

ภาคผนวก จ

สำเนาเอกสารสอบเทียบเครื่องมือวิเคราะห์

รกรดตตามตรวจสอบผลกระทบสังแวดลอม
เหมองมากระบะบา ปรธานบตรที่ 33319/16003(คําขอปรธานบตรที่ 27/2551)
ของบรชั ปูนซีเมนต์นครหลวง จํกต (มหาชน) ปรจํปป พ.ศ. 2565
ระหวํงเดอนมกราคม-มิถุนายน พ.ศ. 2565

รายการเครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
Laboratory Instrument/Equipments.(Ambient)									
1	Analytical Balance (Repeatability 0.1 mg)	ฝุ่นละอองรวม ฝุ่นละอองขนาดไม่เกิน 10 ไมครอน (PM10)	Mettler-Toledo	AB204-S / 1128312528	National Food Institute, Ministry of Industry, Thailand	TH2058-097-040722 ACC-TH	7 Apr 22	6 Apr 23	-
2	Analytical Balance (Repeatability 0.1 mg)		Mettler-Toledo	AB204-S/FACT / B108115858	National Food Institute, Ministry of Industry, Thailand	TH2058-098-040722 ACC-TH	7 Apr 22	6 Apr 23	-
3	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Svantek	SV35A 73246	Innovative Instrument Co.,Ltd.	21-ACT-343	2 Sep 21	1 Sep 22	
4	Sound Level Meter	L _{Aeq} 8 hours' L _{Amax}	Rion, Japan	NL-42 00321432	Sithiporn Associates Co., Ltd.	20E6563	13 Jul 21	12 Jul 22	
5	Sound Level Meter	L _{Aeq} 8 hours' L _{Amax}	Rion, Japan	NL-42 00558211	Sithiporn Associates Co., Ltd.	20E6564	13 Jul 21	12 Jul 22	
6	Sound Level Meter	L _{Aeq} 8 hours' L _{Amax}	Rion, Japan	NL-42 00558206	Sithiporn Associates Co., Ltd.	20E6566	13 Jul 21	12 Jul 22	
Laboratory Instrument/Equipments.(คุณภาพน้ำ)									
1	pH Meter	ความเป็นกรด-ด่าง (pH)	Mettler-Toledo	Seven Easy S20 / 1231155210	National Food Institute, Ministry of Industry, Thailand	2201793-001-01	1 Mar 22	28 Feb 23	-
2	Turbidity Meter	ความขุ่น (Turbidity)	Oakton	T100IR / 1120501017	Technology Promotion Association (Thailand-Japan)	21CH1017	17 Aug 21	16 Aug 22	-

รการติดตามตรวจสอบผลกระทบสิ่งแวดล้อม
เหมืองมาบกระเบา ประทานบัตรที่ 33319/16003(คำขอประทานบัตรที่ 27/2551)
ของบริษัท ปูนซีเมนต์นครหลวง จำกัด (มหาชน) ประจำปี พ.ศ. 2565
ระหว่างเดือนมกราคม-มิถุนายน พ.ศ. 2565

รายการเครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับตรวจวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
3	Analytical Balance (Readability 0.01 mg)	ปริมาณสารแขวนลอย (TSS) ปริมาณของแข็งที่ละลายได้ทั้งหมด(TDS)	Mettler-Toledo	XSR205DU / C210685394	Mettler-Toledo (Thailand) Ltd.	058-043-050622-ACC	9 May 22	8 May 23	-
4	Hot Air Oven		Memmert	UF55 / B216.1666	Technology Promotion Association (Thailand-Japan)	21TM1876	29 Oct 21	28 Oct 22	-
5	UV-VIS Spectrophotometer	ปริมาณซิลิเกต (SO ₄ ²⁻)	Agilent Technologies	Cary60 G6860A / MY15410009	DQE Services Co.,Ltd.	SP22-016	31 May 22	30 May 23	-
6	UV-VIS Spectrophotometer		Hitachi	U-1900 / 2021-064	DQE Services Co.,Ltd.	SP22-007	20 Jan 22	19 Jan 23	-

