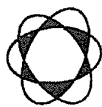


ภาคผนวก จ

เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์
(Calibration)

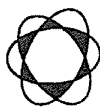
เอกสารสอบเทียบเครื่องมือ
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด



Thai Environmental Technic Limited
บริษัท เทคนิกสิ่งแวดล้อมไทย จำกัด

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์ (ต่อ)

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
1.	Working Air	Ethylene	Personal Air Sampler/Gilian	S/N 20180802094	20/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20180802098	20/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20151102097	26/11/2023	December 2023
			Personal Air Sampler/Gilian	S/N 20151102088	26/11/2023	December 2023
			Personal Air Sampler/Gilian	S/N 20180803003	27/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20151002112	20/11/2023	December 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	25/09/2023	September 2024
			Personal Air Sampler/Gilian	S/N 20180802094	20/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20180802098	20/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20180806027	20/08/2023	September 2023
		Hexane	Personal Air Sampler/Gilian	S/N 20180806025	20/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20151003003	26/11/2023	December 2023
			Personal Air Sampler/Gilian	S/N 20151003020	26/11/2023	December 2023
			Personal Air Sampler/Gilian	S/N 20151003023	26/11/2023	December 2023
			Personal Air Sampler/Gilian	S/N 20151102096	26/11/2023	December 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	25/09/2023	September 2024
			Personal Air Sampler/Gilian	S/N 20180802094	20/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20180802098	20/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20151102097	26/11/2023	December 2023
			Personal Air Sampler/Gilian	S/N 20151102088	26/11/2023	December 2023
		Propylene	Personal Air Sampler/Gilian	S/N 20180806025	27/08/2023	September 2023
			Personal Air Sampler/Gilian	S/N 20151003007	20/11/2023	December 2023
			Gas Chromatograph/GC7890B	S/N CN16343040	25/09/2023	September 2024



Thai Environmental Technic Limited
บริษัท เทคนิกล้างแวลด้อมไทย จํากัด

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์ (ต่อ)

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
1.	Working Air (Cont.)	Respirable Dust	Personal Air Sampler/Gilian Personal Air Sampler/Gilian Electronic Balance/XP 205	S/N 20151002109 S/N 20151003042 S/N 1129273885	20/09/2023 26/11/2023 11/04/2023	October 2023 December 2023 April 2024
		Butene-1	Personal Air Sampler/Gilian Personal Air Sampler/Gilian	S/N 20180802094 S/N 20151003042	27/08/2023 20/11/2023	September 2023 December 2023
2.	Occupational Safety and Health	Heat	Gas Chromatograph/GC7890B Thermal Environment Monitor/JANTYTECH/JT2011-E2A	S/N CN16343040 S/N 3522210140	25/09/2023 09-13/03/2023	September 2024 March 2024



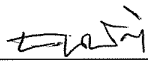
Thai Environmental Technic Limited
บริษัท เทคนิกลิ่งแวดล้อมไทย จำกัด

Personal Pump Calibration Report

Equipment Type : Personal Air Sampler
Equipment Range : 0.1-7.0 l/min
Calibration Range : 0.1-4.0 l/min
Calibration Type : Drycal
Calibration S/N : 109698

Item	Personal Pump S/N	Hi Flow/Low Flow	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	Average	Uncertainty
1.	20180803003	0.08	0.0795	0.0796	0.0795	0.0795	±0.0001
2.	20180806025	0.08	0.0799	0.0798	0.0798	0.0798	±0.0001
3.	20180802094	0.08	0.0792	0.0793	0.0792	0.0792	±0.0001

Calibration Date 27 / 08 / 66

Calibration By 

Remark : Uncertainty Type A = $\frac{\sigma}{\sqrt{n}}$ = SD

: SD = Standard deviation

: \bar{X} = Mean



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Personal Pump Calibration Report

Equipment Type : Personal Air Sampler
Equipment Range : 0.1-7.0 l/min
Calibration Range : 0.1-4.0 l/min
Calibration Type : Drycal
Calibration S/N : 109698

Item	Personal Pump S/N	Hi Flow/Low Flow	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	Average	Uncertainty
1.	20151002109	1.7	1.6960	1.6960	1.6970	1.6960	±0.0006

Calibration Date 20 / 09 / 66

Calibration By

Remark : Uncertainty Type A = $\frac{\sigma}{\sqrt{n}}$ = SD

: SD = Standard deviation

: \bar{X} = Mean



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Personal Pump Calibration Report

Equipment Type : Personal Air Sampler

Equipment Range : 0.1-7.0 l/min

Calibration Range : 0.1-4.0 l/min

Calibration Type : Drycal

Calibration S/N : 4491

Item	Personal Pump S/N	Hi Flow/Low Flow	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	Average	Uncertainty
1.	20151002112	0.08	0.0782	0.0788	0.0788	0.0788	±0.0003
2.	20151003007	0.08	0.0764	0.0769	0.0769	0.0769	±0.0003
3.	20151003042	0.08	0.0791	0.0791	0.0791	0.0791	±0.0000

Calibration Date 20 / 11 / 66

Calibration By

Remark : Uncertainty Type A = $\frac{\sigma}{\sqrt{n}}$ SD

: SD = Standard deviation

: \bar{X} = Mean

Agilent CrossLab Start Up Services

Agilent 7890 Gas Chromatograph

Preventive Maintenance Checklist



Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about **Agilent Technologies services**, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>.
- Need technical support, FAQs, supplies? – visit our **Support Home page** <http://www.agilent.com/search/support>.
- **Videos** about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
 - **Safety**
https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf
 - **Installation and First Startup**
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf
 - **Operation Manual**
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf
 - **Maintaining Your GC**
https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "**Section not applicable**" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Complete the total number of pages field in the Service Completion section
- ***Ask the customer to sign the Service Completion section including the customer's and your signature.***

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table below.

Instrument System Name and ID	Ins-LAB-010 / CN16343040
Instrument System Site and Location	Thai Enviromental Technic Ltd / Lab

List System Component Product Numbers	List the Serial Numbers of each Component
1. G3440B	CN16343040
2. G4513A	CN16350082
3. G4514A	CN16400014
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Preparation

- ☐ Discuss any specific issues with the customer before starting.
- ☐ Review the instrument logbook for recorded problems and comments.
- ☐ Save instrument control settings before starting the procedure.
- ☐ Perform a general inspection of the system for cleanliness.
- ☐ Check for proper installation of parts, assemblies, sensors etc.
- ☐ Check system for required installation of components, settings as defined by current Service Notes.
- ☐ Check for required firmware updates and verify with customers if they would like them installed.
- ☐ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

Preventive Maintenance Procedure

Clean and inspect GC

- ☒ Unplug power cord from the power source.
- ☒ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ☒ Inspect internal connectors for proper contact and placement.
- ☒ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ☒ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ☒ Verify operation of all other fans - the inlet and EPC cooling fans.
- ☒ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

Inlet and detector consumable replacement

- ☒ For the inlets installed, perform inlet maintenance as defined in the 7890 manual – “Maintaining Your GC” - for the inlet(s) installed.
- ☒ Replace the split vent trap cartridge filter on units with these inlets: Split/Splitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiles Interface (VI).
- ☒ If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ☒ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination – clean as necessary.

Zero Sensors and Leak test

- ☒ Zero all pressure sensors per the procedure in the 7890 “Advanced User Guide”.
- ☒ Perform inlet pressure decay test(s) as defined in the 7890 “Troubleshooting Manual”.
If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- ☒ Record if test passed or failed in the results table.

ALS Maintenance

- ☐ **Section NOT applicable**
- ☒ Check all cabling and configuration settings between GC, tray, and injectors.
- ☒ Vacuum or remove any dust, especially around fans.
- ☒ Check operation of all fans.
- ☒ Check syringe for smooth plunger operation.
- ☒ Check for smooth operation of the needle support – clean if necessary

Restore Instrument

- ☒ Restore the normal operating conditions or customer method using the Data System.
- ☒ Purge the system with carrier flow for 15 minutes
- ☒ Bake out the system, then restore the normal operating conditions
- ☒ After equilibration, check and record the post PM detector signal output values.
Results should be similar or lower than the detector outputs recorded prior to PM.
- ☒ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Note: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Signature Page

Service Review

- ☐ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☐ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output	N/A	17.0/FID
Back detector output	N/A	1101/uECD (unused)
AUX detector output	N/A	99.3/TCD (unused)
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	Pass

7890 Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	1
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	1
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	N/A
PP Inlet PM kit	5188-6498	7890A/B	N/A
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	N/A
MMI Cleaning Kit	G3510-60820	7890A/B	N/A
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	N/A
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	N/A
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	1
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	N/A
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	1
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	N/A
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	N/A
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	N/A

Revision: 2.01, Issued: September 15, 2021

Agilent Document Number: D0013618

DE number: 44166.759722222

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Service Engineer Comments

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write include them in this box.

Service Completion

Service request number 6242270600 Date service completed 25 Sep 2023

Agilent signature Saenguthai Tarak Customer signature RD 118657

Total number of pages in this document 9 pages



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert.No.: 23MM161

Page.: 1 of 3

Certificate of Calibration

Equipment : Electronic Balance

Manufacturer : Mettler Toledo

Model : XP205DR

Serial No. : 1129273885

ID No. : -

Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240

Location : Balance Room

Received order : 10 April 2023

Calibration Date : 11 April 2023

Ambient Temperature : 15 °C to 40 °C

Relative Humidity : 30 % to 90 %

Calibrated by : Khit Ruttanaprapachai

Approved by :

Malee

Approved Signatory

- () Pornthippa Tameyakul
(✓) Malee Butkruea
() Suwit Imjai

Issue Date :

25 April 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0053465



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2304-0146OC-13
Procedure used :-

Cert.No.: 23MM161

Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-OB01 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-

<u>Instruments</u>	<u>Model</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Test report No.</u>	<u>Due date</u>
1) Standard Weight Set (E2)	15884	24053	70RC007	MM-0010-22	20 Jan 2024

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

3. This result of calibration was made on requested at the point specified by customer.

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

5. This certification is traceable to the International System of Unit.

Result of calibration () Without Adjustment (*) After Adjustment by Internal Calibration

Range capacity :	0 g to 81 g	Resolution	0.00001 g
	81 g to 220 g	Resolution	0.0001 g

Before Adjustment :

<u>Applied Weight</u> (g)	<u>Balance Reading</u> (g)	<u>Correction</u> (g)	<u>Measurement Uncertainty</u> (± mg)	<u>Coverage Factor</u> (k)
80	79.99946	+0.00054	0.15	2.00
200	199.9984	+0.0016	0.30	2.00

After Adjustment :

1. Determination of the standard deviation of weighing machine (n = 10)

<u>Applied Weight</u> (g)	<u>Standard Deviation of Reading (g)</u>
80	0.000023
200	0.00008

Mlu.



Equipment : Electronic Balance
 Condition As-Received : Used Item
 Reference : 2304-0146OC-13

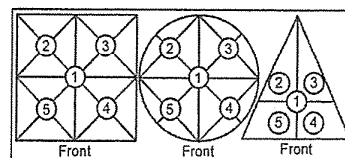
Cert.No.: 23MM161

Page: 3 of 3

Result of calibration

2. Effect of off center loading

A mass of 100 g was placed to various position on the pan.
 The weighing machine reading error obtained is given in the table



Maximum difference between
 off-center and central loading
 (g)
 0.0001

Position 1	Position 2	Position 3	Position 4	Position 5
(g)	(g)	(g)	(g)	(g)
-0.0001	-0.0001	-0.0002	-0.0001	0.0000

3. Departure from nominal value

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	(\pm mg)	(k)
Unload	0.00000	0.00000	0.038	2.28
0.01	0.01000	0.00000	0.039	2.28
0.05	0.05000	0.00000	0.039	2.28
1	1.00001	-0.00001	0.040	2.23
2	2.00001	-0.00001	0.040	2.23
5	5.00001	-0.00001	0.042	2.17
10	10.00001	-0.00001	0.045	2.13
20	20.00001	-0.00001	0.051	2.06
50	49.99998	+0.00002	0.085	2.00
80	80.00002	-0.00002	0.15	2.00
200	199.9999	+0.0001	0.30	2.00

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

-o0o-

Malu



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 23H553

Page : 1 of 2

Equipment : Thermal Environment Monitor

Manufacturer: JANTYTECH

Model : JT2011-E2A

Serial No.: 3522210140

ID No.: HD 2

Condition As-Received: Used Item

Received Date: 03 March 2023

Calibration Date: 09 March 2023
to 13 March 2023

Reference: 2303-0118DSC

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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except with the prior written approval of the head of
Corporate Services 3: Equipment Calibration and Testing Services.

Submitted by: Thai Environmental Technic Limited

1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung,
Bangkok 10240

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with
standard temperature probe for temperature measurement function into humidity / temperature chamber.

Condition of this result of calibration

1. Reference standards instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1) Handheld Thermometer With Sensor	1521	A5A339	22I1251	12 Oct 2023

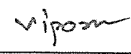
2. The certificate is valid only to the item calibrated on date and place of calibration.

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

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Chakrit Waewanjua
Issue Date : 17 March 2023

Approved Signatory :


[] Chakrit Waewanjua
[] Pornthippa Tameyakul
[✓] Viporn Tantiyawutti

B 0310132



Cert. No.: 23H553

Page.: 2 of 2

Result of Calibration:-

Without Adjustment

Function:

Temperature Measurement for T_a

<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty of Measurement</u> (±°C)
20.021	19.8	-0.221	0.42
29.990	29.9	-0.090	0.42
40.012	40.0	-0.012	0.42

Result of Calibration:-

Without Adjustment

Function:

Temperature Measurement for T_{nw}

<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty of Measurement</u> (±°C)
20.021	19.8	-0.221	0.42
29.990	29.9	-0.090	0.42
40.012	40.0	-0.012	0.42

Result of Calibration:-

Without Adjustment

Function:

Temperature Measurement for T_g

<u>Standard Temperature</u> (°C)	<u>UUC* Reading</u> (°C)	<u>Error</u> (°C)	<u>Uncertainty of Measurement</u> (±°C)
20.021	20.0	-0.021	0.42
29.990	29.9	-0.090	0.42
40.012	39.9	-0.112	0.42

UUC* : Unit Under Calibration

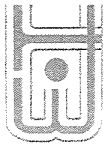
The reported uncertainty of measurement was base on standard uncertainty multiplied by coverage factor $k = 2.00$, providing confidence level approximately 95%.

