

เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์

Request No.: 22-55/0127

Request No.: 22-55/0127

Serial No.: IZ50402-0110-0303

Id No.: N/A

Nominating: INCUBATOR

Maker: Accuplus

Model/Type: H20-DS

Customer: WATER INDEX & CONSULTANT CO.,LTD.

Address: 229/8 Soi Chuan Sanit Wong 95/1, Chuan Sanit Wong Rd., Bangsue, Bangkok 10700.

Date of request: 22 December 2011

Date of calibration: 2 March 2012

Place of calibration: Customer's Laboratory.

Laboratory address: Temperature Standard Laboratory, MTC, Bangkok.

Point of calibration: Calibrated at 20°C.

Conditions of calibration: Ambient temperature: (23 ± 3) °C. Relative humidity: (50 ± 10) %

Reference Standard: Data Acquisition / Switch Unit Equipped, Model: 34070A, SN: MY41002409.

Maker: Agilent with Sensor Resistance Thermometer Detector, SN: RTD-301 = 309 (9 #)

which were calibrated on 19 April 2011, can be traceable to International Standard Units (SI units) through Changchun Institute of Metrology & Measurement.


Calibration certificate No: EP-P 706/53, PSL-T 618-3/53

Calibration Procedure: The calibration was done in accordance with WLC.P.06 which based on TISI Laboratory Accreditation Scheme, Publication Reference G-20 (Guidelines for Calibration and Checks of Temperature Controlled Enclosures).

The temperature scale in use of this laboratory is the International Temperature Scale of 1990 (ITS-90).

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

page 1 of 2



TISTR
THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

CALIBRATION CERTIFICATE

MTC No.: PSL-T 129/55

Serial No.: IZ50402-0110-0303

Id No.: N/A

189 Phahonphong Road, Chauchak, Bangkok 10900

Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5226

Fax. (66) 0 2561 4771, 0 2579 8592

URL: <http://www.tistr.or.th>

Sal 1, Bangpoo Industrial Estate, Subharnul Road, Amphoe Kluang, Samutprakan 10280

Tel. (66) 0 2323 1872 - 80, 0 2709 4147 ext. 115, 116


Fax. (66) 0 2323 5165

URL: <http://www.tistr.or.th>

Request No.: 22-55/0127

Serial No.: IZ50402-0110-0303

Results:



TISTR
THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

CALIBRATION CERTIFICATE

MTC No.: PSL-T 129/55

Serial No.: IZ50402-0110-0303

Id No.: N/A

189 Phahonphong Road, Chauchak, Bangkok 10900

Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5226

Fax. (66) 0 2561 4771, 0 2579 8592

URL: <http://www.tistr.or.th>

Sal 1, Bangpoo Industrial Estate, Subharnul Road, Amphoe Kluang, Samutprakan 10280

Tel. (66) 0 2323 1872 - 80, 0 2709 4147 ext. 115, 116

Fax. (66) 0 2323 5165

URL: <http://www.tistr.or.th>

Request No.: 22-550127

Request No.: 22-550127

Serial No.: 920481

Code No.: N/A

Model: N/A

Customer: WATER INDEX & CONSULTANT CO., LTD.

Address: 222/8 Sai Chuan Sanit Wong 95/1, Chuan Sanit Wong Rd, Bang-wor, Bangkok, 10700.

Date of request : 22 December 2011

Date of calibration : 2 March 2012

Place of calibration : Customer's Laboratory.

Items of calibration : Calibrated at 85°C and 95°C.

Conditions of calibration : - Ambient temperature: (25 ± 5) °C, Relative humidity: (50 ± 20) %.

- AC Power supply (220 ± 3) % VAC.

Reference Standard : Data Acquisition / Switch Unit Equipped, Model : 34970A, SN : MY41002499.

Maker: Agilent with Sensor Resistance Thermometer Detector, SN: RTD-301 ~ 309 (9 each) which were calibrated on 19 April 2011, can be traceable to International Standard Units (SI units) through Chungchong Institute of Metrology & Measurement.

