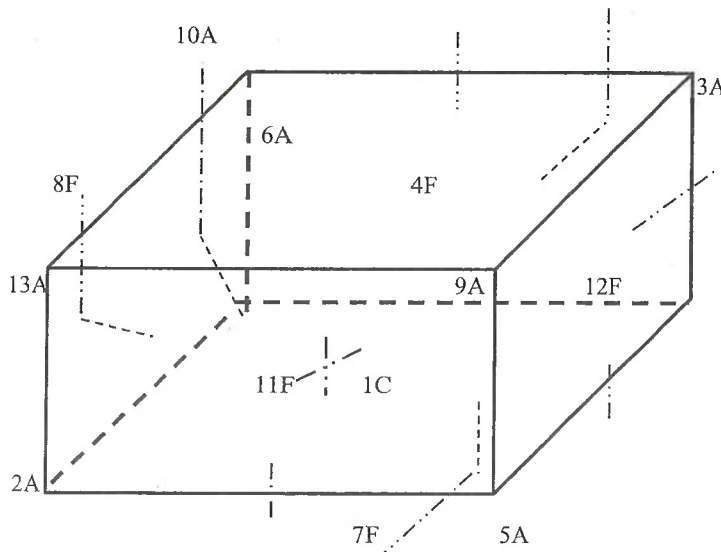
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Certificate No. T202108

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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 :   
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

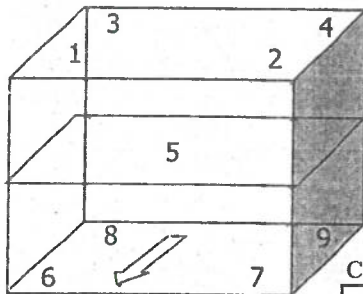
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND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



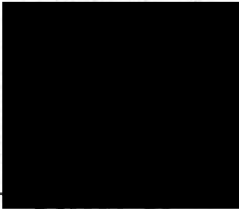
CERTIFICATE No : 20T9165  
REFERENCE No : 58577-2

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

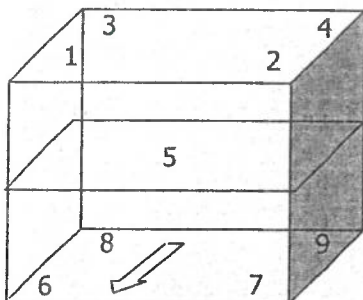
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND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

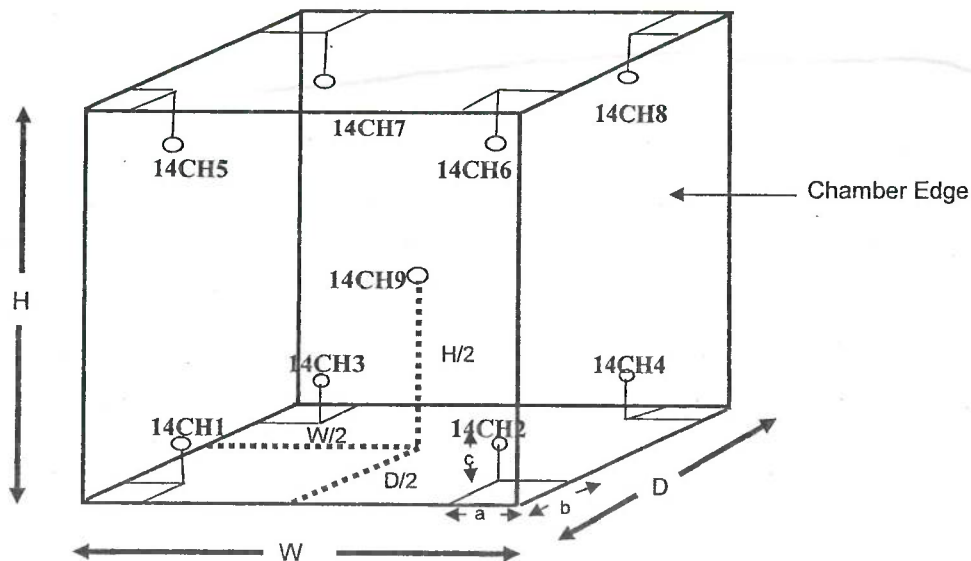
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Certificate No. T202102

## 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 number14CH1 to number14CH8 : a = 5 cm. ,b = 5 cm. and c = 5 cm.  
 Size of Installed Standard sensor number14CH9 : 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

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

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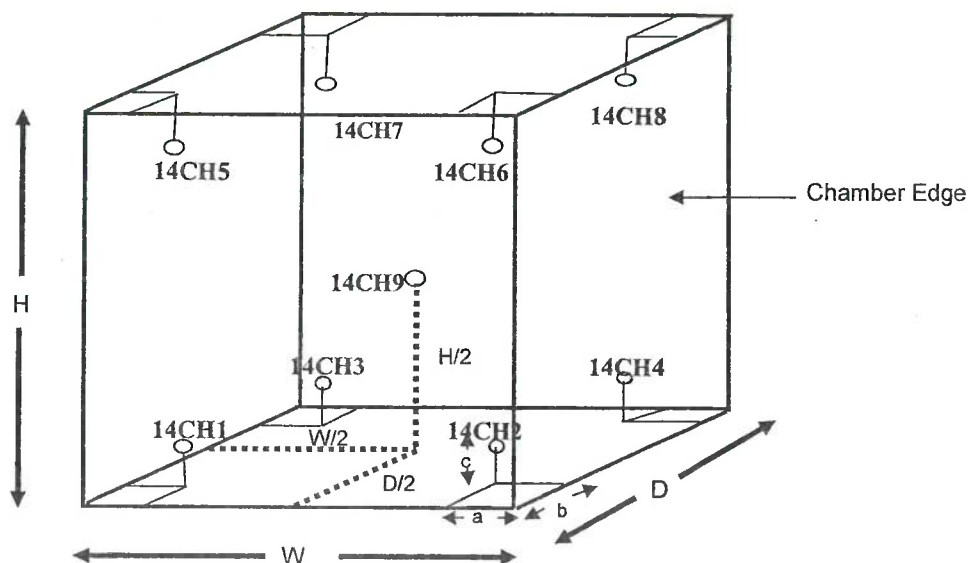




Certificate No. T202103

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## 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. \_\_\_\_\_