-o0o-

vipom

a 1153237

เอกสารสอบเทียบเครื่องมือ
บริษัทอื่นๆ



บริษัท เอกเสควิฟ เทคดิ้ง จำกัด (สำนักงานใหญ่)

48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.ellthai.com E-mail : info@ellthai.com

ที่ RA 033/23

ใบรายงานผลการรับเทียบ

ชื่อผู้ขอรับบริการ : บริษัท ไออาร์พีซี จำกัด (มหาชน)
ที่อยู่ : 299 หมู่ 5 ถนนสุขุมวิท ตำบลเชิงเนิน อำเภอเมืองระยอง จังหวัดระยอง 21000
รับเทียบที่ : บริษัท เอกเสควิฟ เทคดิ้ง จำกัด
ที่อยู่ : 48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวง/เขตลาดพร้าว กรุงเทพฯ 10230

รายละเอียดเครื่องมือที่ทำการเทียบ :

เครื่องมือ : เครื่องตรวจวัดไอระเหยจากสารเคมี อุณหภูมิ : $(25 \pm 3) ^\circ\text{C}$
ผลิตภัณฑ์ : RAE Systems ความชื้นสัมพัทธ์ : $(24 \pm 15) \%$
รุ่น : MiniRAE3000 ความดันบรรยากาศ : 760 มิลลิเมตรปรอท
หมายเลขเครื่อง : 592-001193

วันที่รับเทียบมาตรฐาน

: 7 มีนาคม 2566

วันที่ส่งมอบผลการรับเทียบ

: 7 มีนาคม 2567

วิธีการรับเทียบมาตรฐาน

: รับเทียบ โดยใช้ Standard Reference Gas ผลิตภัณฑ์ CALGAZ.

- Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.

- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

ผลการรับเทียบมาตรฐาน

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy : $\pm 2 \%$ at calibration point

ผู้รับเทียบ

(นายสุวิมลพร สาขามิตร)
Service Engineer

ผู้ตรวจสอบ

(นายสุวิมลพร สาขามิตร)
Service Engineer Manager

ผลการสอบเทียบรับเทียบ นี้ มีผลเฉพาะตัวเครื่องและรายการที่ระบุไว้เท่านั้น

การรายงานผลใบรับเทียบนี้ไปภายนอกและเพื่อการรับรองการเทียบมาตรฐานโดยไม่ผ่านการรับรองจะถือว่าไม่ถูกต้องและอาจได้รับอนุญาตเป็นลายลักษณ์อักษรจากทางบริษัทฯ

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสควิฟ เทคดิ้ง จำกัด (สำนักงานใหญ่)

48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.ellthai.com E-mail : info@ellthai.com

No. RA 033/23

Certificate of Calibration

Customer : IRPC Public Company Limited.
Address : 169 Moo 9, Suk Sawat 45, Suk Sawat Road, Bang Kru, Phra Pradaeng, Samut Prakan 10130 Thailand.
Calibration location : Executive Trading Limited.
Address : 48/194-5 Soi Praditmanutham 19, Pradit Manutham Road, Latphrao, Bangkok 10230

Tools :

Instrument : Gas Detector Temperature : $(25 \pm 3) ^\circ\text{C}$
Product : RAE Systems Relative Humidity : $(24 \pm 15) \%$
Model Name : MiniRAE3000 Pressure : 760 mmHg
Serial Number : 592-001193

Date of Calibration : March 7, 2023

Due Date of Calibration : March 7, 2024

Calibration Method : This instrument has been calibrated using calibration gases. Test and calibration data is

On file with Executive trading limited

Reference Standard : - Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.

- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

Test Result

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy : $\pm 2 \%$ at calibration point

Calibrated By

(นายสุวิมลพร สาขามิตร)
Service Engineer

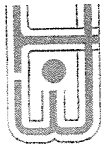
Approved By

(Mr. Sutiwong Kongtongsang.)
Service Engineer Manager

The results relate only to the items tested or calibrated.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the company.

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสคคิวทีฟเทรดดิ้ง จำกัด (สำนักงานใหญ่)

48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etthai.com E-mail: info@etthai.com

ที่ RA 033/23

ใบรายงานการตรวจเช็คเครื่องตรวจวัดก๊าซ รุ่น MiniREA3000

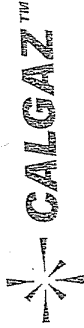
หมายเลขเครื่อง : 592-001193 วันที่ตรวจเช็ค : 7 มีนาคม 2566

ลำดับที่	รายละเอียดการตรวจสอบ	RAW COUNT		สรุป	หมายเหตุ
		REF.	REAL		
1.	PID RAW COUNT				
	Ch.H	10000-62500	48079	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	Ch.L	<62500	52722	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
2.	Lamp	>40	48	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
ลำดับที่	รายละเอียดการตรวจสอบ	การแก้ไข		สรุป	หมายเหตุ
1.	Motor Pump	Check flow rate		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	480 cc/min.
2.	Buzzer	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
3.	Li-ion Battery	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
4.	Key Pad	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
	Y/+	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
	N/-	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
	MODE	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
5.	LCD Display	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
6.	Light Sensor	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
7.	Pocket Clip	-		<input type="checkbox"/> YES <input type="checkbox"/> NO	-
8.	PC Port	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
9.	Slim Rubber Boot	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
10.	Tube adapter assembly	-		<input type="checkbox"/> YES <input type="checkbox"/> NO	-

ผู้ตรวจเช็ค : อภิสิทธิ์ งามแป๊ะ
(นายสุรินทร์ สาขมนตรี)
Service Engineer

สถานที่ตรวจเช็ค: บริษัท เอกเสคคิวทีฟเทรดดิ้ง จำกัด, 48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



CERTIFICATE OF ANALYSIS

Date: November 8, 2021 Customer: CalGaz Internl LLC
PO Number: 0000020821 Use Before: 11/08/2025
Lot Number: 304-402257108-1

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene Air	100 PPM Balance	100.5 PPM Balance

Cylinder Size: 3.6 Cu. Ft. Valve: 5/8" -18UNF
Contents: 103 Liler Pressure: 1000 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst: [Signature]
Gloria Velaz



CERTIFICATE OF ANALYSIS

Date: November 8, 2021
Order Number: 0060020021
Lot Number: 304-402250416-1
Customer: CalGas Internl LLC
Use Before: 11/08/2025

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	1000 PPM	995 PPM
Air	Balance	Balance
Cylinder Size: 1.2 Cu. Ft.	Valve: CGA 600	
Contents: 34 Liter	Pressure: 530 psig	

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst:

[Signature]
Glen Velez

**CERTIFICATE
of
Attendance**

It is hereby certified that

Mr Surinthorn Sainate
(Executive Trading Limited)

has successfully completed the

RAE Service Training Course

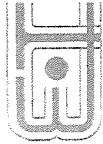
Conducted by

HONEYWELL

on 2nd August 2022

[Signature]

Conducted by : Desmond Tan
Service Engineer / Technical Trainer
Date of Issue : 2nd August 2022
Certificate valid for 2 years from date of issue



บริษัท เอกเสคคิวทิฟเทรดดิ้ง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.eltthai.com E-mail : info@eltthai.com

ที่ RA 033/23

ใบรายงานผลการปรับเทียบ

ชื่อผู้ให้บริการ : บริษัท ไออาร์พีซี จำกัด (มหาชน)

ที่อยู่ : 299 หมู่ 5 ถนนสุขุมวิท ตำบลจันทน์ เป็น อำเภอเมืองระยอง จังหวัดระยอง 21000

ปรับเทียบที่ : บริษัท เอกเสคคิวทิฟเทรดดิ้ง จำกัด

ที่อยู่ : 48/194-5 ซอย ประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวง/เขตลาดพร้าว กรุงเทพฯ 10230

รายละเอียดเครื่องมือที่ทำการปรับเทียบ :

เครื่องมือ : เครื่องตรวจวัดไฮโดรเจนจากสารเคมี

ผลิตภัณฑ์ : RAE Systems

รุ่น : MiniRAE3000

หมายเลขเครื่อง : 592-001193

สถานะแวดล้อม :

อุณหภูมิ : (25 ± 3) °C

ความชื้นสัมพัทธ์ : (24 ± 15) %

ความดันบรรยากาศ : 760 มิลลิเมตรปรอท

วันที่ปรับเทียบมาตรฐาน : 7 มีนาคม 2566

วันที่ครบกำหนดการปรับเทียบ : 7 มีนาคม 2567


วิธีการปรับเทียบมาตรฐาน : ปรับเทียบ โดยใช้ Standard Reference Gas ผลิตภัณฑ์ CALGAZ.
- Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.
- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

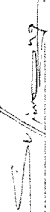
ผลการปรับเทียบมาตรฐาน

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy : ± 2 % at calibration point

ผู้ปรับเทียบ :  (นายสุรินทร์ สาหนตร)

ผู้ตรวจสอบ :  (นายสุทิวังศ์ คงทองสังข์)

Service Engineer

Service Engineer Manager

ผลการตรวจเทียบเครื่องมือ : รับรองเฉพาะตัวอย่างและรายการที่ระบุไว้เท่านั้น

ท่านสามารถ/ปรับรองนี้ไปใช้งานและออกข้อเท็จจริงการันตีตามค่าที่ได้มาแต่ผู้ผลิตได้โดยไม่ต้องเสียค่าธรรมเนียมจากทางบริษัทฯ

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230

บริษัท เอกเสคคิวทิฟเทรดดิ้ง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.eltthai.com E-mail : info@eltthai.com

No. RA 033/23

Certificate of Calibration

Customer : IRPC Public Company Limited.

Address : 169 Moo 9, Suk Sawai 45, Suk Sawat Road, Bang Kru, Phra Pradaeng, Samut Prakan 10130 Thailand.

Calibration location : Executive Trading Limited.

Address : 48/194-5 Soi Praditmanutham 19, Pradit Manutham Road, Latphrao, Bangkok 10230

Tools :

Instrument : Gas Detector

Product : RAE Systems

Model Name : MiniRAE3000

Serial Number : 592-001193

Environmental Condition :

Temperature : (25 ± 3) °C

Relative Humidity : (24 ± 15) %

Pressure : 760 mmHg

Date of Calibration : March 7, 2023

Due Date of Calibration : March 7, 2024

Calibration Method : This instrument has been calibrated using calibration gases. Test and calibration data is On file with Executive trading limited.

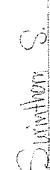
Reference Standard : - Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.
- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.


Test Result

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy : ± 2 % at calibration point

Calibrated By :  (Mr. Surinthorn Sinaue)

Approved By :  (Mr. Suttiwong Kongtongsung)

Service Engineer

Service Engineer Manager

These results relate only to the items tested or calibrated.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the company.

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสคคิวทิฟ เทคดิง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์มิตรธรรม 19 ถนนประดิษฐ์มิตรธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etthai.com E-mail : info@etthai.com



ใบรายงานการตรวจเช็คเครื่องตรวจวัดก๊าซ รุ่น MiniREA3000

หมายเลขเครื่อง : 592-001193 วันที่ตรวจเช็ค : 7 มีนาคม 2566

ที่ RA 033/23

ลำดับที่	รายละเอียดการตรวจสอบ	RAW COUNT		สรุป	หมายเหตุ
		REF.	REAL		
1.	PID RAW COUNT				
	Ch.H	10000-62500	48079	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	Ch.L	<62500	52722	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
2.	Lamp	>40	48	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
ลำดับที่	รายละเอียดการตรวจสอบ	การแก้ไข	สรุป	หมายเหตุ	
1.	Motor Pump	Check flow rate	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	480 cc/min.	
2.	Buzzer	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
3.	Li-ion Battery	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
4.	Key Pad				
	Y/H	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
	N/-	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
	MODE	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
5.	LCD Display	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
6.	Light Sensor	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
7.	Pocket Clip	-	<input type="checkbox"/> YES <input type="checkbox"/> NO	-	
8.	PC Port	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
9.	Slim Rubber Boot	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
10.	Tube adapter assembly	-	<input type="checkbox"/> YES <input type="checkbox"/> NO	-	

ผู้ตรวจเช็ค : สุวิทย์ สันตผล
(นายสุวิทย์ สันตผล)
Service Engineer

ผลการสอบเทียบ/รับเทียบ มีรับรองเฉพาะตัวอย่างและรายการที่ได้รับอนุญาตให้ทำ
การตรวจสอบและให้การรับรองการดำเนินงานไปโดยพร้อมด้วยเครื่องมือที่ได้รับอนุญาตเป็นลายลักษณ์อักษรจากทางบริษัทฯ

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230

CERTIFICATE OF ANALYSIS

Date: November 8, 2021 Customer: CalGas Internl LLC
PO Number: 0000020821 Use Before: 11/08/2025
Lot Number: 304-402257108-1

Component	Requested Concentration	Analytical Result (±1-2%)
Isobutylene Air	100 PPM Balance	100.5 PPM Balance

Cylinder Size: 3.6 Cu. Ft.
Contents: 103 Liter
Valve: 5/8" -18UNF
Pressure: 1000 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst: [Signature]
CalGas Ver 2.0



CERTIFICATE OF ANALYSIS

Date: November 8, 2021
Order Number: 0000020821
Lot Number: 304-402250416-1
Customer: CalGaz Internl LLC
Use Before: 11/08/2025

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	1000 PPM	995 PPM
Air	Balance	Balance
Cylinder Size: 1.2 Cu. Ft.		Valve: CGA 600
Contents: 34 Liter		Pressure: 500 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst:

[Signature]
Gloria Velazquez

**CERTIFICATE
of
Attendance**

It is hereby certified that

Mr Surinthorn Sainate
(Executive Trading Limited)

has successfully completed the

RAE Service Training Course

Conducted by

HONEYWELL

on 2nd August 2022

[Signature]