Calibration certificate No.: BP-P 706/51, PSL-T 618-3/53

Calibration Procedure : The calibration was done in accordance with WLC.P.08 in-house method.

The temperature scale in use of this laboratory is the International Temperature Scale of 1990 (ITS-90).

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

MTC No.: PSL-T 130455

Code No.: N/A

Nomenclature: WATER BATH

Maker: Memmert

CALIBRATION CERTIFICATE

page 1 of 3

The above results are valid exclusively for the tested / analysed sample(s) calibrated item(s) as mentioned in this report/certificate. Adversing the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governing TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Sai 1, Bangpoo Industrial Estate, Subharnum Road,
Amphoe Muang, Samutprakan 10280
Tel. (66) 0 2591 121-30, 0 2591 5515 ext. 5255, 5256
Fax. (66) 0 2591 4771, 0 2591 8592
URL : <http://www.tistr.or.th>

Request No.: 22-550127

Request No.: 22-550127

Serial No.: 920481

Code No.: N/A

Model: N/A

Customer: WATER INDEX & CONSULTANT CO., LTD.

Address: 222/8 Sai Chuan Sanit Wong 95/1, Chuan Sanit Wong Rd, Bang-wor, Bangkok, 10700.

Date of request : 22 December 2011

Date of calibration : 2 March 2012

Place of calibration : Customer's Laboratory.

Items of calibration : Calibrated at 85°C and 95°C.

Conditions of calibration : - Ambient temperature: (25 ± 5) °C, Relative humidity: (50 ± 20) %.

- AC Power supply (220 ± 3) % VAC.

Reference Standard : Data Acquisition / Switch Unit Equipped, Model : 34970A, SN : MY41002499.

Maker: Agilent with Sensor Resistance Thermometer Detector, SN: RTD-301 ~ 309 (9 each) which were calibrated on 19 April 2011, can be traceable to International Standard Units (SI units) through Chungchong Institute of Metrology & Measurement.

Calibration certificate No.: BP-P 706/51, PSL-T 618-3/53

Calibration Procedure : The calibration was done in accordance with WLC.P.08 in-house method.

The temperature scale in use of this laboratory is the International Temperature Scale of 1990 (ITS-90).

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

MTC No.: PSL-T 130455

Code No.: N/A

Nomenclature: WATER BATH

Maker: Memmert

CALIBRATION CERTIFICATE

page 2 of 3

The above results are valid exclusively for the tested / analysed sample(s) calibrated item(s) as mentioned in this report/certificate. Adversing the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governing TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Sai 1, Bangpoo Industrial Estate, Subharnum Road,
Amphoe Muang, Samutprakan 10280
Tel. (66) 0 2591 121-30, 0 2591 5515 ext. 5255, 5256
Fax. (66) 0 2591 4771, 0 2591 8592
URL : <http://www.tistr.or.th>

Request No.: 22-55/0127

Serial No.: 9098/2426

Model: ET 125 SC

Customer: WATER INDEX & CONSULTANT CO.,LTD.

Address: 229/8 Soi Charan Sanit Wong 93/1, Charan Sanit Wong Rd., Bangsue, Bangkok 10700.

Date of request: 22 December 2011

Date of calibration: 1 March 2012

Place of calibration: Temperature Standards Laboratory, MTC, Bangkok.

Point of calibration: Calibrated at 150°C.

Conditions of calibration: Ambient temperature: 25 ± 3°C and relative humidity: 50 ± 20%.

Reference Standard: Data Acquisition / Switch Unit Equipped, Model: 34970A, SN: MY11002495, Maier.

Agilent with Sensor Thermocouple Wires Type K, SN: TC-K-301 - 309 (9 ea.), which was calibrated on 19 April 2011, can be traceable to International Standard Units (SI units) through Changchun Institute of Metrology & Measurement, Calibration certificate No.: BP-P 70653, ISL-T 618-3/53

Calibration Procedure: Indicate temperature of Unit Under Calibration (UUC) was compared to temperature obtained from reference standards at calibration point.