Laboratory Instrument/Equipments.(คุณภาพน้ำ)									
7	Atomic Absorption Spectrophotometer (AAS)	ปริมาณเหล็กรวม (Total Fe) ปริมาณสารหนู (Arsenic) ปริมาณแคดเมียม (Cadmium)	Agilent Technologies	System ID:G8432A AA240FS / MY13160001	Thailand Institute of Scientific and Technological Research (TISTR).	MTC.ACL. No. 486/65	7 Mar 22	6 Mar 23	-
8	Inductively Coupled Plasma (ICP)		Agilent Technologies	System ID:G8015A G8015AA / MY18030001	Agilent Technologies (Thailand) Co.,Ltd.	Preventive Maintenance Checklist	9 Dec 21	8 Dec 22	-

Due Date of Calibration* : Schedule the program once a year at least once a year.

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
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MT-TH.ServiceSupport@mt.com



Accuracy Calibration Certificate

Customer

Company: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udom Suk 41, Sukhumvit Rd., Bang Chak
City: Phra Khanong Contact: Suwit Chotnok
Zip / Postal: 10260
State / Province: Bangkok
Order Number: 

Weighing Device

Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: AB204-S Asset Number: UAE.AIR.019/2550
Serial No.: 1128312528 Terminal Model: N/A
Building: N/A Terminal Serial No.: N/A
Floor: 2 Terminal Asset No.: N/A
Room: Balance Room 2 (206)

Range	Max. Capacity	Readability (d)
1	220 g	0.0001 g

Procedure



Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CP/W002/20

This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.

The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.

In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature		Humidity	
As Found	Start: 22.5 °C	End: 21.4 °C	Start: 56.1 %	End: 63.2 %

As Found Calibration Date: 07-Apr-2022 Calibrator: 
As Left Calibration Date: N/A
Issue Date: 08-Apr-2022
Approved Signatory: 
☒ Kassakorn Tassanachaisakul
☐ Santi Jitniyom
☐ Surachet Sukkate

Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	99.9999 g	N/A
2	100.0000 g	N/A
3	99.9998 g	N/A
4	100.0000 g	N/A
5	99.9999 g	N/A
6	100.0000 g	N/A
7	99.9999 g	N/A
8	100.0001 g	N/A
9	99.9999 g	N/A
10	100.0000 g	N/A

Standard Deviation	0.00008 g	N/A
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The "d" in the graph represents the readability of the range/interval in which the test was performed.

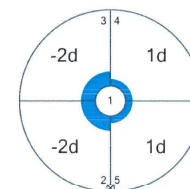
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 100 g

Position	As Found	As Left
1	100.0000 g	N/A
2	99.9998 g	N/A
3	99.9998 g	N/A
4	100.0001 g	N/A
5	100.0001 g	N/A

Maximum Deviation	0.0002 g	N/A
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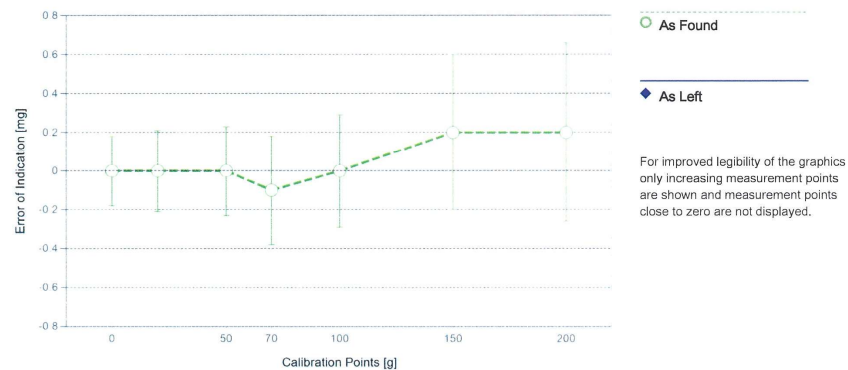
As Found