Conducted by : Desmond Tan
Service Engineer / Technical Trainer
Date of Issue : 2nd August 2022
Certificate valid for 2 years from date of issue



บริษัท เอกเสคคิวทิฟเทรดดิ้ง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว กรุงเทพมหานคร 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etlthai.com E-mail : info@etlthai.com

ที่ RA 03/23

ใบรายงานผลการปรับเทียบ

ชื่อผู้ขอรับบริการ : บริษัท ไออาร์พีซี จำกัด (มหาชน)
ที่อยู่ : 299 หมู่ 5 ถนนสุขุมวิท ตำบลเชิงเนิน อำเภอเมืองระยอง จังหวัดระยอง 21000
ปรับเทียบที่ : บริษัท เอกเสคคิวทิฟเทรดดิ้ง จำกัด
ที่อยู่ : 48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวง/เขตลาดพร้าว กรุงเทพมหานคร 10230

รายละเอียดเครื่องมือที่ทำการปรับเทียบ : สถานะแวดล้อม :
เครื่องมือ : เครื่องตรวจวัด โอโซนจากสารเคมี อุณหภูมิ : $(25 \pm 3) ^\circ\text{C}$
ผลิตภัณฑ์ : RAE Systems ความชื้นสัมพัทธ์ : $(24 \pm 15) \%$
รุ่น : MiniRAE3000 ความดันบรรยากาศ : 760 มิลลิเมตรปรอท
หมายเลขเครื่อง : 592-001193



วันที่รับเทียบมาตรฐาน : 7 มีนาคม 2566
วันที่ทำการทดสอบ : 7 มีนาคม 2567
วิธีการปรับเทียบมาตรฐาน : ปรับเทียบโดยใช้ Standard Reference Gas ผลิตภัณฑ์ CALGAZ.
- Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.
- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

ผลการปรับเทียบมาตรฐาน

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy : $\pm 2 \%$ at calibration point

ผู้รับเทียบ :  (นายสุรินทร์ สายนคร)
ผู้ตรวจสอบ :  (นายสุทธิวงศ์ คงทองหงษ์)
Service Engineer
Service Engineer Manager

ผลการสอบเทียบ/รับเทียบ มีรับรองสถานะด้วยและรายการที่ใส่ระบุไว้ข้างต้น

การรับรองสถานะ/ใบรับรองนี้ ไม่ได้ออกและยกเลิกโดยปราศจากการมีส่วนร่วมจากฝ่ายผู้ตรวจเทียบและต้องได้รับอนุญาตเป็นลายลักษณ์อักษรจากทางบริษัท*

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสคคิวทิฟเทรดดิ้ง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว กรุงเทพมหานคร 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etlthai.com E-mail : info@etlthai.com

No. RA 03/23

Certificate of Calibration

Customer : IRPC Public Company Limited.
Address : 169 Moo 9, Suk Sawat 45, Suk Sawat Road, Bang Kru, Phra Pradaeng, Samut Prakan 10130
Thailand.
Calibration location : Executive Trading Limited.
Address : 48/194-5 Soi Praditmanutham 19, Pradit Manutham Road, Latphrao, Bangkok 10230

Tools :
Instrument : Gas Detector Temperature : $(25 \pm 3) ^\circ\text{C}$
Product : RAE Systems Relative Humidity : $(24 \pm 15) \%$
Model Name : MiniRAE3000 Pressure : 760 mmHg
Serial Number : 592-001193

Date of Calibration : March 7, 2023

Due Date of Calibration : March 7, 2024

Calibration Method : This instrument has been calibrated using calibration gases. Test and calibration data is
On file with Executive trading limited.



Reference Standard : - Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.
- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

Test Result

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

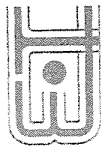
Accuracy : $\pm 2 \%$ at calibration point

Calibrated By :  (Mr. Surinbhorn Sainate)
ผู้ตรวจสอบ :  (Mr. Suttiwong Konglongsang.)
Service Engineer
Service Engineer Manager

The results relate only to the items tested or calibrated.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the company.

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสคคิวทิฟ เทรดดิ้ง จำกัด (สำนักงานใหญ่)

48/194-5 ซอยประดิษฐ์นิมิต 19 ถนนประดิษฐ์นิมิต แขวงลาดพร้าว กรุงเทพมหานคร 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.bttthai.com E-mail : info@bttthai.com



ใบรายงานการตรวจเช็คเครื่องวัดก๊าซ รุ่น MinireA3000

หมายเลขเครื่อง : 592-001103

วันที่ตรวจเช็ค : 7 มีนาคม 2566

ที่ RA 033/23

ลำดับที่	รายละเอียดการตรวจสอบ	RAW COUNT		สรุป	หมายเหตุ
		REF.	REAL		
1.	PID RAW COUNT				
	Ch.H	10000-62500	48079	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	Ch.L	<62500	52722	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
2.	Lamp	>40	48	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
ลำดับที่	รายละเอียดการตรวจสอบ	การแก้ไข	สรุป	หมายเหตุ	
1.	Motor Pump	Check flow rate	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	480 cc/min.	
2.	Buzzer	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
3.	Li-ion Battery	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
4.	Key Pad				
	Y/+	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
	N/-	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
	MODE	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
5.	LCD Display	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
6.	Light Sensor	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
7.	Pocket Clip	-	<input type="checkbox"/> YES <input type="checkbox"/> NO	-	
8.	PC Port	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
9.	Slim Rubber Boot	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
10.	Tube adapter assembly	-	<input type="checkbox"/> YES <input type="checkbox"/> NO	-	

ผู้ตรวจเช็ค : อภิเดช งามนาค
(นายสุรินทร์ สาณบุตร)
Service Engineer

ผลการสอบเทียบ/ปรับเทียบ : ธีระพงษ์ งามนาค มีใบรองทดสอบและรายการที่ส่งไปให้ท่าน
การนำรายงาน/ใบรับรองนี้ไปใช้งานและการจัดการข้อมูลการดำเนินงานส่วน ไปรษณีย์จะต้องได้รับอนุญาตเป็นลายลักษณ์อักษรจากทางบริษัทฯ

EXECUTIVE TRADING LIMITED 40/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230

CERTIFICATE OF ANALYSIS

Customer: CalGas Internl LLC

Date: November 8, 2021

PO Number: 0000020821

Use Before: 11/08/2025

Lot Number: 304-402257108-1

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	100 PPM	100.5 PPM
Air	Balance	Balance

Cylinder Size: 3.6 Cu. Ft.
Contents: 103 Liter

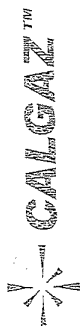
Valve: 5/8" -18UNF
Pressure: 1000 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst:

Gloria Valle

Honeywell



CERTIFICATE OF ANALYSIS

Date: November 8, 2021
Order Number: 0000020821
Lot Number: 304-402250416-1
Customer: CalGas Internl LLC
Use Before: 11/09/2025

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	1000 PPM Balance	995 PPM Balance
Air		
Cylinder Size: 1.2 Cu. Ft. Contents: 34 Liter		Valve: CGA 600 Pressure: 500 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst

Glenn Velez

CERTIFICATE of Attendance

It is hereby certified that

Mr Surinthorn Sainate
(Executive Trading Limited)

has successfully completed the

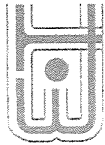
RAE Service Training Course

Conducted by

HONEYWELL

on 2nd August 2022

Conducted by : Desmond Tan
Service Engineer / Technical Trainer
Date of Issue : 2nd August 2022
Certificate valid for 2 years from date of issue



บริษัท เอกเสดคิวทีพี เทคคิง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์นุธรรม 19 ถนนประดิษฐ์นุธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etlthai.com E-mail : info@etlthai.com

ที่ RA 033/23

ใบรายงานผลการปรับเทียบ

ชื่อผู้ขอรับบริการ : บริษัท ไออาร์พีซี จำกัด (มหาชน)
ที่อยู่ : 299 หมู่ 5 ถนนสุขุมวิท ตำบลเชิงเนิน อำเภอเมืองระยอง จังหวัดระยอง 21000
ปรับเทียบที่ : บริษัท เอกเสดคิวทีพี เทคคิง จำกัด
ที่อยู่ : 48/194-5 ซอย ประดิษฐ์นุธรรม 19 ถนนประดิษฐ์นุธรรม แขวง/เขตลาดพร้าว กรุงเทพฯ 10230

รายละเอียดเครื่องมือที่ทำการปรับเทียบ :

เครื่องมือ : เครื่องตรวจวัดไอระเหยจากสารเคมี อุณหภูมิ : $(25 \pm 3) ^\circ\text{C}$
ผลิตภัณฑ์ : RAE Systems ความชื้นสัมพัทธ์ : $(24 \pm 15) \%$
รุ่น : MiniRAE3000 ความดันบรรยากาศ : 760 มิลลิเมตรปรอท
หมายเลขเครื่อง : 592-001193

วันที่รับเทียบมาตรฐาน : 7 มีนาคม 2566

วันที่ครบกำหนดการปรับเทียบ : 7 มีนาคม 2567



วิธีการปรับเทียบมาตรฐาน : ปรับเทียบโดยใช้ Standard Reference Gas ผลิตภัณฑ์ CALGAZ.
- Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.
- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

ผลการปรับเทียบมาตรฐาน

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy : $\pm 2 \%$ at calibration point

ผู้รับเทียบ :  ผู้ตรวจสอบ : 
(นายสุรินทร์ สาหนธร) (นายสุทธิพงษ์ คงทองสิงห์)
Service Engineer Service Engineer Manager

ผลการสอบเทียบได้รับเทียบนี้ไว้เฉพาะตัวเครื่องและรายการที่ระบุไว้เท่านั้น
กรณีรายงานผล/ใบรับรองนี้ไปนอกเขตและอาจมีการเปลี่ยนแปลงไปโดยไม่มีเอกสารอ้างอิงได้รูปถ่ายชุดนี้มาขอเทียบอีกครั้งจากทางบริษัทฯ
EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสดคิวทีพี เทคคิง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์นุธรรม 19 ถนนประดิษฐ์นุธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etlthai.com E-mail : info@etlthai.com

No. RA 033/23

Certificate of Calibration

Customer : IRPC Public Company Limited.
Address : 169 Moo 9, Suk Sawat 45, Suk Sawat Road, Bang Kru, Phra Pradaeng, Samut Prakan 10130 Thailand.
Calibration location : Executive Trading Limited.
Address : 48/194-5 Soi Praditmanutham 19, Pradit Manutham Road, Latphrao, Bangkok 10230

Tools :

Instrument : Gas Detector Temperature : $(25 \pm 3) ^\circ\text{C}$
Product : RAE Systems Relative Humidity : $(24 \pm 15) \%$
Model Name : MiniRAE3000 Pressure : 760 mmHg
Serial Number : 592-001193

Date of Calibration : March 7, 2023

Due Date of Calibration : March 7, 2024

Calibration Method : This instrument has been calibrated using calibration gases. Test and calibration data is
On file with Executive trading limited.



Reference Standard : - Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.
- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

Test Result

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy : $\pm 2 \%$ at calibration point

Calibrated By :  Approved By : 
(Mr. Surinthorn Sainate) (Mr. Suttiwong Konglongsang.)
Service Engineer Service Engineer Manager

The results relate only to the items tested or calibrated.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the company.

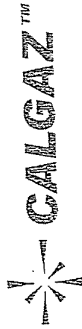
EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสดคิวทีฟ เทคคิง จำกัด (สำนักงานใหญ่)

48/194-5 ซอยประติมากรรม 19 ถนนประติมากรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etitthai.com E-mail : info@etitthai.com

ใบรายงานการตรวจเช็คเครื่องตรวจวัดก๊าซ รุ่น MiniRA3000					
หมายเลขเครื่อง : 592-001193		วันที่ตรวจเช็ค : 7 มีนาคม 2566			
ที่ RA 033/23					
ลำดับที่	รายละเอียดการตรวจซ่อม	RAW COUNT		สรุป	หมายเหตุ
		REF.	REAL		
1.	PID RAW COUNT				
	Ch.H	10000-62500	48079	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	Ch.L	<62500	52722	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
2.	Lamp	>40	48	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
ลำดับที่	รายละเอียดการตรวจซ่อม	การแก๊ว	สรุป	หมายเหตุ	
1.	Motor Pump	Check flow rate	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	480 cc/min.	
2.	Buzzer	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
3.	Li-ion Battery	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
4.	Key Pad				
	Y/+	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
	N/-	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
	MODE	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
5.	LCD Display	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
6.	Light Sensor	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
7.	Pocket Clip	-	<input type="checkbox"/> YES <input type="checkbox"/> NO	-	
8.	PC Port	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
9.	Slim Rubber Boot	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
10.	Tube adapter assembly	-	<input type="checkbox"/> YES <input type="checkbox"/> NO	-	
ผู้ตรวจเช็ค : อภิสิทธิ์ วัฒนชัย (นายสุรินทร์ สายเนตร)				Service Engineer	
ผลการตรวจเช็ค/ประเมินเบื้องต้น : เครื่องตรวจวัดก๊าซและเครื่องวัดก๊าซที่ใช้งานได้					
การบำรุงรักษา/ใบรับรอง : ใบรายงานผลการตรวจเช็คเครื่องวัดก๊าซและเครื่องวัดก๊าซที่ได้รับอนุญาตให้ใช้งานได้					
EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATHPHRAO, BANGKOK 10230					



CERTIFICATE OF ANALYSIS

Date: November 8, 2021 Customer: CalGaz Interim LLC
PO Number: 000020821 Use Before: 11/08/2025
Lot Number: 304-402257108-1


Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene Air	100 PPM Balance	100.5 PPM Balance

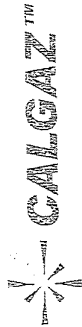
Cylinder Size: 3.6 Cu. Ft.
Contents: 103 Liter

Valve: 5/8" -18UNF
Pressure: 1000 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst:


G. H. K. K. K.



CERTIFICATE OF ANALYSIS

Date: November 8, 2021
Order Number: 0000020821
Lot Number: 304-402250416-1
Customer: CalGaz Internl LLC
Use Before: 11/08/2025