The temperature scale in use of this laboratory is the International Temperature Scale of 1990 (ITS-90).

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

page 1 of 4

CALIBRATION CERTIFICATE

MTC No.: PSL-T 13055

Nomenclature: HEATING BLOCK

Maker: Lovibond.

The above results are valid exclusively for the tested / analysed sample(s) calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

158 Phahonyothin Road, Chauchak, Bangkok 10900
Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2581 4771, 0 2579 8952
URL: <http://www.tistr.or.th>

Request No.: 22-55/0127

Serial No.: 920481

Result:

(Side View)

Water surface (depth = 12 cm)

Immersion line (depth = 6 cm.)

Geometric center

RTD-301

RTD-302

RTD-303

RTD-304

UUC's floor

Temperature of UUC at each position, measured by Working Standards (°C)

Calibration point	1	2	3	4	5
Maximum	95.3	95.5	95.7	95.5	95.5
Minimum	94.7	94.4	94.8	95.0	94.8
Mid-range	95.0	95.0	95.2	95.3	95.1
Difference	0.3	0.5	0.4	0.3	0.3
Uncertainty of measurement (± °C)	0.3	0.6	0.5	0.3	0.4

*1 ~ *5 = Position of Working standards

MTC No.: PSL-T 13055

Code No.: N/A

Acting Director

Photometry and Temperature Standards Laboratory

Ref.: 201225412203441005

Issued date: 12 March 2012

page 3 of 3

The above results are valid exclusively for the tested / analysed sample(s) calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

158 Phahonyothin Road, Chauchak, Bangkok 10900
Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2581 4771, 0 2579 8952
URL: <http://www.tistr.or.th>

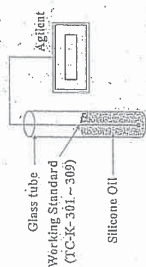


Request No.: 22-55/0127

Serial No.: 0908/2426

Results:

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25



Top View

Calibration point 150 °C	Temperature of UUC at each position (°C)					
	1	2	3	4	5	6
Maximum	150.2	150.4	150.5	149.4	150.6	150.7
Minimum	148.6	148.8	148.6	147.5	149.0	149.1
Mid-Range	149.4	149.6	149.5	148.5	149.8	149.9
Difference	1.6	1.6	1.9	1.8	1.6	1.7
Uncertainty of measurement (± °C)	1.58	1.57	1.71	1.68	1.56	1.51

Note: - Reference Standards are measurement in tube silicone oil at 240 value record after temperature stability.
- Level high of silicone oil is equal heater plate of UUC.

page 2 of 4

The above results are valid exclusively for the tested / analyzed samples/ calibrated items as mentioned in this report/certificate. Adverting the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governance of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
195 Phahomyothin Road, Chatuchak, Bangkok 10900
Tel. (66) 0 2578 1121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2571 4771, 0 2579 8592
URL : <http://www.tistr.or.th>



Request No.: 22-55/0127

Serial No.: 0908/2426

Results:

Calibration point 150 °C	Temperature of UUC at each position (°C)					
	7	8	9	10	11	12
Maximum	150.5	151.0	151.7	150.6	150.6	150.7
Minimum	149.0	149.3	149.8	149.0	149.0	149.0
Mid-Range	149.7	150.1	150.8	149.8	149.8	149.9
Difference	1.5	1.7	1.9	1.6	1.6	1.6
Uncertainty of measurement (± °C)	1.55	1.52	1.67	1.56	1.60	1.60

Note: - Reference Standards are measurement in tube silicone oil at 240 value record after temperature stability.
- Level high of silicone oil is equal heater plate of UUC.