The "d" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.18 mg	2
2	0.1000 g	0.1000 g	0.0000 g	0.19 mg	2
3	1.0000 g	0.9999 g	-0.0001 g	0.19 mg	2
4	5.0000 g	5.0000 g	0.0000 g	0.19 mg	2
5	10.0000 g	9.9999 g	-0.0001 g	0.20 mg	2
6	20.0000 g	20.0000 g	0.0000 g	0.21 mg	2
7	50.0000 g	50.0000 g	0.0000 g	0.23 mg	2
8	70.0001 g	70.0000 g	-0.0001 g	0.28 mg	2
9	100.0000 g	100.0000 g	0.0000 g	0.29 mg	2
10	150.0000 g	150.0002 g	0.0002 g	0.40 mg	2
11	200.0001 g	200.0003 g	0.0002 g	0.46 mg	2



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML E2

Weight Set No.:	WS80	Date of Issue:	23-Feb-2022
Certificate Number:	C208581631	Calibration Due Date:	14-Aug-2023

Thermo Hygrometer

Equipment No.:	IN161	Date of Issue:	14-Jun-2021
Certificate Number:	21H1220	Calibration Due Date:	01-Jun-2022

Remarks

Equipment condition: Good

Next calibration according to customer's procedure

Calibration data not decide by calibration laboratory

Test weight by Filter pan : 1 g = 0.9999 g, 3 g = 3.0000 g, 5 g = 5.0000 g

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: 3,0 · 10⁻⁶ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

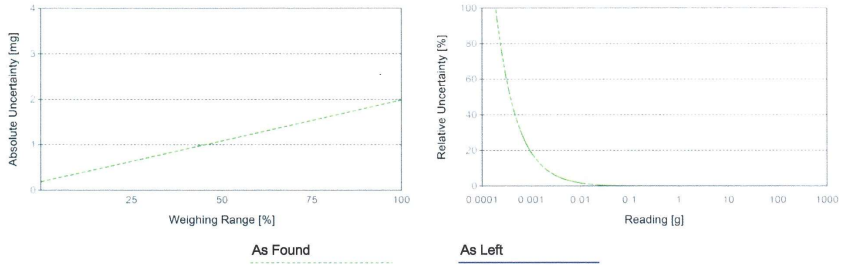
Linearization of Uncertainty Equation

Range			As Found	As Left
	d	Max		
1	0.0001 g	220 g	U ₁ = 0.19 mg + 0.00817 mg/g · R	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.0220 g	0.19 mg	0.86%	N/A	N/A
0.2200 g	0.19 mg	0.087%	N/A	N/A
2.2000 g	0.21 mg	0.0095%	N/A	N/A
22.0000 g	0.37 mg	0.0017%	N/A	N/A
220.0000 g	2.0 mg	0.00090%	N/A	N/A



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Accuracy Calibration Certificate

Customer

Company: United Analyst and Engineering Consultant Co., Ltd.
Address: 3 Soi Udom Suk 41, Sukhumvit Rd., Bang Chak
City: Phra Khanong Contact: Suwit Chotnok
Zip / Postal: 10260
State / Province: Bangkok
Order Number: 

Weighing Device



Manufacturer: Mettler Toledo Instrument Type: Weighing Instrument
Model: MS603S/01 Asset Number: UAE.MIC.008/2553
Serial No.: B007010311 Terminal Model: N/A
Building: N/A Terminal Serial No.: N/A
Floor: 2 Terminal Asset No.: N/A
Room: Balance Room (206)

Range	Max. Capacity	Readability (d)
1	620 g	0.001 g

Procedure

Calibration Guideline: EURAMET cg-18 v. 4.0 (11/2015)
METTLER TOLEDO Work Instruction: CP/W002/20
This calibration certificate contains measurements for As Found calibration. No As Left calibration was performed because the device was not modified after As Found calibration. Therefore, results for As Left correspond to As Found.
The sensitivity/span of the weighing instrument was adjusted before calibration with a built-in weight.
In accordance with EURAMET cg-18 (11/2015), the test loads were selected to reflect the specific use of the weighing device or to accommodate specific calibration conditions.