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	1000 PPM	995 PPM
Air	Balance	Balance
Cylinder Size: 1.2 Cu. Ft.		
Contents: 34 Liter		
Valve: CGA 600		
Pressure: 500 psig		

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst

Glenn Velez
Glenn Velez

**CERTIFICATE
of
Attendance**

It is hereby certified that

Mr Surinthorn Sainate
(Executive Trading Limited)

has successfully completed the

RAE Service Training Course

Conducted by

HONEYWELL

on 2nd August 2022

Desmond Tan

Conducted by : Desmond Tan
Service Engineer / Technical Trainer
Date of Issue : 2nd August 2022
Certificate valid for 2 years from date of issue



บริษัท เอกเสคคิวทิฟ เทรดิ้ง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.eltthai.com E-mail : info@eltthai.com

ใบรายงานผลการปรับเทียบ

ที่ RA 03/23

ชื่อผู้ขอรับบริการ : บริษัท ไออาร์พีซี จำกัด (มหาชน)
ที่อยู่ : 299 หมู่ 5 ถนนสุขุมวิท ตำบลจตุรพักดินพิมาน อำเภอเมืองระยอง จังหวัดระยอง 21000
ปรับเทียบที่ : บริษัท เอกเสคคิวทิฟ เทรดิ้ง จำกัด
ที่อยู่ : 48/194-5 ซอย ประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวง/เขตลาดพร้าว กรุงเทพฯ 10230

รายละเอียดเครื่องมือที่ทำการปรับเทียบ : สถานะแวดล้อม :
เครื่องมือ : เครื่องตรวจวัดโอโซนแบบพกพาแบบมือถือ : (25 ± 3) °C
ผลิตภัณฑ์ : RAE Systems : ความชื้นสัมพัทธ์ : (24 ± 15) %
รุ่น : MiniRAE3000 : ความดันบรรยากาศ : 760 มิลลิเมตรปรอท
หมายเลขเครื่อง : 592-001193



วันที่ปรับเทียบมาตรฐาน : 7 มีนาคม 2566
วันที่ตรวจทานผลการปรับเทียบ : 7 มีนาคม 2567
วิธีการปรับเทียบมาตรฐาน : ปรับเทียบโดยใช้ Standard Reference Gas ผลิตภัณฑ์ CALGAZ.
- Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.
- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

ผลการปรับเทียบมาตรฐาน

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy : ± 2 % at calibration point

ผู้ปรับเทียบ :  (นายสุรินทร์ สาหนนดร)
ผู้ตรวจสอบ :  (นายสุวิทย์ คงทองสิงห์)
Service Engineer : Service Engineer Manager

ผลการสอบเทียบเป็นที่ยอมรับ มีรับรองเฉพาะตัวอุปกรณ์และบุคลากรที่เกี่ยวข้องเท่านั้น

การรายงานผล/ใบรับรองนี้ใช้ได้เฉพาะการที่ส่งมาตรวจเท่านั้น ไม่สามารถนำผลการสอบไปเผยแพร่หรืออ้างสิทธิ์ใดๆได้โดยไม่ขออนุญาตจากทางบริษัทฯ
EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสคคิวทิฟ เทรดิ้ง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยประดิษฐ์มนูธรรม 19 ถนนประดิษฐ์มนูธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.eltthai.com E-mail : info@eltthai.com

Certificate of Calibration

No. RA 03/23

Customer : IRPC Public Company Limited.
Address : 169 Moo 9, Suk Sawat 45, Suk Sawat Road, Bang Kru, Phra Pradaeng, Samut Prakan 10130 Thailand.
Calibration location : Executive Trading Limited.
Address : 48/194-5 Soi Praditmanutham 19, Pradit Manutham Road, Latphrao, Bangkok 10230

Tools : Environmental Condition :
Instrument : Gas Detector : Temperature : (25 ± 3) °C
Product : RAE Systems : Relative Humidity : (24 ± 15) %
Model Name : MiniRAE3000 : Pressure : 760 mmHg
Serial Number : 592-001193

Date of Calibration : March 7, 2023

Due Date of Calibration : March 7, 2024

Calibration Method : This instrument has been calibrated using calibration gases. Test and calibration data is on file with Executive trading limited.



Reference Standard : - Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.
- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

Test Result

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

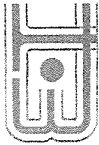
Accuracy : ± 2 % at calibration point

Calibrated By :  (Mr. Surin Sainate)
ผู้ตรวจสอบ :  (Mr. Sutiwong Kongtongsang.)
Service Engineer : Service Engineer Manager

The results relate only to the items tested or calibrated.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the company.

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



บริษัท เอกเสคคิวทีฟเทรดดิ้ง จำกัด (สำนักงานใหญ่)

48/194-5 ซอยประดิษฐ์บุธรรม 19 ถนนประดิษฐ์บุธรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etlthai.com E-mail : info@etlthai.com

ที่ RA 033/23

ใบรายงานการตรวจเช็คเครื่องตรวจวัดก๊าซ รุ่น MinireA3000

หมายเลขเครื่อง : 592-001193 วันที่ตรวจเช็ค : 7 มีนาคม 2566

ลำดับที่	รายละเอียดการตรวจสอบ	RAW COUNT		สรุป	หมายเหตุ
		REF.	REAL		
1.	PID RAW COUNT				
	Ch.H	10000-62500	48079	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	Ch.L	<62500	52722	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
2.	Lamp	>40	48	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
ลำดับที่	รายละเอียดการตรวจสอบ	การแก๊จ		สรุป	หมายเหตุ
1.	Motor Pump	Check flow rate		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	480 cc/min.
2.	Buzzer	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
3.	Li-ion Battery	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
4.	Key Pad	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
	Y/+	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
	N/-	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
	MODE	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
5.	LCD Display	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
6.	Light Sensor	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
7.	Pocket Clip	-		<input type="checkbox"/> YES <input type="checkbox"/> NO	-
8.	PC Port	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
9.	Slim Rubber Boot	-		<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-
10.	Tube adapter assembly	-		<input type="checkbox"/> YES <input type="checkbox"/> NO	-

ผู้ตรวจเช็ค : สุวิทย์ งามแป๊ะ
(นายสุวิทย์ งามแป๊ะ)
Service Engineer

ผลการตรวจเทียบ/ปรับเทียบ นี้รับรองเฉพาะตัวอย่างและรายการที่ได้รับไปเท่านั้น

การรับรองและ/หรือกรณีที่ไปและและการคัดลอกหรือการนำกลับมาใช้ใหม่โดยไม่ได้รับอนุญาตถือเป็นความผิดตามกฎหมายบริษัท

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATPHRAO, BANGKOK 10230



CERTIFICATE OF ANALYSIS

Date: November 8, 2021 Customer: CalGaz Internl LLC
PO Number: 0000020821 Use Before: 11/08/2025
Lot Number: 304-402257108-1

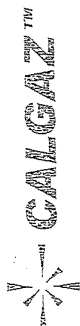
Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene Air	100 PPM Balance	100.5 PPM Balance

Cylinder Size: 3.6 Cu. Ft.
Contents: 103 Liter
Valve: 5/8" -18UNF
Pressure: 1000 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst: [Signature]
Gloria Velaz

Honeywell



CERTIFICATE OF ANALYSIS

Date: November 8, 2021
Order Number: 0000020621
Lot Number: 304-402250416-1
Customer: CalGas Internl LLC
Use Before: 11/08/2025

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	1000 PPM	995 PPM
Air	Balance	Balance
Cylinder Size: 1.2 Cu. Ft. Contents: 34 Liter	Valve: CGA 600 Pressure: 500 psig	

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst:

Glenys Velazquez

CERTIFICATE of Attendance

It is hereby certified that

Mr. Surinthorn Sainate
(Executive Trading Limited)

has successfully completed the

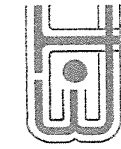
RAE Service Training Course

Conducted by

HONEYWELL

on 2nd August 2022

Conducted by : Desmond Tan
Service Engineer / Technical Trainer
Date of Issue : 2nd August 2022
Certificate valid for 2 years from date of issue



บริษัท เอเอสเคคิวิล์ เทรดดิ้ง จำกัด (สำนักงานใหญ่)
48/194-5 ซอยปรีดิษฐ์บูรรม 19 ถนนประดิษฐ์บูรรม แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (962) 515-0145-50 FAX (662) 515-0144 www.eskthai.com E-mail : info@esktai.com

No. RA 033/23

Certificate of Calibration

Customer : IRPC Public Company Limited.

Address : 169 Moo 9, Suk Sawat 45, Suk Sawat Road, Bang Kru, Phra Pradaeng, Samut Prakan 10130
Thailand.

Calibration location : Executive Trading Limited.

Address : 48/194-5 Soi Pradinnutham 19, Pradi Manutham Road, Laoprao, Banakok 10230

ผลการประเมิน :

Tools :		Environmental Condition :	
Instrument	: Gas Detector	Temperature	: (25 ± 3) °C
Product	: RAE Systems	Relative Humidity	: (24 ± 15) %
Model Name	: MiniRAE3000	Pressure	: 760 mmHg
Serial Number	: 592-001193		

Date of Calibration : March 7, 2023

Due Date of Calibration : March 7, 2024

Calibration Method : This instrument has been calibrated using calibration gases. Test and calibration data is

On file with Executive trading limited.


Reference Standard : - Isobutylene Standard Gas 100 ppm; Lot number 304-402257108-1.

- Isobutylene Standard Gas 1000 ppm; Lot number 304-402250416-1.

Sensor Type	Reference Concentration	Before Cal.	After Cal.	Error Reading	Result
PID	0 ppm (Air Zero)	0.0 ppm	0.0 ppm	0.0 ppm	Pass
PID	100 ppm (Isobutylene 100 ppm)	85.0 ppm	100.0 ppm	0.0 ppm	Pass
PID	1000 ppm (Isobutylene 1000 ppm)	899.5 ppm	991.8 ppm	8.2 ppm	Pass

Flow Rate of Pump : 480 cc/min.

Accuracy	$\pm 2\%$ at calibration point
Flow rate of pump	400 cc/min.

Approved By : 

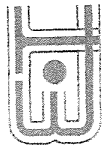
Comics Edition

Senior Engineer Manager

The results relate only to the items tested or calibrated.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the company.

EMERALD TIME TRADING LIMITED 40/404 F SOI BRADITMANIUTHAM 10 BRADITMANIUTHAM ROAD | ATEHBAO BANGKOK 10230



บริษัท เอกเสดคิวทีพี เพรดิงส์ จำกัด (สำนักงานใหญ่)

48/194-5 ซอยประดิษฐ์นิมิต 19 ถนนประดิษฐ์นิมิต แขวงลาดพร้าว เขตลาดพร้าว กรุงเทพฯ 10230
TEL (662) 515-0145-50 FAX (662) 515-0144 www.etlthai.com E-mail : info@etlthai.com

ที่ RA 033/23

ใบรายงานการตรวจเช็คเครื่องวัดก๊าซ รุ่น MiniREA3000

หมายเลขเครื่อง : 592-001193

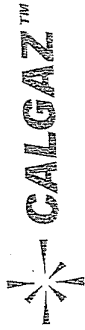
วันที่ตรวจเช็ค : 7 มีนาคม 2566

ลำดับที่	รายละเอียดการตรวจสอบ	RAW COUNT		สรุป	หมายเหตุ
		REF.	REAL		
1.	PID RAW COUNT				
	Ch.H	10000-62500	48079	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	Ch.L	<62500	52722	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
2.	Lamp	>40	48	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
ลำดับที่	รายละเอียดการตรวจสอบ	การแก้ไข	สรุป	หมายเหตุ	
1.	Motor Pump	Check flow rate	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	480 cc/min.	
2.	Buzzer	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
3.	Li-ion Battery	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
4.	Key Pad				
	Y/+	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
	N/-	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
	MODE	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
5.	LCD Display	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
6.	Light Sensor	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
7.	Pocket Clip	-	<input type="checkbox"/> YES <input type="checkbox"/> NO	-	
8.	PC Port	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
9.	Slim Rubber Boot	-	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	-	
10.	Tube adapter assembly	-	<input type="checkbox"/> YES <input type="checkbox"/> NO	-	

ผู้ตรวจเช็ค : อภิเทพ วัฒนชัย
(นายสุรินทร์ สานนตร)
Service Engineer

ผลการสอบเทียบที่ปรากฏมีค่าที่รับรองเฉพาะตัวเครื่องและรายการที่ระบุไว้เท่านั้น
การนำรายงาน/ใบรับรองนี้ไปโฆษณาและการใช้เพื่อการนำผลงานส่วนไปเผยแพร่ต่อสาธารณะต้องได้รับอนุญาตเป็นลายลักษณ์อักษรจากทางบริษัทฯ

EXECUTIVE TRADING LIMITED 48/194-5 SOI PRADITMANUTHAM 19, PRADITMANUTHAM ROAD, LATHPHRAO, BANGKOK 10230



CERTIFICATE OF ANALYSIS

Customer: CalGaz Internl LLC

Date: November 8, 2021

PO Number: 0000020821

Use Before: 11/08/2025

Lot Number: 304-402257108-1

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	100 PPM	100.5 PPM
Air	Balance	Balance

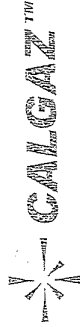
Cylinder Size: 3.6 Cu. Ft.
Contents: 103 Liter

Valve: 5/8" -18UNF
Pressure: 1000 psig

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst:

Gloria Velez



CERTIFICATE OF ANALYSIS

Date: November 8, 2021
Order Number: 0000020821
Lot Number: 304-402250416-1
Customer: CalGas Internl LLC
Use Before: 11/08/2025

Component	Requested Concentration	Analytical Result (+/- 2%)
Isobutylene	1000 PPM Balance	995 PPM Balance
Air		
Cylinder Size: 1.2 Cu. Ft. Contents: 34 Liter		
Valve: CGA 600 Pressure: 500 psig		

Product composition verified by direct comparison to calibration standards traceable to N.I.S.T. weights and/or N.I.S.T. Gas Mixture reference materials.