Calibration point 150 °C	Temperature of UUC at each position (°C)					
	13	14	15	16	17	18
Maximum	150.8	151.1	150.7	149.8	151.0	151.3
Minimum	149.1	149.4	149.0	148.2	149.4	149.7
Mid-Range	150.0	150.3	149.8	149.0	150.2	150.5
Difference	1.7	1.7	1.6	1.6	1.6	1.7
Uncertainty of measurement (± °C)	1.62	1.52	1.62	1.58	1.59	1.55

Note: - Reference Standards are measurement in tube silicone oil at 240 value record after temperature stability.
- Level high of silicone oil is equal heater plate of UUC.

page 3 of 4

The above results are valid exclusively for the tested / analyzed samples/ calibrated items as mentioned in this report/certificate. Adverting the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governance of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
195 Phahomyothin Road, Chatuchak, Bangkok 10900
Tel. (66) 0 2578 1121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2571 4771, 0 2579 8592
URL : <http://www.tistr.or.th>



TISTR
THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Request No. 23-55/0208-03

2 / 2

MTC No. 23-55/0208-03

Nomenclature : "Wigeg" VOLUMETRIC BURET

Serial No. 5589

Capacity 50 ml

Calibration Result : based on the gravimetric determination of the quantity of water which is converted to true volume at the standard temperature of 20 °C

Unit : ml

Nominal volume	Measured volume	Uncertainty
50	50.016 9	± 0.005 0

Note : 1) The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

END OF CERTIFICATE


The above results are valid exclusively for the tested analysed sample(s) calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FRL-MTC-028 Rev.2

195 Phahomyothin Road, Chauchak, Bangkok 10900
Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2579 1771, 0 2579 8952
URL : <http://www.tistr.or.th>

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Sol 1, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Samutprakan 10280
Tel. (66) 0 2323 672-90, 0 2709 4147 ext. 115, 116
Fax. (66) 0 2323 9165



TISTR
THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Request No. 23-55/0208-

2

MTC No. 23-55/0208-01

Nomenclature : "HBQ" MEASURING PIPET

Serial No. 5591

Capacity 5 ml

Submitted by : WATER INDEX & CONSULTANT CO., LTD.
229/8 Soi Charansanitwong 95/1 CharanSanitwong Rd.,
Bang-soi, BangFikiet, Bangkok 10700.

Received date : 24 February 2012

Calibration date : 13 March 2012

Calibration Method : ASTM E 542 : 01 (Reapproved 2007) , to deliver

Calibration range : 0 ml to 5 ml

Condition of the item : Normal

Calibration location : R 118

Ambient condition : Temperature (23 ± 2.5) °C , Relative Humidity (50 ± 10) %

Barometric Pressure 739 mmHg.

Measuring Equipment : 1. Balance, Serial No. 12910701 traceable to NIMT through accredited TISTR Certificate No.MTC.No.23-550070-01
2. Liquid-In-Glass Thermometer, Serial No. 0082 traceable to International System of Units (SI) through accredited TISTR Certificate No.MTC.No.05L-07-37754
3. Barometer, Serial No. MEL-5203 traceable to International System of Units (SI) through accredited TISTR Certificate No.MTC. No. 23-550175

Calibrated BY : [Redacted]

Through TISTR
MECHANICAL ENGINEERING STANDARDS LABORATORY

Ref. 2013255022400616001

Issued Date : 16 March 2012

Mechanical Engineering Standards Laboratory Sol1, Bangpoo Industrial Estate, Muang, Samutprakan 10280


The above results are valid exclusively for the tested analysed sample(s) calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FRL-MTC-028 Rev.2

195 Phahomyothin Road, Chauchak, Bangkok 10900
Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2579 1771, 0 2579 8952
URL : <http://www.tistr.or.th>

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Sol 1, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Samutprakan 10280
Tel. (66) 0 2323 672-90, 0 2709 4147 ext. 115, 116
Fax. (66) 0 2323 9165



TISTR
THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

MTC.No. 23-55 / 0208 - 01

2 / 2

Request No. 23-55 / 0208

Nomenclature "HBG" MEASURING PIPET

Serial No. 5591

Capacity 5 ml

Calibration Result : based on the gravimetric determination of the quantity of water which is converted to true volume at the standard temperature of 20 °C

Note : 1) The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Unit : ml

Nominal Volume	Measured Volume	Uncertainty
5	5.004 7	+ 0.000 82


END OF CERTIFICATE

The above results are valid exclusively for the tested and sample(s) item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governing of TISTR.