	Temperature	Humidity
As Found	Start: 22.8 °C End: 23.0 °C	Start: 49.9 % End: 58.3 %

As Found Calibration Date: 07-Apr-2022 Calibrator: 
As Left Calibration Date: N/A
Issue Date: 08-Apr-2022 Approved Signatory: 
☒ Kassakorn Tassanachaisakul
☐ Santi Jitniyom
☐ Surachet Sukkate

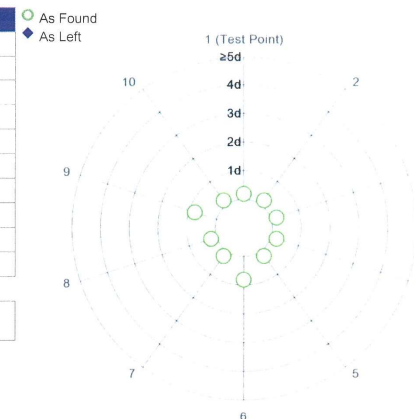
Measurement Results

Repeatability

Test Load: 200 g

	As Found	As Left
1	200.001 g	N/A
2	200.001 g	N/A
3	200.001 g	N/A
4	200.001 g	N/A
5	200.001 g	N/A
6	200.000 g	N/A
7	200.001 g	N/A
8	200.001 g	N/A
9	200.000 g	N/A
10	200.001 g	N/A

Standard Deviation	0.0004 g	N/A
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The "d" in the graph represents the readability of the range/interval in which the test was performed.

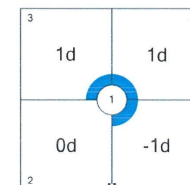
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

Test Load: 200 g

Position	As Found	As Left
1	200.001 g	N/A
2	200.001 g	N/A
3	200.002 g	N/A
4	200.002 g	N/A
5	200.000 g	N/A

Maximum Deviation	0.001 g	N/A
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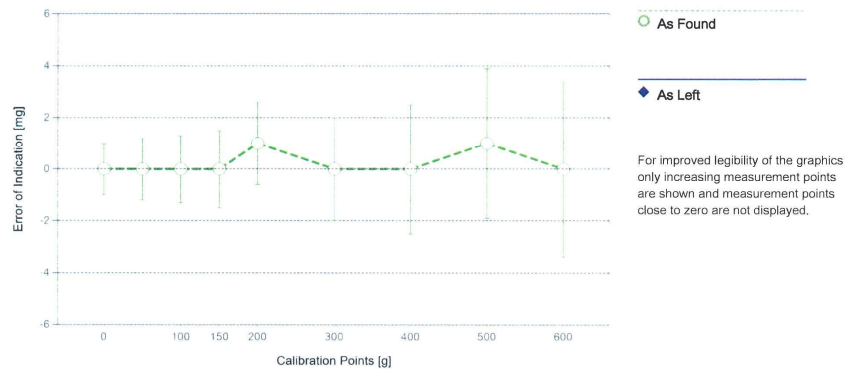


As Found

The "d" in the graph represents the readability of the range/interval in which the test was performed.

Error of Indication

As Found					
	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.000 g	0.000 g	0.000 g	1.0 mg	2
2	0.500 g	0.500 g	0.000 g	1.2 mg	2
3	1.000 g	1.000 g	0.000 g	1.2 mg	2
4	50.000 g	50.000 g	0.000 g	1.2 mg	2
5	100.000 g	100.000 g	0.000 g	1.3 mg	2
6	150.000 g	150.000 g	0.000 g	1.5 mg	2
7	200.000 g	200.001 g	0.001 g	1.6 mg	2
8	300.001 g	300.001 g	0.000 g	2.0 mg	2
9	400.001 g	400.001 g	0.000 g	2.5 mg	2
10	500.001 g	500.002 g	0.001 g	2.9 mg	2
11	600.001 g	600.001 g	0.000 g	3.4 mg	2



The uncertainty stated is the expanded uncertainty at calibration obtained by multiplying the standard combined uncertainty by the coverage factor k – which can be larger than 2 according to EURAMET cg-18. The value of the measurand lies within the assigned range of values with a probability of approximately 95%.

The user is responsible for maintaining environmental conditions and the settings of the weighing instrument when it was calibrated.

Test Equipment

All weights used for metrological testing are traceable to national or international standards. The weights were calibrated and certified by an accredited calibration laboratory.