Analyst

Glenn Velez
Glenn Velez

**CERTIFICATE
of
Attendance**

It is hereby certified that

Mr Surinthon Sainate
(Executive Trading Limited)

has successfully completed the

RAE Service Training Course

Conducted by

HONEYWELL

on 2nd August 2022

Conducted by : Desmond Tan
Service Engineer / Technical Trainer
Date of Issue : 2nd August 2022
Certificate valid for 2 years from date of issue



PETRO-INSTRUMENTS CORP., LTD.

7/409 Soi Vibhavadi-Rangsit 36, Vibhavadi-Rangsit Rd. Chatuchak, Bangkok 10900 Thailand

Tel : (+66) 2939 5711 (12 Lines) (+66) 2513 2333 (12 Lines) Fax : (+66) 939 4207 (+66) 2939 4207

Website <http://www.pico.co.th> email-address pico@pico.co.th , service@pico.co.th

DOC. NUMBER

CMV-S23-0034

SERVICE REPORT

REPORT DATE

June 21, 2023

EQUIPMENT: Multi Water Quality Checker, U-5000G	SERIAL NUMBER / TAG NUMBER RAAGSEN3	BRAND / MANUFACTURER HORIBA
CUSTOMER NAME: IRPC PUBLIC COMPANY LIMITED	LOCATION: rayong	JOB NUMBER / REQUESTED NUMBER JID2300281-002

SCOPE OF WORK / REASON FOR VISIT

Repair and Calibration

FOUND FAILURE & CORRECTIVE ACTION DETAILS

1. ตรวจเช็คสภาพเครื่อง Multi Water Quality Checker

- Meter Model: U-5000G S/N: RAAGSEN3 สามารถใช้งานได้ปกติ
- Probe Model: U-53 S/N: V39CGM6U พบว่า Sensor Turbidity ไม่สามารถใช้งานได้
- Sensor pH,COND,ORP,DO ใช้งานได้ปกติ

2. ทำการ Cleaning sensor ทุก parameter

- เติม Internal Solution (KCl) ใน Reference sensor

3. ปรับเทียบ Auto Calibration ด้วย Buffer pH 4

- พบว่าสามารถปรับเทียบค่าผ่าน คือ pH , COND, ORP, Temp, DO and Depth

4. ปรับเทียบ Manual Calibration 2 จุด (zero , span)

- พบว่าสามารถปรับเทียบค่าผ่าน คือ pH , COND,ORP, Temp, DO and Depth

สรุป : เครื่อง Multi Water Quality Checker Meter Model: U-5000G S/N: RAAGSEN3 และ

Sensor Model: U-53 S/N: V39CGM6U สามารถใช้งานได้ตามปกติ ยกเว้น Sensor Turbidity

WORK CONCLUSION

<input checked="" type="checkbox"/> COMPLETED		<input type="checkbox"/> IN COMPLETED	PARTS REPLACEMENT		
<input checked="" type="checkbox"/> CHARGE	<input type="checkbox"/> NO CHARGE		PARTS NAME	P/N	QTY.
<input checked="" type="checkbox"/> Service Fee	<input type="checkbox"/> Project Warranty	<input type="checkbox"/> Take to Office			
<input type="checkbox"/> Travelling	<input type="checkbox"/> Service Warranty	<input type="checkbox"/> Wait for Parts			
<input type="checkbox"/> Spare Parts	<input type="checkbox"/> Spare Parts Warranty	<input type="checkbox"/> In Progress			
<input type="checkbox"/> Other	<input type="checkbox"/> Service Contract	<input type="checkbox"/> Other			

TIME SPENT (HOURS)

YEAR	2023								TOTAL HOURS	TRAVELING DETAILS	
MONTH	6									TRAVEL BY	-
DATE	21									FROM	-
SERVICE TIME	4							4		TO	-
OVERTIME	-							-		TOTAL ROUND TRIP	-
TRAVELING TIME	-							-		DISTANCE (KM.)	-
TOTAL HOURS	4							4			

SERVICE CREW

NAME		NAME	
1.	Chamaiporn Vongchealee	3.	
2.		4.	

CUSTOMER'S NAME	CUSTOMER'S SIGNATURE	DATE



PETRO-INSTRUMENTS CORP., LTD.

7/409 Soi Vibhavadi-Rangsit 36, Vibhavadi-Rangsit Rd., Chatuchak, Bangkok 10900 Thailand

Tel. (+66) 2939 5711 (12 Lines), (+66) 2513 2333 (12 Lines), Fax (+66) 939 4207, (+66) 2939 4207

Website <http://www.pico.co.th> email-address: pico@pico.co.th, service@pico.co.th

DOC. NUMBER

CMV-S23-0034

SERVICE REPORT

REPORT DATE

June 21, 2023

EQUIPMENT: Multi Water Quality Checker, U-5000G	SERIAL NUMBER / TAG NUMBER RAAGSEN3	BRAND / MANUFACTURER HORIBA
CUSTOMER NAME: IRPC PUBLIC COMPANY LIMITED	LOCATION: rayong	JOB NUMBER / REQUESTED NUMBER JID2300281-002

SCOPE OF WORK / REASON FOR VISIT

Repair and Calibration

FOUND FAILURE & CORRECTIVE ACTION DETAILS

1. ตรวจเช็คสภาพเครื่อง Multi Water Quality Checker

- Meter Model: U-5000G S/N: RAAGSEN3 สามารถใช้งานได้ปกติ
- Probe Model: U-53 S/N: V39CGM6U พบว่า Sensor Turbidity ไม่สามารถใช้งานได้
- Sensor pH, COND, ORP, DO ใช้งานได้ปกติ

2. ทำการ Cleaning sensor ทุก parameter

- เติมน Internal Solution (KCl) ใน Reference sensor

3. ปรับเทียบ Auto Calibration ด้วย Buffer pH 4

- พบว่าสามารถปรับเทียบค่าผ่าน คือ pH, COND, ORP, Temp, DO and Depth

4. ปรับเทียบ Manual Calibration 2 จุด (zero, span)

- พบว่าสามารถปรับเทียบค่าผ่าน คือ pH, COND, ORP, Temp, DO and Depth

สรุป : เครื่อง Multi Water Quality Checker Meter Model: U-5000G S/N: RAAGSEN3 และ

Sensor Model: U-53 S/N: V39CGM6U สามารถใช้งานได้ตามปกติ ยกเว้น Sensor Turbidity

WORK CONCLUSION

<input checked="" type="checkbox"/> COMPLETED		<input type="checkbox"/> IN COMPLETED	PARTS REPLACEMENT		
<input checked="" type="checkbox"/> CHARGE	<input type="checkbox"/> NO CHARGE		PARTS NAME	P/N	QTY.
<input checked="" type="checkbox"/> Service Fee	<input type="checkbox"/> Project Warranty	<input type="checkbox"/> Take to Office			
<input type="checkbox"/> Travelling	<input type="checkbox"/> Service Warranty	<input type="checkbox"/> Wait for Parts			
<input type="checkbox"/> Spare Parts	<input type="checkbox"/> Spare Parts Warranty	<input type="checkbox"/> In Progress			
<input type="checkbox"/> Other	<input type="checkbox"/> Service Contract	<input type="checkbox"/> Other			

TIME SPENT (HOURS)

YEAR	2023								TOTAL HOURS	TRAVELING DETAILS	
MONTH	6									TRAVEL BY	-
DATE	21									FROM	-
SERVICE TIME	4							4		TO	-
OVERTIME	-							-		TOTAL ROUND TRIP	-
TRAVELING TIME	-							-		DISTANCE (KM.)	-
TOTAL HOURS	4							4			

SERVICE CREW

NAME		NAME	
1.	Chamaiporn Vongchalee	3.	
2.		4.	

CUSTOMER'S NAME	CUSTOMER'S SIGNATURE	DATE



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DOC. NUMBER

CMV-S23-0034

SERVICE REPORT

REPORT DATE

June 21, 2023

EQUIPMENT: Multi Water Quality Checker, U-5000G	SERIAL NUMBER / TAG NUMBER RAAGSEN3	BRAND / MANUFACTURER HORIBA
CUSTOMER NAME: IRPC PUBLIC COMPANY LIMITED	LOCATION: rayong	JOB NUMBER / REQUESTED NUMBER JID2300281-002

SCOPE OF WORK / REASON FOR VISIT

Repair and Calibration

FOUND FAILURE & CORRECTIVE ACTION DETAILS

1. ตรวจสอบสภาพเครื่อง Multi Water Quality Checker

- Meter Model: U-5000G S/N: RAAGSEN3 สามารถใช้งานได้ปกติ
- Probe Model: U-53 S/N: V39CGM6U พบว่า **Sensor Turbidity** ไม่สามารถใช้งานได้
- Sensor pH, COND, ORP, DO ใช้งานได้ปกติ

2. ทำการ Cleaning sensor ทุก parameter

- เติมน Internal Solution (KCI) ใน Reference sensor

3. ปรับเทียบ Auto Calibration ด้วย Buffer pH 4

- พบว่าสามารถปรับเทียบค่าผ่าน คือ pH, COND, ORP, Temp, DO and Depth

4. ปรับเทียบ Manual Calibration 2 จุด (zero, span)

- พบว่าสามารถปรับเทียบค่าผ่าน คือ pH, COND, ORP, Temp, DO and Depth

สรุป : เครื่อง Multi Water Quality Checker Meter Model: U-5000G S/N: RAAGSEN3 และ

Sensor Model: U-53 S/N: V39CGM6U สามารถใช้งานได้ตามปกติ ยกเว้น Sensor Turbidity

WORK CONCLUSION

<input checked="" type="checkbox"/> COMPLETED		<input type="checkbox"/> IN COMPLETED	PARTS REPLACEMENT		
<input checked="" type="checkbox"/> CHARGE	<input type="checkbox"/> NO CHARGE		PARTS NAME	P/N	QTY.
<input checked="" type="checkbox"/> Service Fee	<input type="checkbox"/> Project Warranty	<input type="checkbox"/> Take to Office			
<input type="checkbox"/> Travelling	<input type="checkbox"/> Service Warranty	<input type="checkbox"/> Wait for Parts			
<input type="checkbox"/> Spare Parts	<input type="checkbox"/> Spare Parts Warranty	<input type="checkbox"/> In Progress			
<input type="checkbox"/> Other	<input type="checkbox"/> Service Contract	<input type="checkbox"/> Other			

TIME SPENT (HOURS)

YEAR	2023								TOTAL HOURS	TRAVELING DETAILS	
MONTH	6									TRAVEL BY	-
DATE	21									FROM	-
SERVICE TIME	4								4	TO	-
OVERTIME	-								-	TOTAL ROUND TRIP	-
TRAVELING TIME	-								-	DISTANCE (KM.)	-
TOTAL HOURS	4								4		

SERVICE CREW

NAME		NAME	
1.	Chamaiporn Vongchaiee	3.	
2.		4.	

CUSTOMER'S NAME	CUSTOMER'S SIGNATURE	DATE



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DOC. NUMBER CMV-S23-0034

SERVICE REPORT

REPORT DATE June 21, 2023

EQUIPMENT: Multi Water Quality Checker, U-5000G	SERIAL NUMBER / TAG NUMBER RAAGSEN3	BRAND / MANUFACTURER HORIBA
CUSTOMER NAME: IRPC PUBLIC COMPANY LIMITED	LOCATION: rayong	JOB NUMBER / REQUESTED NUMBER JID2300281-002

SCOPE OF WORK / REASON FOR VISIT

Repair and Calibration

FOUND FAILURE & CORRECTIVE ACTION DETAILS

- ตรวจสอบสภาพเครื่อง **Multi Water Quality Checker**
 - Meter Model: U-5000G S/N: RAAGSEN3 สามารถใช้งานได้ปกติ
 - Probe Model: U-53 S/N: V39CGM6U พบว่า **Sensor Turbidity** ไม่สามารถใช้งานได้
 - Sensor pH,COND,ORP,DO ใช้งานได้ปกติ
- ทำการ **Cleaning sensor** ทุก parameter
 - เติม Internal Solution (KCl) ใน Reference sensor
- ปรับเทียบ **Auto Calibration** ด้วย **Buffer pH 4**
 - พบว่าสามารถปรับเทียบค่าผ่าน คือ pH , COND, ORP, Temp, DO and Depth
- ปรับเทียบ **Manual Calibration 2 จุด (zero , span)**
 - พบว่าสามารถปรับเทียบค่าผ่าน คือ pH , COND,ORP, Temp, DO and Depth

สรุป : เครื่อง **Multi Water Quality Checker Meter Model: U-5000G S/N: RAAGSEN3** และ
Sensor Model: U-53 S/N: V39CGM6U สามารถใช้งานได้ตามปกติ ยกเว้น **Sensor Turbidity**

WORK CONCLUSION

<input checked="" type="checkbox"/> COMPLETED		<input type="checkbox"/> IN COMPLETED	PARTS REPLACEMENT		
<input checked="" type="checkbox"/> CHARGE	<input type="checkbox"/> NO CHARGE		PARTS NAME	P/N	QTY.
<input checked="" type="checkbox"/> Service Fee	<input type="checkbox"/> Project Warranty	<input type="checkbox"/> Take to Office			
<input type="checkbox"/> Travelling	<input type="checkbox"/> Service Warranty	<input type="checkbox"/> Wait for Parts			
<input type="checkbox"/> Spare Parts	<input type="checkbox"/> Spare Parts Warranty	<input type="checkbox"/> In Progress			
<input type="checkbox"/> Other	<input type="checkbox"/> Service Contract	<input type="checkbox"/> Other			

TIME SPENT (HOURS)

YEAR	2023							TOTAL HOURS	TRAVELING DETAILS	
MONTH	6									
DATE	21								TRAVEL BY	-
SERVICE TIME	4							4	FROM	-
OVERTIME	-							-	TO	-
TRAVELING TIME	-							-	TOTAL ROUND TRIP	-
TOTAL HOURS	4							4	DISTANCE (KM.)	-

SERVICE CREW

NAME		NAME	
1.	Chamaiporn Vongchailee	3.	
2.		4.	