FHA.BJ.MTC.002 Rev.2

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Sol 1, Bangpoo Industrial Estate, Subhavit Road,
Amphoe Muang, Samutprakarn 10280
Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2561 4771, 0 2579 8592
URL : <http://www.tistr.or.th>



TISTR
THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

MTC.No. 23-55 / 0208 - 02

Number of Page(s) 2

Request No. 23-55 / 0208

Nomenclature "HBG" MEASURING PIPET

Serial No. 5590

Capacity 10 ml

Submitted by WATER INDEX & CONSULTANT CO., LTD.
229/8 Soi CharanSanitWong 88/1 CharanSanitWong Rd.,
Bang-aor, BangPhlat, Bangkok 10700

Received date : 24 February 2012

Calibration date : 13 March 2012

Calibration Method : ASTM E 512 - 01 (Reapproved 2007), 1p deliver

Calibration range : 0 ml to 10 ml

Condition of the item : Normal

Calibration location : R 119

Ambient condition : Temperature (23 ± 2.5) °C, Relative Humidity (50 ± 10) %


Barometric Pressure 759 mmHg.

Measuring Equipment : 1. Balance, Serial No. 12910701 traceable to NIMT through accredited TISTR Certificate No.MTC.No. 23-550070-01
2. Liquid-In-Glass Thermometer, Serial No. 0082 traceable to International System of Units (SI) through accredited TISTR Certificate No.MTC.No. 23-550070-01
3. Barometer, Serial No. MEL-5203 traceable to NIMT through accredited TISTR Certificate No.MTC. No. 23-550075

Calibrated BY : [Redacted]

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Sol 1, Bangpoo Industrial Estate, Subhavit Road,
Amphoe Muang, Samutprakarn 10280
Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2561 4771, 0 2579 8592
URL : <http://www.tistr.or.th>



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
CALIBRATION NO. 0037

Request No. 23-55/0208

2 / 2

MTC No. 23-55 / 0208 : 02

Nomenclature : "HBC" MEASURING PIPET

Serial No. 5580

Capacity 10 ml

Calibration Result : based on the gravimetric determination of the quantity of water which is converted to true volume at the standard temperature of 20 °C

Unit : ml

Nominal volume	Measured volume	Uncertainty
10	10.0408	± 0.0015

Note : -1) The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.


END OF CERTIFICATE

The above results are valid exclusively for the tested/untested sample(s) calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FAL/ATC.002 Rev.2

185 Phahonyothin Road, Chauchak, Bangkok 10000
Tel. (66) 0 2579 121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2581 4771, 0 2579 6592
URL : <http://www.tistr.or.th>

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
Sri 1, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Samutprakan 10280
Tel. (66) 0 2323 1672-80, 0 2323 9165
Fax. (66) 0 2323 9165



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
CALIBRATION NO. 0037

Request No. 23-55/0190

MTC No. EEL DT 01/0255

CALIBRATION CERTIFICATE

Submitted by : Water Index & Consultant Co., Ltd.

Address : 229/8 Soi Charansanitwong 93/1, Charansanitwong Rd., Bang-aor, Bangkok 10700

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre
Sri 1, Bangpoo Industrial Estate, T. Prakasa, A. Muang Samutprakan 10280

Instrument Calibrated :

Description : pH Meter and Glass Combination Electrode

Manufacturer : Eutech Instruments

Model No. : pH 510

Serial No. : 1315131

Ambient Environment :

Temperature : (23 ± 2) °C

Relative humidity : (50 ± 15) %

Electrode Serial No. : GC7232101B 43704

Standards Used :

1. DC Voltage Calibrator FLUKE 343A SN765001
2. Bath Circulators Thermo Scientific NESLAB RTE7 S/N108183009

Reference Materials : Standard buffer solution pH 4.01 (NIMT 0001/01).