Weight Set 1: OIML F1

Weight Set No.: WS55 Date of Issue: 09-Jul-2021
Certificate Number: CCM-0137-21-C Calibration Due Date: 07-Jul-2022

Weight Set 2: OIML E2

Weight Set No.: WS80 Date of Issue: 23-Feb-2022
Certificate Number: C208581631 Calibration Due Date: 14-Aug-2023

Thermo Hygrometer

Equipment No.: IN161 Date of Issue: 14-Jun-2021
Certificate Number: 21H1220 Calibration Due Date: 01-Jun-2022

Remarks

FACT adjustment functionality activated
Equipment condition: Good
Next calibration according to customer's procedure
Calibration data not decide by calibration laboratory

End of Accredited Section

The information below and any attachments to this calibration certificate are not part of the accredited calibration.

Measurement Uncertainty of the Weighing Instrument in Use

Stated is the expanded uncertainty with k=2 in use. The formula shall be used for the estimation of the uncertainty under consideration of the errors of indication. The value R represents the net load indication in the unit of measure of the device.

Temperature coefficient for the evaluation of the measurement uncertainty in use: 3.0 · 10⁻⁶ / K

Temperature range on site for the evaluation of the measurement uncertainty in use: 3 K

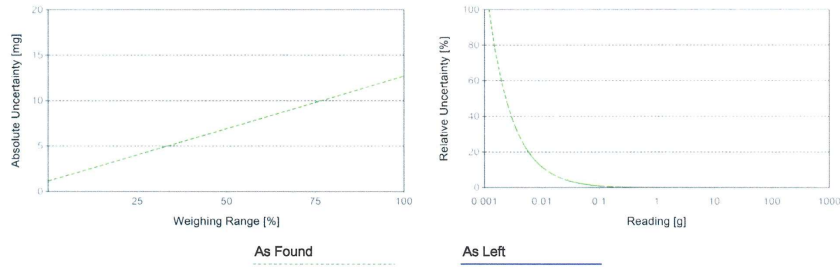
Linearization of Uncertainty Equation

	Range		As Found	As Left
	d	Max		
1	0.001 g	620 g	$U_1 = 1.2 \text{ mg} + 0.0186 \text{ mg/g} \cdot R$	N/A

To optimize the stability of the linearization, besides of the zero load only increasing measurement points with a test load of 5% of the measurement range or larger are taken for the calculation of the linear equation.

Absolute and Relative Measurement Uncertainty in Use for Various Net Indications (Examples)

Net Indication	As Found		As Left	
0.062 g	1.2 mg	1.9%	N/A	N/A
0.620 g	1.2 mg	0.20%	N/A	N/A
6.200 g	1.3 mg	0.021%	N/A	N/A
62.000 g	2.4 mg	0.0038%	N/A	N/A
620.000 g	13 mg	0.0021%	N/A	N/A



เอกสารไม่ควบคุม

Certificate of Calibration

Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD. Certificate No : 21-ACT-343
Address : 81 Soi Udumsuk 41, Sukhumvit Road, Bangchak, Prakanong, Bangkok Request No : Req-2021-1170
10260

Unit Under Calibration Details

Measurement item : Sound Level Meter Microphone Class : 1
Manufacturer : SVANTEK Microphone Model : 7052 E
Model : SVAN 971 Microphone S/N : 68238
Serial Number : 80390 Preamplifier Model : -
ID : - Preamplifier S/N : -
Resolution : 0.1 dB Intrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 30 August 2021
Calibrated Date : 2 September 2021
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	29 October 2021	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	14 June 2022	TSI
Audio Generator	Svantek	Svan401	131	30 September 2021	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Calibrated By : me
Mr. Noppadon Luangart
Calibration Officer

Approved By : ภาสกร
Mr. Pacit Mathavorn
Calibration Engineer Supervisor
Issue Date : 2 September 2021