CUSTOMER'S NAME	CUSTOMER'S SIGNATURE	DATE



Certificate No.: CP20230383EA

Calibration Report

3. Function : Total distortion + noise

Normal Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value (%)	Acceptance limit ^[5] (%)
94	1000	1.40	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: [1] The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

[2] The deviated value is the absolute value of the difference in percent between the measured value

and the corresponding specified frequency.

[3] The acceptance limit is for the deviated value.

[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

[5] The acceptance limit is for the Measured value.

Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.

2. Acceptance limit was IEC 60942:2017 Class 1.

3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230383EA

Calibration Report

3. Function : Total distortion + noise

Normal Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value (%)	Acceptance limit ^[5] (%)
94	1000	1.40	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: [1] The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

[2] The deviated value is the absolute value of the difference in percent between the measured value

and the corresponding specified frequency.

[3] The acceptance limit is for the deviated value.

[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

[5] The acceptance limit is for the Measured value.

Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.

2. Acceptance limit was IEC 60942:2017 Class 1.

3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

มูลนิธิห้ไฟฟ้าและอิเล็กทรอนิกส์
เพื่อการพัฒนาอุตสาหกรรม

Certificate No.: CP20230383EA

Calibration Report

3. Function : Total distortion + noise

Normal Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value ^(d) (%)	Acceptance limit ⁽⁵⁾ (%)
94	1000	1.40	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: [1] The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

[2] The deviated value is the absolute value of the difference in percent between the measured value

and the corresponding specified frequency.

[3] The acceptance limit is for the deviated value.

[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

[5] The acceptance limit is for the Measured value.

Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.

2. Acceptance limit was IEC 60942:2017 Class 1.

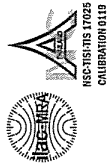
3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT
9/15 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280
Tel: 166 2109 4860 Fax: 166 2324 0917



NSC-005 Ed.1
CALIBRATION

Certificate No.: CP20230383EA
Operation No.: CP2023100010

Certificate of Calibration

Equipment: Sound Calibrator

Manufacturer: RION

Model/Type: NC-74

Serial No.: 34536115

ID No.:

Customer: IRPC Public Company Limited.

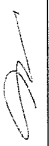
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungtem,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023

Calibrated Date: 30 October 2023

Issued Date: 31 October 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230383EA

Calibration Report

Equipment: Sound Calibrator

Manufacturer: RION

Model/Type: NC-74

Serial No.: 34536115

ID No.:

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 15) %

Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-

IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Waveform Generator	33511B	MY52302264	CK20230039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	000136E	E1U225466	2 December 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance limit ^[3] (dB)
1000	94	94.10	0.10	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[2] (%)	Acceptance limit ^[3] (%)
94	1000	1002.76	0.28	±0.70



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230383EA

Calibration Report

3. Function : Total distortion + noise

Normal Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value (%)	Acceptance limit ^[5] (%)
94	1000	1.40	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: [1] The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

[2] The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.

[3] The acceptance limit is for the deviated value.

[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

[5] The acceptance limit is for the Measured value.

Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.

2. Acceptance limit was IEC 60942:2017 Class 1.

3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230383EA

Calibration Report

3. Function : Total distortion + noise

Sound Pressure level (dB)	Nominal Frequency (Hz)	Measured value (%)	Acceptance limit ^[5] (%)
94	1000	1.40	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: (1) The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

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(3) The acceptance limit is for the deviated value.

(4) The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

(5) The acceptance limit is for the Measured value.

Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.


2. Acceptance limit was IEC 60942:2017 Class 1.

3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

Page 1 of 3

F-CAL-004 Ed.1

Equipment:	Sound Calibrator
Manufacturer:	RION
Model/Type:	NC-74
Serial No.:	345361115
ID No.:	-
Ambient Temperature:	(23 ± 2) °C
Relative Humidity:	(50 ± 15) %
Pressure:	(101.3 ± 1.5) kPa
Method of Calibration :-	
IEC 60942:2017	

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AK-2024-22	6 November 2023
2) Waveform Generator	335118	MY52302264	CC-2024-30039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	000136E	E1U225466	2 December 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F06400002	CL1-P2300024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit ⁽³⁾ (dB)
1000	94	94,10	0,10	±0,25

2. Function : f:frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Acceptance limit (%)
94	1000	1002.76	0.28	±0.70



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230383EA

Calibration Report

3. Function : Total distortion + noise

Normal Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	1.40	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: [1] The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

[2] The deviated value is the absolute value of the difference in percent between the measured value

and the corresponding specified frequency.

[3] The acceptance limit is for the deviated value.

[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

[5] The acceptance limit is for the Measured value.

Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.

2. Acceptance limit was IEC 60942:2017 Class 1.

3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



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FOUNDATION FOR INDUSTRIAL DEVELOPMENT
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Tel: +66 2709 4860 Fax: +66 2324 0917



NIST
CALIBRATION 015

Certificate No.: CP20230382EA
Operation No.: CP2023100009

Certificate of Calibration

Equipment: Sound Calibrator

Manufacturer: RION

Model/Type: NC-74

Serial No.: 34904949

ID No.: -

Customer: IRPC Public Company Limited.


Address: 299 Moo 5, Sukhumvit Rd., Tambon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023

Calibrated Date: 30 October 2023

Issued Date: 31 October 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT

ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230382EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34904949
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Waveform Generator	33511B	MY52302264	CK20230039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	000136E	E1U225466	2 December 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
1000	94	94.11	0.11	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Acceptance limit (%)
94	1000	1002.52	0.25	±0.70



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Certificate No.: CP20230382EA

Calibration Report

3. Function : Total distortion + noise			
Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value (%)	Acceptance limit (%)
94	1000	1.45	2.50

Uncertainty of measurement		
Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

- Note:
- [1] The deviated value is the absolute value of the difference between the measured value and the corresponding specified sound pressure level.
 - [2] The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.
 - [3] The acceptance limit is for the deviated value.
 - [4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.
 - [5] The acceptance limit is for the Measured value.
- Remarks:
- 1. Using the 1/2-inch microphone adaptor NC-74-002.
 - 2. Acceptance limit was IEC 60942:2017 Class 1.
 - 3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.
 - 4. The coverage factor $k = 2.00$

-- End of Report --



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Certificate No.: CP20230382EA
Operation No.: CP2023100009

Certificate of Calibration

Equipment: Sound Calibrator
Manufacturer: RICON
Model/Type: NC-74
Serial No.: 34904949
ID No.:

Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023
Calibrated Date: 30 October 2023
Issued Date: 31 October 2023
Calibrated by: Ms. Juntaporn Kunhakom

Approved by: (Mr. Sittichai Swaksuriyawong)
Group Manager

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230382EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: RICON
Model/Type: NC-74
Serial No.: 34904949
ID No.:
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Waveform Generator	33511B	MY52302264	CK20230039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	000136E	E1U225466	2 December 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance limit ^[3] (dB)
Frequency (Hz) 1000	94	94.11	0.11	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB) 94	Specified Frequency (Hz) 1000	Measured value (Hz) 1002.52	Deviated value ^[2] (%) 0.25	Acceptance limit ^[3] (%) ±0.70
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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230382EA

Calibration Report

3. Function : Total distortion + noise	Sound Pressure level (dB)	Nominal Frequency (Hz)	Measured value ^(d) (%)	Acceptance limit ⁽⁵⁾ (%)
94		1000	1.45	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: (1) The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

(2) The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.

(3) The acceptance limit is for the deviated value.

(4) The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

(5) The acceptance limit is for the Measured value.

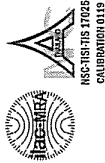
Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.

2. Acceptance limit was IEC 60942:2017 Class 1.

3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$


-- End of Report --



Certificate No.: CP20230382EA
Operation No.: CP2023100009

Certificate of Calibration

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34904949
ID No.: -
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnarn,
Amphor Muang, Rayong 21000
Received Date: 24 October 2023
Calibrated Date: 30 October 2023
Issued Date: 31 October 2023
Calibrated by: Ms. Juntaporn Kunhakorn

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

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Certificate No.: CP20230382EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34904949
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Waveform Generator	33511B	MY52302264	CK20230039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	000136E	E1U225466	2 December 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
1000	94	94.11	0.11	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Acceptance limit (%)
94	1000	1002.52	0.25	±0.70



ELECTRICAL AND ELECTRONICS INSTITUTE
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Certificate No.: CP20230382EA

Calibration Report

3. Function : Total distortion + noise

Nominal Sound Pressure Level (dB)	Nominal Frequency (Hz)	Measured value ⁽⁴⁾ (%)	Acceptance limit ⁽⁵⁾ (%)
94	1000	1.45	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note:

- [1] The deviated value is the absolute value of the difference between the measured value and the corresponding specified sound pressure level.
[2] The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.
[3] The acceptance limit is for the deviated value.
[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.
[5] The acceptance limit is for the Measured value.
- Remarks: 1. Using the 1/2-inch microphone adaptor MC-74-002.
2. Acceptance limit was IEC 60942:2017 Class 1.
3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.
4. The coverage factor $k = 2.00$

-- End of Report --



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AS-181818 17225
CALIBRATION 0119

Certificate No.: CP20230382EA
Operation No.: CP2023100009

Certificate of Calibration

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34904949
ID No.:
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023
Calibrated Date: 30 October 2023
Issued Date: 31 October 2023
Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230382EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34904949
ID No.:
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Waveform Generator	33511B	MY52302264	CK20230039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	000136E	E1U225466	2 December 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit (dB)
1000	94	94.11	0.11	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value (Hz)	Acceptance limit (Hz)
94	1000	1002.52	0.25	±0.70



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Certificate No.: CP20230382EA

Calibration Report

3. Function : Total distortion + noise

Sound Pressure level (dB)	94	Nominal Frequency (Hz)	1000	Measured value (a)	1.45	Acceptance limit (b)	2.50
Sound Pressure level							

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: [1] The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

[2] The deviated value is the absolute value of the difference in percent between the measured value

and the corresponding specified frequency.

[3] The acceptance limit is for the deviated value.

[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

[5] The acceptance limit is for the Measured value.

Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.

2. Acceptance limit was IEC 60942:2017 Class 1.

3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



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MEASURING INSTRUMENT
CALIBRATION

Certificate No.: CP20230382EA
Operation No.: CP2023100009

Certificate of Calibration

Equipment: Sound Calibrator

Manufacturer: RION

Model/Type: NC-74

Serial No.: 34904949

ID No.:

Customer: IRPC Public Company Limited.


Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023

Calibrated Date: 30 October 2023

Issued Date: 31 October 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230382EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34904949
ID No.:
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	278749C	AA-1024-22	6 November 2023
2) Waveform Generator	33511B	MY52302264	CIQ20230039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	000136E	E1U225466	2 December 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance limit ^[3] (dB)
1000	94	94.11	0.11	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[2] (%)	Acceptance limit ^[3] (%)
94	1000	1002.52	0.25	±0.70



Certificate No.: CP20230382EA

Calibration Report

3. Function : Total distortion + noise

Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	1.45	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note: [1] The deviated value is the absolute value of the difference between the measured value

and the corresponding specified sound pressure level.

[2] The deviated value is the absolute value of the difference in percent between the measured value

and the corresponding specified frequency.

[3] The acceptance limit is for the deviated value.

[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.

[5] The acceptance limit is for the Measured value.

Remarks: 1. Using the 1/2-inch microphone adaptor NC-74-002.

2. Acceptance limit was IEC 60942:2017 Class 1.

3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



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Tel: +66 2109 4860 Fax: +66 2324 0917



NIST-USA
CALIBRATION 0119

Certificate No.: CP20230382EA
Operation No.: CP2023100009

Certificate of Calibration

Equipment: Sound Calibrator

Manufacturer: RION

Model/Type: NC-74

Serial No.: 34904949

ID No.:

Customer: IRPC Public Company Limited.


Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023

Calibrated Date: 30 October 2023

Issued Date: 31 October 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Silichai Swaksunyawong)
Group Manager

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มูลนิธิเพื่อการพัฒนาอุตสาหกรรม

Certificate No.: CP20230382EA

Calibration Report

Equipment: Sound Calibrator
Manufacturer: RION
Model/Type: NC-74
Serial No.: 34904949
ID No.:
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 60942:2017

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Waveform Generator	33511B	MY52302264	CK20230039EA	27 June 2024
3) Audio Analyzing DMM	2015-P	000136F	E1U225466	2 December 2023
4) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024

2. This result of calibration is found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

1. Function : Sound pressure level

Normal Frequency (Hz)	Specified Sound Pressure level (dB)	Measured value (dB)	Deviated value ^[1] (dB)	Acceptance limit ^[3] (dB)
1000	94	94,11	0.11	±0.25

2. Function : Frequency

Normal Sound Pressure level (dB)	Specified Frequency (Hz)	Measured value (Hz)	Deviated value ^[2] (%)	Acceptance limit ^[3] (%)
94	1000	1002.52	0.25	±0.10



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

สถาบันพัฒนาอุตสาหกรรม
อิเล็กทรอนิกส์แห่งประเทศไทย

Certificate No.: CP20230382EA

Calibration Report

3. Function : Total distortion + noise

Sound Pressure level (dB)	Normal Frequency (Hz)	Measured value ^[4] (%)	Acceptance limit ^[5] (%)
94	1000	1.45	2.50

Uncertainty of measurement

Function	Uncertainty	Maximum-permitted uncertainty of measurement
Sound pressure level	0.10 dB	0.15 dB
Frequency	0.10 %	0.20 %
Total distortion + noise	0.40 %	0.50 %

Note:

- [1] The deviated value is the absolute value of the difference between the measured value and the corresponding specified sound pressure level.
[2] The deviated value is the absolute value of the difference in percent between the measured value and the corresponding specified frequency.
[3] The acceptance limit is for the deviated value.
[4] The measured value is the total distortion + noise, measured over the frequency range from 20 Hz to 20 kHz.
[5] The acceptance limit is for the Measured value.