Calibration Procedure : Standard buffer solution pH 6.86 (NIMT 0001/02).
Standard buffer solution pH 9.19 (NIMT 0001/03).
(CP-PH.01, CP-PH.02) The electrical measurement was performed by direct measurement method of the meter reading. The electrode test and sample test measurement were performed by comparison of the meter reading with NIMT standard buffer solution by control condition at (25 ± 0.2) °C.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through
National Institute of Metrology (Thailand)

Date of Receipt : 1 Feb. 2012

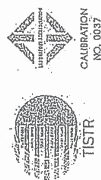
Date of Calibration : 7 Feb. 2012

The above results are valid exclusively for the tested/untested sample(s) calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FAL/ATC.002 Rev.1

185 Phahonyothin Road, Chauchak, Bangkok 10000
Tel. (66) 0 2579 121-30, 0 2579 5515 ext. 5225, 5226
Fax. (66) 0 2581 4771, 0 2579 6592
URL : <http://www.tistr.or.th>

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
Sri 1, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Samutprakan 10280
Tel. (66) 0 2323 1672-80
Fax. (66) 0 2323 9165



CAIBRATION
NO. 0037

MTC No. EEL BP 01/0255

Request No. EE. 21-55/0190

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k=2$, providing a level of confidence of approximately 95%.

militivolt Scale

Range	Standard Setting	Unit Under Test Reading	Uncertainty
1999 mV	0 mV	0.3 mV	± 0.065 mV
	300 mV	299 mV	± 0.65 mV
	600 mV	600 mV	± 0.65 mV
	900 mV	900 mV	± 0.65 mV
	1200 mV	1200 mV	± 0.65 mV
	1500 mV	1500 mV	± 0.65 mV
	1900 mV	1900 mV	± 0.65 mV
	-1900 mV	-1900 mV	± 0.65 mV

Note: 1. No adjustment

2. Performing standard curve by Fluke 343A at pH 7.00 : 0 mV

Date of Calibration : 7 Feb. 2012

The above results are valid exclusively for the tested/analysed sample(s)/calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the Governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
HEAD OFFICE
186 Phahonyothin Road, Chatuchak, Bangkok 10900
Tel. (66) 0 2551 121-50, 0 2551 8515 ext. 5225, 5226
Fax. (66) 0 2581 1771, 0 2579 8392
URL : <http://www.tistr.or.th>
PHIL/MTC.002 Rev.1
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
Sri 1, Binomoo Industrial Estate, Sukhumvit Road,
Anphong Maeng, Samutprakan 10280
Tel. (66) 0 2323 872-80
Fax. (66) 0 2323 8165



CAIBRATION
NO. 0037

MTC No. EEL BP 01/0255

Request No. EE. 21-55/0190

pH Scale

Standard Setting	Unit Under Test Reading		Uncertainty
	pH	DC Voltage	
414.11 mV	0.00	414 mV	± 0.65 mV
354.95 mV	1.00	355 mV	± 0.65 mV
295.80 mV	2.00	296 mV	± 0.65 mV
236.64 mV	2.99	237 mV	± 0.65 mV
177.48 mV	4.00	177.3 mV	± 0.065 mV
118.32 mV	5.00	118.3 mV	± 0.065 mV
59.16 mV	6.00	59.1 mV	± 0.065 mV
0.00 mV	7.00	0.3 mV	± 0.065 mV
-59.16 mV	7.99	-58.8 mV	± 0.065 mV
-118.32 mV	8.99	-118.2 mV	± 0.065 mV
-177.48 mV	9.99	-177.2 mV	± 0.065 mV
-236.64 mV	10.99	-236 mV	± 0.65 mV
-295.80 mV	11.99	-296 mV	± 0.65 mV
-354.95 mV	12.99	-355 mV	± 0.65 mV
-414.11 mV	13.99	-414 mV	± 0.65 mV