Certificate No : 21-ACT-343
Request No : Req-2021-1170

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		Adjust		UNCERTAINTY (± dB)	Acceptance Limit (+ dB)
FAST / A / 37-139	Level	UUC	ERR	UUC	ERR		
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)		
1000 Hz 114.00 dB	113.85	113.3	-0.55	113.9	0.05	0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN.58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 27-125	(dB)	(± dB)
UUC Weighting		
A	14.2	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 27-125	(dB)	(± dB)
UUC Weighting		
A	14.2	0.10
C	14.2	0.10
Z	19.2	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Responce curve			UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z		
STD Setting	(dB)	(dB)	(dB)		
125 Hz	0.2	0.3	0.2	0.50	1.0
1000 Hz	0.0	0.0	0.0	0.60	0.7
4000 Hz	0.1	0.1	0.0	0.60	1.0
8000 Hz	-0.4	-0.4	-0.5	0.70	+1.5 -2.5

Certificate No : 21-ACT-343
Request No : Req-2021-1170

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency			UNCERTAINTY	Acceptance
FAST / 37-139	Weighting Response curve				Limit
STD Setting	A (dB)	C (dB)	Z (dB)	(± dB)	(± dB)
63 Hz	-0.1	0.0	0.0	0.2	1.0
125 Hz	-0.1	0.0	0.0		1.0
250 Hz	-0.1	0.0	0.0		1.0
500 Hz	-0.1	0.0	0.0		1.0
1000 Hz	0.0	0.0	0.0		0.7
2000 Hz	0.0	0.0	0.0		1.0
4000 Hz	0.0	0.0	0.0		1.0
8000 Hz	0.1	0.1	0.0		+1.5, -2.5
16000 Hz	-0.3	-0.3	0.0		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / 37-139	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	Limit (± dB)
A	114.00	114.0	0.0	0.2	0.2
C	114.00	114.0	0.0		0.2
Z	114.00	114.0	0.0		0.2

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
37-139 / A	REF	UUC	ERR		
UUC Time Response	(dB)	(dB)	(dB)	(± dB)	Limit (± dB)
Fast	114.00	114.0	0.0	0.2	0.1
Slow	114.00	114.0	0.0		0.1
Leq	114.00	114.0	0.0		0.1

Certificate No : 21-ACT-343
Request No : Req-2021-1170

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 37-139	UUC		
STD Setting	(dB)	(± dB)	Limit (± dB)
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance
FAST / A / 37-139	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	(± dB)	Limit (± dB)
139.00	139	139.0	0.0	0.3	0.8
134.00	134	134.0	0.0		0.8
129.00	129	129.0	0.0		0.8
124.00	124	124.0	0.0		0.8
119.00	119	119.0	0.0		0.8
114.00	114	114.0	0.0		0.8
109.00	109	109.0	0.0		0.8
104.00	104	104.0	0.0		0.8
99.00	99	99.0	0.0		0.8
94.00	94	94.0	0.0		0.8
89.00	89	89.0	0.0		0.8
84.00	84	84.0	0.0		0.8
79.00	79	79.0	0.0		0.8
74.00	74	74.0	0.0		0.8
69.00	69	69.0	0.0		0.8
64.00	64	64.0	0.0		0.8
59.00	59	59.0	0.0		0.8
54.00	54	54.0	0.0		0.8
49.00	49	49.1	0.1		0.8
44.00	44	44.0	0.0		0.8
39.00	39	39.0	0.0		0.8

Certificate No : 21-ACT-343
Request No : Req-2021-1170

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR		Limit
UUC Range	(dB)	(dB)	(dB)	(± dB)	(± dB)
27-125	32.9	32.8	-0.1	0.3	0.8
	114	114.0	0.0		0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance
A / 37-139	Toneburst	Ref	UUC	ERR		Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	200	135.0	135.0	0.0	0.3	0.5
	2	118.0	118.0	0.0		+1.0, -1.5
	0.25	109.0	108.9	-0.1		+1.0, -3.0
Slow	200	128.6	128.5	-0.1		0.5
	2	109.0	108.9	-0.1		+1.0, -3.0
SEL	200	129.0	129.0	0.0		0.5
	2	109.0	109.0	0.0		+1.0, -1.5
	0.25	100.0	99.9	-0.1		+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance
FAST / C / 37-139	REF	UUC	ERR		Limit
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
Complete cycle	134.4	134.2	-0.20	0.2	2.0
Positive half cycle	133.4	133.3	-0.10		1.0
Negative half cycle	133.4	133.3	-0.10		1.0