Remarks:

1. Using the 1/2-inch microphone adaptor NC-74-002.
2. Acceptance limit was IEC 60942:2017 Class 1.
3. Maximum-permitted uncertainty of measurement was IEC 60942:2017 Class 1.
4. The coverage factor $k = 2.00$

-- End of Report --



Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280

MSC-TISI-TIS 17025
CALIBRATION 0119

Approved by: _____
(Mr. Sittichai Swaksuriyawong)
Group Manager

Page 1 of 6

F-CAL-004 Ed.1



Certificate No.: CP20230373EA

Equipment:	Sound Level Meter
Manufacturer:	01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)
Model/Type:	CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.:	11442 (Meter), 330591 (Microphone), 1707308 (Preamplifier)
ID No.:	11442 (Extension cable)
Ambient Temperature:	(23 ± 2) °C
Relative Humidity:	(50 ± 15) %
Pressure:	((101.3 ± 1.5) kPa
Method of Calibration :-	

Condition of this result of calibration

1. Reference standards instrument :-

Instrument

	Instrument	Model	Serial No.	Cert. No.	Due Date
1)	Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2)	Arbitrary Function Generator	AFG5021	C010063	CK20230040EA	26 June 2024
3)	Programmable Attenuator	PA5	2755	EF-0034-22	30 October 2023
4)	6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5)	Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024
6)	Pressure humidity and Temperature Transmitter	PTU301	F0640003	CL1-P230032 CD20230197EA	4 April 2024 23 July 2024
7)	Performance Audio Analyzer	UB903B	MY56510003	CB20230038EA CK20230072EA	14 February 2024 13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- National Institute of Metrology (Thailand)

-Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Correction for Microphone Model 40CD (dB)	Effective Calibration Level (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
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E-CAL-005 Ed 1



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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230373EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
16.8

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	10.1
C-weighting	10.0
Z-weighting	18.1

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.0	-0.2	-0.1
1000	0.2	0.2	0.2
8000	-0.9	-0.9	-0.4
			+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.2	-0.1	0.2
250	0.1	0.1	0.2
500	0.2	0.2	0.2
1000	0.2	0.2	0.2
2000	0.2	0.1	0.1
4000	0.9	0.8	0.9
8000	-0.1	0.0	0.4
16000	-9.8	-9.6	-4.3
			+1.5; -2.5
			+2.5; -16.0

Certificate No.: CP20230373EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.8	-0.2	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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Certificate No.: CP20230373EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	116.9	-0.1	+1.0 ; -1.5
	0.25	107.8	-0.2	+1.0 ; -3.0
Slow	200	127.6	0.0	±0.5
	2	108.0	0.0	+1.0 ; -3.0
	200	128.0	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -1.5
	0.25	98.8	-0.2	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.9	1.5	±2.0
Positive half cycle	132.4	131.6	-0.8	±1.0
Negative half cycle	132.4	131.6	-0.8	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.6	±1.5
138.4	139.0		

Certificate No.: CP20230373EA

Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.

2. The acceptance limit is for the deviated value.

3. Acceptance limits was IEC61672-3:2013 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



Certificate No.: CP20230373EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Frequency	Measured value
Weighting	(dB)
A-weighting	10.1
C-weighting	10.0
Z-weighting	18.1

2.2 Microphone replaced by the electrical input signal device

Frequency	Measured value
Weighting	(dB)
A-weighting	10.1
C-weighting	10.0
Z-weighting	18.1

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.0	-0.2	-0.1
1000	0.2	0.2	0.2
8000	-0.9	-0.9	-0.4

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.2	-0.1	0.2
250	0.1	0.1	0.2
500	0.2	0.2	0.2
1000	0.2	0.2	0.2
2000	0.2	0.1	0.1
4000	0.9	0.8	0.9
8000	-0.1	0.0	0.4
16000	-9.8	-9.6	-4.3

Certificate No.: CP20230373EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency	Measured value	Deviated value	Acceptance limits
Weighting	(dB)	(dB)	(dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time	Measured value	Deviated value	Acceptance limits
Weighting	(dB)	(dB)	(dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.8	-0.2	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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Certificate No.: CP20230373FA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	+0.8
89.0	89.0	0.0	+0.8
84.0	84.0	0.0	+0.8
79.0	79.0	0.0	+0.8
74.0	74.0	0.0	+0.8
69.0	69.0	0.0	+0.8
64.0	64.0	0.0	+0.8
59.0	59.0	0.0	+0.8
54.0	54.0	0.0	+0.8
49.0	49.0	0.0	+0.8
44.0	44.0	0.0	+0.8
39.0	39.0	0.0	+0.8
34.0	33.8	-0.2	+0.8
29.0	28.8	-0.2	+0.8
24.0	24.0	0.0	+0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	+0.5
	2	116.9	-0.1	+1.0 ; -1.5
Slow	0.25	107.8	-0.2	+1.0 ; -3.0
	200	127.6	0.0	+0.5
LAE	2	108.0	0.0	+1.0 ; -3.0
	200	128.0	0.0	+0.5
	2	108.0	0.0	+1.0 ; -1.5
	0.25	98.8	-0.2	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.9	1.5	±2.0
Positive half cycle	132.4	131.6	-0.8	±1.0
Negative half cycle	132.4	131.6	-0.8	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.6	±1.5
138.4	139.0		

Certificate No.: CP20230373FA

Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks:

1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k = 2.00$

-- End of Report --



975 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,

Tel: +66 2709 4860 Fax: +66 2324 0917

Certificate of Calibration

Received Date: 22 September 2023

Calibrated Date: 18 - 19 October 2023

Issued Date: 20 October 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: _____
(Mr. Sittichai Swaksuriyawong)
Group Manager

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.

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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230373EA

Calibration Report

Equipment: Sound Level Meter
Model: 01dB (Microphone), 01dB (Preamplifier)
Mode/Type: CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.: 11442 (Meter), 330591 (Microphone), 1707308 (Preamplifier)
ID No.: 11442 (Extension cable)
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-

IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument

	Instrument	Model	Serial No.	Cert. No.	Due Date
1)	Standard Microphone	4180	Z787490	AA-1024-22	6 November 2023
2)	Arbitrary Function Generator	AFG5021	C010063	CK20230040EA	26 June 2024
3)	Programmable Attenuator	PA5	Z715	EF-0034-22	30 October 2023
4)	6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5)	Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024
6)	Pressure humidity and Temperature Transmitter	PTU301	F0640003	CL1-P230032 CD20230197EA	4 April 2024 23 July 2024
7)	Performance Audio Analyzer	U8903B	MY56510003	CB20230038EA CK20230072EA	14 February 2024 13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- National Institute of Metrology (Thailand)

-Electrical and Electronics Institute: NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Correction for Microphone Model 40CD (dB)	Effective Calibration Level (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
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E-CAL-005 Ed 1



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT



ELECTRICAL AND ELECTRONICS INSTITUTE
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Certificate No.: CP20230373EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
16.8

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	10.1
C-weighting	10.0
Z-weighting	18.1

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
125	0.0	-0.2	-0.1	±1.0
1000	0.2	0.2	0.2	±0.7
8000	-0.9	-0.9	-0.4	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
63	-0.1	-0.1	0.0	±1.0
125	0.2	-0.1	0.2	±1.0
250	0.1	0.1	0.2	±1.0
500	0.2	0.2	0.2	±1.0
1000	0.2	0.2	0.2	±0.7
2000	0.2	0.1	0.1	±1.0
4000	0.9	0.8	0.9	±1.0
8000	-0.1	0.0	0.4	+1.5; -2.5
16000	-9.8	-9.6	-4.3	+2.5; -16.0

Certificate No.: CP20230373EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.8	-0.2	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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Certificate No.: CP20230373EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	116.9	-0.1	+1.0 ; -1.5
	0.25	107.8	-0.2	+1.0 ; -3.0
Slow	200	127.6	0.0	±0.5
	2	108.0	0.0	+1.0 ; -3.0
	200	128.0	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -1.5
	0.25	98.8	-0.2	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.9	1.5	±2.0
Positive half cycle	132.4	131.6	-0.8	±1.0
Negative half cycle	132.4	131.6	-0.8	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.6	±1.5
138.4	139.0		

Certificate No.: CP20230373EA

Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.

2. The acceptance limit is for the deviated value.

3. Acceptance limits was IEC61672-3:2013 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

NSC-1818:HS 17023
CALIBRATION 0119

Certificate No.: CP20230373EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: 01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)
Model/Type: CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.: 11442 (Meter), 330591 (Microphone), 1707308 (Preamplifier)
ID No.: 11442 (Extension cable)
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PA5	2755	EF-0034-22	30 October 2023
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU301	F0640003	CL1-P230032	4 April 2024
7) Performance Audio Analyzer	U8903B	MY56510003	CD20230197EA	23 July 2024
			CB20230038EA	14 February 2024
			CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
Reference standards instrument for Electrical function
- National Institute of Metrology (Thailand)
- Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Correction for Microphone Model 40CD (dB)	Effective Calibration Level (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
-	-	-	-	-	-

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NSC-1818:HS 17023
CALIBRATION 0119

Certificate No.: CP20230373EA
Operation No.: CP2023090019

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: 01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)
Model/Type: CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.: 11442 (Meter), 330591 (Microphone), 1707308 (Preamplifier)
ID No.: 11442 (Extension cable)
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnarn, Amphor Muang, Rayong 21000

Received Date: 22 September 2023

Calibrated Date: 18 - 19 October 2023

Issued Date: 20 October 2023

Calibrated by: Ms. Juntaporn Kunkhakom

Approved by: (Mr. Sittichai Swaksuriyawong)
Group Manager

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Certificate No.: CP20230373EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Frequency (Hz)	Measured value (dB)
16.8	

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	10.1
C-weighting	10.0
Z-weighting	18.1

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.0	-0.2	-0.1
1000	0.2	0.2	0.2
8000	-0.9	-0.9	-0.4

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.2	-0.1	0.2
250	0.1	0.1	0.2
500	0.2	0.2	0.2
1000	0.2	0.2	0.2
2000	0.2	0.1	0.1
4000	0.9	0.8	0.9
8000	-0.1	0.0	0.4
16000	-9.8	-9.6	-4.3

Certificate No.: CP20230373EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.8	-0.2	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	116.9	-0.1	+1.0 ; -1.5
Slow	0.25	107.8	-0.2	+1.0 ; -3.0
	200	127.6	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -3.0
	200	128.0	0.0	±0.5
	2	108.0	0.0	+1.0 ; -1.5
	0.25	98.8	-0.2	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.9	1.5	±2.0
Positive half cycle	132.4	131.6	-0.8	±1.0
Negative half cycle	132.4	131.6	-0.8	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.6	±1.5
138.4	139.0		

Certificate No.: CP20230373EA

Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k = 2.00$

-- End of Report --



Certificate No.: CP20230373EA

Calibration Report

Function : 2. Self-generated Noise

Frequency Weighting (dB)	Measured value (dB)
C-weighting	16.8

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting (dB)	Measured value (dB)
A-weighting	10.1
C-weighting	10.0
Z-weighting	18.1

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.0	-0.2	-0.1	±1.0
1000	0.2	0.2	0.2	±0.7
8000	-0.9	-0.9	-0.4	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	-0.1	-0.1	0.0	±1.0
125	0.2	-0.1	0.2	±1.0
250	0.1	0.1	0.2	±1.0
500	0.2	0.2	0.2	±1.0
1000	0.2	0.2	0.2	±0.7
2000	0.2	0.1	0.1	±1.0
4000	0.9	0.8	0.9	±1.0
8000	-0.1	0.0	0.4	+1.5; -2.5
16000	-9.8	-9.6	-4.3	+2.5; -16.0

Certificate No.: CP20230373EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Value (dB)	Deviated value (dB)		
94.0	94.0	0.0	0.0	±0.8
99.0	99.0	0.0	0.0	±0.8
104.0	104.0	0.0	0.0	±0.8
109.0	108.8	-0.2	-0.2	±0.8
114.0	113.8	-0.2	-0.2	±0.8
119.0	118.8	-0.2	-0.2	±0.8
124.0	123.8	-0.2	-0.2	±0.8
129.0	128.8	-0.2	-0.2	±0.8



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Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	116.9	-0.1	+1.0 ; -1.5
Slow	0.25	107.8	-0.2	+1.0 ; -3.0
	200	127.6	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -3.0
	200	128.0	0.0	±0.5
	2	108.0	0.0	+1.0 ; -1.5
	0.25	98.8	-0.2	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.9	1.5	±2.0
Positive half cycle	132.4	131.6	-0.8	±1.0
Negative half cycle	132.4	131.6	-0.8	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.6	±1.5
138.4	139.0		

Certificate No.: CP20230373EA

Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C-sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k = 2.00$

-- End of Report --



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Certificate No.: CP20230373EA

Calibration Report

Sound Level Meter
 01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)
Manufacturer: CUBE (Meter), 40CD (Microphone) PRE22 (Preamplifier)
Model/Type: 11442 (Meter), 330591 (Microphone), 1707308 (Preamplifier)
Serial No.: 11442 (Extension cable)
ID No.: (23 ± 2) °C
Ambient Temperature: (50 ± 15) %
Relative Humidity: (101.3 ± 1.5) kPa
Pressure:

Method of Calibration :-

IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

	Instrument	Model	Serial No.	Cert. No.	Due Date
1)	Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2)	Arbitrary Function Generator	AFG2021	C010063	CK202300040EA	26 June 2024
3)	Programmable Attenuator	PA5	27155	EF-0034-22	30 October 2023
4)	16.5 Digit precision multimeter	8846A	9610014	CB2022020223EA	14 November 2023
5)	Pressure humidity and Temperature Transmitter	PTU301	F06400002	CL1-P2300024 CD20230196EA	20 March 2024 23 July 2024
6)	Pressure humidity and Temperature Transmitter	PTU301	F06400003	CL1-P2300032 CD20230197EA	4 April 2024 23 July 2024
7)	Performance Audio Analyzer	U8903B	MY56510003	CB20230038EA CK20230072EA	14 February 2024 13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

National Institute of Metrology (Thailand)

Electrical and Electronics Institute; NSC Accredited Calibration No 01119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic signal (dB)	Correction for Microphone Model 40CD (dB)	Effective Calibration Level (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
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Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Frequency Weighting (dB)	Measured value (dB)
	16.8

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting (dB)	Measured value (dB)
A-weighting	10.1
C-weighting	10.0
Z-weighting	18.1

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.0	-0.2	-0.1	±1.0
1000	0.2	0.2	0.2	±0.7
8000	-0.9	-0.9	-0.4	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	-0.1	-0.1	0.0	±1.0
125	0.2	-0.1	0.2	±1.0
250	0.1	0.1	0.2	±1.0
500	0.2	0.2	0.2	±0.7
1000	0.2	0.2	0.1	±1.0
2000	0.2	0.1	0.9	±1.0
4000	0.9	0.8	0.4	+1.5; -2.5
8000	-0.1	0.0	-0.4	+2.5; -16.0
16000	-9.8	-9.6	-4.3	

Certificate No.: CP20230373EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.8	-0.2	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



Certificate No.: CP20230373EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	+0.8
89.0	89.0	0.0	+0.8
84.0	84.0	0.0	+0.8
79.0	79.0	0.0	+0.8
74.0	74.0	0.0	+0.8
69.0	69.0	0.0	+0.8
64.0	64.0	0.0	+0.8
59.0	59.0	0.0	+0.8
54.0	54.0	0.0	+0.8
49.0	49.0	0.0	+0.8
44.0	44.0	0.0	+0.8
39.0	39.0	0.0	+0.8
34.0	33.8	-0.2	+0.8
29.0	28.8	-0.2	+0.8
24.0	24.0	0.0	+0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	+0.5
	2	116.9	-0.1	+1.0 ; -1.5
	0.25	107.8	-0.2	+1.0 ; -3.0
Slow	200	127.6	0.0	+0.5
	2	108.0	0.0	+1.0 ; -3.0
	0.25	128.0	0.0	+0.5
LAE	200	108.0	0.0	+1.0 ; -1.5
	0.25	98.8	-0.2	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.9	1.5	+2.0
Positive half cycle	132.4	131.6	-0.8	±1.0
Negative half cycle	132.4	131.6	-0.8	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.6	±1.5
138.4	139.0		

Certificate No.: CP20230373EA

Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.