Note: 1. No adjustment

2. Performing standard curve by Fluke 343A at pH 7.00 : 0 mV

Date of Calibration : 7 Feb. 2012

The above results are valid exclusively for the tested/analysed sample(s)/calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the Governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
HEAD OFFICE
186 Phahonyothin Road, Chatuchak, Bangkok 10900
Tel. (66) 0 2551 121-50, 0 2551 8515 ext. 5225, 5226
Fax. (66) 0 2581 1771, 0 2579 8392
URL : <http://www.tistr.or.th>
PHIL/MTC.002 Rev.1
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
Sri 1, Binomoo Industrial Estate, Sukhumvit Road,
Anphong Maeng, Samutprakan 10280
Tel. (66) 0 2323 872-80
Fax. (66) 0 2323 8165



MTC No. EEL BP 01/0255

Request No. EE 21-55/0190

Measuring pH range acidity

Electrode Test Results

The zero point of the pH electrode = 7.45

The practical slope of the pH electrode = -38.5 mV

Sample Test Results

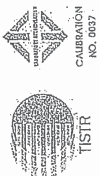
Standard buffer solution	Unit Under Test Reading	Uncertainty
4.01 pH	4.04 pH	± 0.036 pH
6.86 pH	6.87 pH	± 0.036 pH

Note. 1. Performing 2-points calibration standard curve using buffer pH 6.86 with pH 4.01

Date of Issue : 7 Feb. 2012

The above results are valid exclusively for the tested/analyzed sample(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of this result except in full as prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
FACILITY 002 Rev.1
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
189 Phahonyothin Road, Chatuchak, Bangkok 10900
Tel. (66) 0 2579 112-30, 0 2579 5545 ext. 5225, 5226
Fax. (66) 0 2581 4771, 0 2579 5592
URL : <http://www.tistr.or.th>



Request No. EE 21-55/0190

MTC No. EEL BP 01/0255

Measuring pH range alkalinity

Electrode Test Results

The zero point of the pH electrode = 7.45

The practical slope of the pH electrode = -58.0 mV

Sample Test Results

Standard buffer solution	Unit Under Test Reading	Uncertainty
6.86 pH	6.87 pH	± 0.036 pH
9.19 pH	9.12 pH*	± 0.036 pH

Note. 1. Performing 2-points calibration standard curve using buffer pH 6.86 with pH 9.19
2. Results marked "*" in this Certificate are not accredited by Thai Industrial Standard Institute (TISI)



Calibrated by :

Approved by :

Acting Director
Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Ref : 201255020100338001

Date of Calibration : 7 Feb. 2012

Date of Issue : 8 Feb. 2012

5/5

The above results are valid exclusively for the tested/analyzed sample(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of this result except in full as prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
FACILITY 002 Rev.1
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
189 Phahonyothin Road, Chatuchak, Bangkok 10900
Tel. (66) 0 2579 112-30, 0 2579 5545 ext. 5225, 5226
Fax. (66) 0 2581 4771, 0 2579 5592
URL : <http://www.tistr.or.th>



Request No.: 22-55/0127

MTC No.: PSL-T 12155

CALIBRATION CERTIFICATE

Nomenclature: REFRIGERATOR
Maker: N/A

Serial No.: N/A
Code Id.No.: 402251

Customer: WATER INDEX & CONSULTANT CO.,LTD.

Address: 2258 Soi Charan Sanit Wong 95/1, Charan Sanit Wong Rd., Bangnae, Bangkok, 10700.

Date of request: 22 December 2011

Date of calibration: 2 March 2012

Place of calibration: Customer's Laboratory.

Laboratory address: Temperature Standards Laboratory, MTC Bangkok.