Certificate No : 21-ACT-343
Request No : Req-2021-1170

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 37-139	UUC		Limit
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	144.1		
Negative one-half cycle	144.1		
Deviated	0.0	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 37-139	UUC		Limit
STD Setting	(dB)	(± dB)	(± dB)
Initial	138.0		
Final	138.0		
Deviated	0.0	0.1	0.1

End of Certificate



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www.qcalibration.com

CERTIFICATE No : 20E6563
REFERENCE No : 57780-5

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : SOUND LEVEL METER
MANUFACTURER : RION
MODEL : NL-42
SERIAL No : 00321432
ID No : UAE.EMA2.081/2555
SUBMITTED BY : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
3 SOI UDOMSUK 41, SUKHUMVIT ROAD,
BANGCHAK, PHRAKHANONG, BANGKOK
10260

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 14-Jul-20

APPROVED BY : PONGSAK J.

ISSUED DATE : 14-Jul-20

RECEIVED DATE : 08-Jul-20

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
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CERTIFICATE No : 20E6563

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : SOUND LEVEL METER
MANUFACTURER : RION MODEL : NL-42
S/N : 00321432 ID No : UAE.EMA2.081/2555
RECEIVED DATE : 08-Jul-20 CALIBRATION DATE : 14-Jul-20
AMBIENT TEMPERATURE : 23°C ± 3°C RELATIVE HUMIDITY : 50 % RH ± 20% RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO IEC 61672-2 :2003-04 AGAINST MULTIFUNCTION SOUND CALIBRATOR. THIS INSTRUMENT WAS PERFORMED SELF-CALIBRATION BY CALIBRATOR FROM CUSTOMER AT 114 Hz BEFORE CALIBRATION.
2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) MULTIFUNCTION SOUND CALIBRATOR	1986	01285	20E6450	06-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 :-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR).

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. A-WEIGHTING ACOUSTIC FREQUENCY RESPONSE

FREQUENCY (Hz)	STANDARD EXPECTED READING (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
125.00	-16.10	-15.4	-0.7	0.50
250.00	-8.60	-8.1	-0.5	0.50
500.00	-3.20	-3.0	-0.2	0.50
1000.00	0.00	-0.1	0.1	0.50
2000.00	1.20	0.7	0.5	0.50

2. C-WEIGHTING ACOUSTIC FREQUENCY RESPONSE

FREQUENCY (Hz)	STANDARD EXPECTED READING (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
125.00	-0.20	0.2	-0.4	0.50
250.00	0.00	0.3	-0.3	0.50
500.00	0.00	0.2	-0.2	0.50
1000.00	0.00	-0.1	0.1	0.50
2000.00	-0.20	-0.7	0.5	0.50

3. SOUND LEVEL LINEARITY TEST AT 1000 Hz

STANDARD APPLIED (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
74	73.9	0.1	0.50
84	83.9	0.1	0.50
94	94.0	0.0	0.50
104	103.9	0.1	0.50
114	114.1	-0.1	0.50

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

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CERTIFICATE No : 20E6564
REFERENCE No : 57780-6

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : SOUND LEVEL METER
MANUFACTURER : RION
MODEL : NL-42
SERIAL No : 00558211
ID No : UAE.EFM.043/2558
SUBMITTED BY : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
3 SOI UDOMSUK 41, SUKHUMVIT ROAD,
BANGCHAK, PHRAKHANONG, BANGKOK
10260

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 14-Jul-20

APPROVED BY : PONGSAK J.

ISSUED DATE : 14-Jul-20

RECEIVED DATE : 08-Jul-20

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CERTIFICATE No : 20E6564

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : SOUND LEVEL METER
MANUFACTURER : RION MODEL : NL-42
S/N : 00558211 ID No : UAE.EFM.043/2558
RECEIVED DATE : 08-Jul-20 CALIBRATION DATE : 14-Jul-20
AMBIENT TEMPERATURE : 23°C ± 3°C RELATIVE HUMIDITY : 50 % RH ± 20% RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO IEC 61672-2 :2003-04 AGAINST MULTIFUNCTION SOUND CALIBRATOR.
THIS INSTRUMENT WAS PERFORMED SELF-CALIBRATION BY CALIBRATOR AT 94 Hz BEFORE CALIBRATION.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) MULTIFUNCTION SOUND CALIBRATOR	1986	01285	20E6450	06-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 :-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL
RESEARCH (TISTR).

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. A-WEIGHTING ACOUSTIC FREQUENCY RESPONSE

FREQUENCY (Hz)	STANDARD EXPECTED READING (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
125.00	-16.10	-15.5	-0.6	0.50
250.00	-8.60	-8.2	-0.4	0.50
500.00	-3.20	-2.9	-0.3	0.50
1000.00	0.00	0.0	0.0	0.50
2000.00	1.20	0.7	0.5	0.50

2. C-WEIGHTING ACOUSTIC FREQUENCY RESPONSE

FREQUENCY (Hz)	STANDARD EXPECTED READING (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
125.00	-0.20	0.1	-0.3	0.50
250.00	0.00	0.3	-0.3	0.50
500.00	0.00	0.2	-0.2	0.50
1000.00	0.00	-0.1	0.1	0.50
2000.00	-0.20	-0.7	0.5	0.50

3. SOUND LEVEL LINEARITY TEST AT 1000 Hz

STANDARD APPLIED (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
74	73.9	0.1	0.50
84	83.9	0.1	0.50
94	94.0	0.0	0.50
104	104.0	0.0	0.50
114	114.1	-0.1	0.50

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

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CERTIFICATE No : 20E6566
REFERENCE No : 57780-8

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : SOUND LEVEL METER
MANUFACTURER : RION
MODEL : NL-42
SERIAL No : 00558206
ID No : UAE.EFM.038/2558
SUBMITTED BY : UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
3 SOI UDOMSUK 41, SUKHUMVIT ROAD,
BANGCHAK, PHRAKHANONG, BANGKOK
10260

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 14-Jul-20

APPROVED BY : PONGSAK J.

ISSUED DATE : 14-Jul-20

RECEIVED DATE : 08-Jul-20

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CERTIFICATE No : 20E6566

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : SOUND LEVEL METER
MANUFACTURER : RION MODEL : NL-42
S/N : 00558206 ID No : UAE.EFM.038/2558
RECEIVED DATE : 08-Jul-20 CALIBRATION DATE : 14-Jul-20
AMBIENT TEMPERATURE : 23°C ± 3°C RELATIVE HUMIDITY : 50 % RH ± 20% RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO IEC 61672-2 :2003-04 AGAINST MULTIFUNCTION SOUND CALIBRATOR.
THIS INSTRUMENT WAS PERFORMED SELF-CALIBRATION BY CALIBRATOR AT 94 Hz BEFORE CALIBRATION.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) MULTIFUNCTION SOUND CALIBRATOR	1986	01285	20E6450	06-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 :-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL
RESEARCH (TISTR).

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. A-WEIGHTING ACOUSTIC FREQUENCY RESPONSE

FREQUENCY (Hz)	STANDARD EXPECTED READING (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
125.00	-16.10	-15.9	-0.2	0.50
250.00	-8.60	-8.5	-0.1	0.50
500.00	-3.20	-3.1	-0.1	0.50
1000.00	0.00	0.0	0.0	0.50
2000.00	1.20	0.9	0.3	0.50
4000.00	1.00	-0.2	1.2	0.50

2. C-WEIGHTING ACOUSTIC FREQUENCY RESPONSE

FREQUENCY (Hz)	STANDARD EXPECTED READING (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
125.00	-0.20	-0.2	0.0	0.50
250.00	0.00	0.0	0.0	0.50
500.00	0.00	0.1	-0.1	0.50
1000.00	0.00	-0.1	0.1	0.50
2000.00	-0.20	-0.5	0.3	0.50
4000.00	-0.80	-2.0	1.2	0.50

3. SOUND LEVEL LINEARITY TEST AT 1000 Hz

STANDARD APPLIED (dB)	UUC READING (dB)	CORRECTION (dB)	UNCERTAINTY OF MEASUREMENT (± dB)
74	73.9	0.1	0.50
84	83.9	0.1	0.50
94	94.0	0.0	0.50
104	104.0	0.0	0.50
114	114.1	-0.1	0.50

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

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