Point of calibration: Calibrated at 4°C

Conditions of calibration: - Ambient temperature: (25 ± 3) °C, Relative humidity: (50 ± 20) %
- AC Power supply: (220 ± 5) VAC

Reference Standard: Data Acquisition / Switch Unit Equipped, Model: 34970A, SN: MY41002499

Maker: Agilent with Sensor TC-T, SN: TC-T 301 ~ 319 (19 units), which was calibrated on 19 April 2011, can be traceable to International Standard Units (SI units) through Changchun Institute of Metrology & Measurement, Calibration certificate No.: BP-P 70653, PSL-T 618-3453

Calibration Procedure: The calibration was done in accordance with VILCP.06 which based on Thai Laboratory Accreditation Scheme; Publication Reference G- 20 (Guidelines for Calibration and Checks of Temperature Controlled Enclosures).

The temperature scale in use of this laboratory is the International Temperature Scale of 1990 (ITS-90).

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

page 1 of 3

The above results are valid exclusively for the tested / analyzed sample(s) calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Sat 1, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Samutprakan 10900
Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5236
Fax. (66) 0 2561 4771, 0 2579 8892
URL: http://www.tistr.or.th



Request No.: 22-55/0127

MTC No.: PSL-T 12155

Serial No.: N/A

Results:

1. TC-T-301 Upper left back
2. TC-T-302 Upper left front
3. TC-T-303 Upper right back
4. TC-T-304 Upper right front
5. TC-T-305 Lower left back
6. TC-T-306 Lower left front
7. TC-T-307 Lower right back
8. TC-T-308 Lower right front
9. TC-T-309 Geometric Center of Chamber (Reference point)

Calibration point (°C)	Temperature of CUUC at each position (UP) (°C)									Uncertainty of Measurement (±°C)
	1	2	3	4	5	6	7	8	9	
4	4.0	4.8	4.0	3.9	4.7	4.3	4.4	4.7	4.1	3.36

Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability (°C)	Measured Uniformity (°C)	Overall Variation (°C)
N/A	0 ~ 6	2.8	0.7	5.7

page 2 of 3

The above results are valid exclusively for the tested / analyzed sample(s) calibrated item(s) as mentioned in this report/certificate. Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE

Sat 1, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Samutprakan 10900
Tel. (66) 0 2579 1121-30, 0 2579 5515 ext. 5225, 5236
Fax. (66) 0 2561 4771, 0 2579 8892
URL: http://www.tistr.or.th



Request No.: 22-550127

Serial No.: N/A

Results :

9. TC-T-319 Geometric Center of Chamber (Reference point)
1. TC-T-311 Upper left back
 2. TC-T-312 Upper left front
 3. TC-T-313 Upper right back
 4. TC-T-314 Upper right front
 5. TC-T-315 Lower left back
 6. TC-T-316 Lower left front
 7. TC-T-317 Lower right back
 8. TC-T-318 Lower right front
- DOWN

Temperature of UUC at each position (DOWN) (°C)									Uncertainty of Measurement (±°C)
Calibration point (°C)	1	2	3	4	5	6	7	8	
4	2.9	3.1	4.1	3.8	3.9	4.1	5.0	4.4	3.36
								Ref.	4.4

Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability (°C)	Measured Uniformity (°C)	Overall Variation (°C)
N/A	0 - 6	2.0	1.4	5.3

Calibrated by :

Agee-Digital
Photometry and Temperature Standards Laboratory
Ref : 2017317203441002
Issued date : 12 March 2012

page 3 of 3

This above results are valid exclusively for the tested / analyzed sample(s) calibrated / certified as mentioned in this report/certificate. Advertising the report/certificate and validity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)
INDUSTRIAL METROLOGY AND TESTING SERVICE CENTRE
159 Phahonyothin Road, Chauchak, Bangkok 10900
Tel. 661 0 2579 1121-80, 0 2579 5515 ext. 5225, 5226
Fax. 661 0 2581 4771, 0 2579 8582
URL : <http://www.dstr.or.th>
Sai 1, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Bang, Samutprakan 10280
Tel. 661 0 2233 0372 - 80, 0 2108 4147 ext. 115, 116
Fax. 661 0 2233 9195
FMELATC02 Rev.2