2. The acceptance limit is for the deviated value.

3. Acceptance limits was IEC61672-3:2013 Class 1.

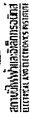
4. The coverage factor $k = 2.00$

-- End of Report --



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Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone installed

Measured value (dB)
17.5

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	11.7
C-weighting	11.5
Z-weighting	19.3

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.0	-0.1	0.0	±1.0
1000	0.1	0.1	0.1	±0.7
8000	-1.2	-1.2	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	0.0	-0.2	0.1	±1.0
125	0.2	-0.1	0.0	±1.0
250	0.2	0.1	0.1	±1.0
500	0.3	0.1	0.2	±1.0
1000	0.2	0.2	0.2	±0.7
2000	0.2	0.1	0.1	±1.0
4000	0.8	0.8	0.8	±1.0
8000	0.0	-0.1	0.4	+1.5; -2.5
16000	-9.8	-9.7	-4.3	+2.5; -16.0

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Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.9	-0.1	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	117.0	0.0	+1.0 ; -1.5
	0.25	107.8	-0.2	+1.0 ; -3.0
Slow	200	127.6	0.0	±0.5
	2	108.0	0.0	+1.0 ; -3.0
	0.25	128.0	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -1.5
	0.25	99.0	0.0	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.6	1.2	±2.0
Positive half cycle	132.4	131.5	-0.9	±1.0
Negative half cycle	132.4	131.5	-0.9	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.4	±1.5
139.2	139.6		

Certificate No.: CP20230372EA

Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k = 2.00$

-- End of Report --



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Phrack Sa, Mueang Samut Prakan, Samut Prakan 10280

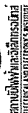
MSC-YIS-YIS 17025
CALIBRATION 0119

Operation No.: CP2023090018

Group Manager

with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.

F-CAL-004 Ed.1



1. Reference standards instrument :-

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Electrical and Electronics Institute; NSC Accredited Calibration No.01119

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Correction for Microphone Model 40CD (dB)	Effective Calibration Level (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
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F-CAL-005 Fd11



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Certificate No.: CP20230372EA

Calibration Report

Function : 2. Self-generated Noise

Frequency (Hz)	Measured value (dB)
125	17.5

2.2 Microphone replaced by the electrical input signal device

Frequency (Hz)	Measured value (dB)
125	11.7
1000	11.5
8000	19.3

Function : 3. Acoustical signal tests of frequency weightings (With Windscreens)
Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.0	-0.1	0.0	±1.0
1000	0.1	0.1	0.1	±0.7
8000	-1.2	-1.2	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	0.0	-0.2	0.1	±1.0
125	0.2	-0.1	0.0	±1.0
250	0.2	0.1	0.1	±1.0
500	0.3	0.1	0.2	±1.0
1000	0.2	0.2	0.2	±0.7
2000	0.2	0.1	0.1	±1.0
4000	0.8	0.8	0.8	±1.0
8000	0.0	-0.1	0.4	+1.5; -2.5
16000	-9.8	-9.7	-4.3	+2.5; -16.0



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Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.9	-0.1	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	117.0	0.0	+1.0 ; -1.5
Slow	0.25	107.8	-0.2	+1.0 ; -3.0
	200	127.6	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -3.0
	200	128.0	0.0	±0.5
	2	108.0	0.0	+1.0 ; -1.5
	0.25	99.0	0.0	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.6	1.2	±2.0
Positive half cycle	132.4	131.5	-0.9	±1.0
Negative half cycle	132.4	131.5	-0.9	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.4	±1.5
139.2	139.6		

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Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.

2. The acceptance limit is for the deviated value.

3. Acceptance limits was IEC61672-3:2013 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



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Calibration Report

Function : 2. Self-generated Noise

Frequency (Hz)	Measured value (dB)
17.5	

2.2 Microphone replaced by the electrical input signal device

Frequency (Hz)	Measured value (dB)
17.5	11.7
A-weighting	11.5
C-weighting	19.3

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.0	-0.1	0.0
1000	0.1	0.1	0.1
8000	-1.2	-1.2	-0.7

Function : 4. Electrical signal tests of frequency weightings

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	0.0	-0.2	0.1
125	0.2	-0.1	0.0
250	0.2	0.1	0.1
500	0.3	0.1	0.2
1000	0.2	0.2	0.2
2000	0.2	0.1	0.1
4000	0.8	0.8	0.8
8000	0.0	-0.1	0.4
16000	-9.8	-9.7	-4.3

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Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency (Hz)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time (min)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.9	-0.1	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	117.0	0.0	+1.0 ; -1.5
	0.25	107.8	-0.2	+1.0 ; -3.0
Slow	200	127.6	0.0	±0.5
	2	108.0	0.0	+1.0 ; -3.0
	0.25	128.0	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -1.5
	0.25	99.0	0.0	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.6	1.2	±2.0
Positive half cycle	132.4	131.5	-0.9	±1.0
Negative half cycle	132.4	131.5	-0.9	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	135.2	0.4	±1.5
Negative one-half cycle	139.6		

Certificate No.: CP20230372EA

Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.20	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.

2. The acceptance limit is for the deviated value.

3. Acceptance limits was IEC61672-3:2013 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



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NECTEC 17023
CALIBRATION 0119

Certificate No.: CP20230372EA
Operation No.: CP2023090018

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: 01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)
Model/Type: CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.: 14257 (Meter), 494247 (Microphone), 2138114 (Preampfier)
ID No.: 14257 (Extension cable)
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 22 September 2023
Calibrated Date: 18 - 19 October 2023
Issued Date: 20 October 2023
Calibrated by: Ms. Juntaporn Kunhakorn

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230372EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: 01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)
Model/Type: CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.: 14257 (Meter), 494247 (Microphone), 2138114 (Preampfier)
ID No.: 14257 (Extension cable)
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) hPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PA5	2755	EF-0034-22	30 October 2023
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU301	F0640003	CD20230196EA	23 July 2024
7) Performance Audio Analyzer	U8903B	MY56510003	CD20230197EA	4 April 2024
			CB20230038EA	23 July 2024
			CK20230072EA	14 February 2024
				13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
 - National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
 - National Institute of Metrology (Thailand)
 - Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Correction for Microphone Model 40CD (dB)	Effective Calibration Level (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
-	-	-	-	-	-



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230372EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
17.5

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	11.7
C-weighting	11.5
Z-weighting	19.3

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.0	-0.1	0.0	±1.0
1000	0.1	0.1	0.1	±0.7
8000	-1.2	-1.2	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	0.0	-0.2	0.1	±1.0
125	0.2	-0.1	0.0	±1.0
250	0.2	0.1	0.1	±1.0
500	0.3	0.1	0.2	±1.0
1000	0.2	0.2	0.2	±0.7
2000	0.2	0.1	0.1	±1.0
4000	0.8	0.8	0.8	±1.0
8000	0.0	-0.1	0.4	+1.5; -2.5
16000	-9.8	-9.7	-4.3	+2.5; -16.0



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230372EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.9	-0.1	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230372EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	117.0	0.0	+1.0 ; -1.5
Slow	0.25	107.8	-0.2	+1.0 ; -3.0
	200	127.6	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -3.0
	200	128.0	0.0	±0.5
	2	108.0	0.0	+1.0 ; -1.5
	0.25	99.0	0.0	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.6	1.2	±2.0
Positive half cycle	132.4	131.5	-0.9	±1.0
Negative half cycle	132.4	131.5	-0.9	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.4	±1.5
139.2	139.6		

Certificate No.: CP20230372EA

Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.

2. The acceptance limit is for the deviated value.

3. Acceptance limits was IEC61672-3:2013 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT
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HSC-181515 17025
CALIBRATION 0119

Certificate No.: CP20230372EA
Operation No.: CP2023090018

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: 01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)
Model/Type: CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.: 14257 (Meter), 494247 (Microphone), 2138114 (Preamplifier)
ID No.: 14257 (Extension cable)
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 22 September 2023
Calibrated Date: 18 - 19 October 2023
Issued Date: 20 October 2023
Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

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The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k)
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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230372EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: 01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)
Model/Type: CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.: 14257 (Meter), 494247 (Microphone), 2138114 (Preamplifier)
ID No.: 14257 (Extension cable)
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2) Arbitrary Function Generator	AFG2021	C010063	CK20230000EA	26 June 2024
3) Programmable Attenuator	PA5	2755	EF-0034-22	30 October 2023
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU501	F0640002	CL1-P230024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU501	F0640003	CL1-P230032	23 July 2024
7) Performance Audio Analyzer	U8903B	MY56510003	CB20230197EA	4 April 2024
			CB20230038EA	14 February 2024
			CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
 - National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
 - National Institute of Metrology (Thailand)
 - Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Correction for Microphone Model 40CD (dB)	Effective Calibration Level (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
-	-	-	-	-	-



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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230372EA

Calibration Report

Function : 2. Self-generated Noise

Microphone Installed	Measured value (dB)
	17.5

2.2 Microphone replaced by the electrical input signal device

Frequency (Hz)	Measured value (dB)
A-weighting	11.7
C-weighting	11.5
Z-weighting	19.3

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.0	-0.1	0.0	±1.0
1000	0.1	0.1	0.1	±0.7
8000	-1.2	-1.2	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	0.0	-0.2	0.1	±1.0
125	0.2	-0.1	0.0	±1.0
250	0.2	0.1	0.1	±1.0
500	0.3	0.1	0.2	±1.0
1000	0.2	0.2	0.2	±0.7
2000	0.2	0.1	0.1	±1.0
4000	0.8	0.8	0.8	±1.0
8000	0.0	-0.1	0.4	+1.5; -2.5
16000	-9.8	-9.7	-4.3	+2.5; -16.0

Certificate No.: CP20230372EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
Laeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.3
109.0	108.9	-0.1	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



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FOUNDATION FOR INDUSTRIAL DEVELOPMENT



ELECTRICAL AND ELECTRONICS INSTITUTE
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Certificate No.: CP20230372EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	117.0	0.0	+1.0 ; -1.5
	0.25	107.8	-0.2	+1.0 ; -3.0
Slow	200	127.6	0.0	±0.5
	2	108.0	0.0	+1.0 ; -3.0
	0.25	128.0	0.0	±0.5
LAE	2	108.0	0.0	+1.0 ; -1.5
	0.25	99.0	0.0	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.6	1.2	±2.0
Positive half cycle	132.4	131.5	-0.9	±1.0
Negative half cycle	132.4	131.5	-0.9	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.4	±1.5
139.2	139.6		

Certificate No.: CP20230372EA

Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
- Free-field sound pressure response level	0.20	0.20
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.10	0.10
6) Long-Term Stability	0.20	0.30
7) Level Linearity on the reference level range	0.20	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.

2. The acceptance limit is for the deviated value.

3. Acceptance limits was IEC61672-3:2013 Class 1.

4. The coverage factor $k = 2.00$

-- End of Report --



Phraek Sa, Mueang Samut Prakan, Samut Prakan 10280

(5C-TISI-YIS 17025

CP20230372EA
CP2023090018

Certificate of Calibration

Sound Level Meter

01dB (Meter), G.R.A.S. (Microphone), 01dB (Preamplifier)

CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)

14257 (Meter), 494247 (Microphone), 2138114 (Preamplifier)

14257 (Extension cable)

RPC Public Company Limited.

299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

22 September 2023

18 - 19 October 2023

20 October 2023

Ms. Juntaporn Kunhakom

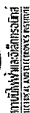
Approved by: _____
(Mr. Sittichai Swaksuriyawong)
Group Manager

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F-CAL-004 Ed.1



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

CP20230372EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: G.R.A.S. (Microphone), 01dB (Preamplifier)
Model/Type: CUBE (Meter), 40CD (Microphone), PRE22 (Preamplifier)
Serial No.: 14257 (Meter), 494247 (Microphone), 2138114 (Preamplifier)
ID No.: 14257 (Extension cable)
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-

EC 61672-3:2013.

Condition of this result of calibration

	Instrument	Model	Serial No.	Cert. No.	Due Date
1)	Standard microphone	4180	2787490	AA-1024-22	6 November 2023
2)	Arbitrary Function Generator	AFG2021	C010063	CK20230040E	26 June 2024
3)	Programmable Attenuator	PA5	2755	EF-0034-22	30 October 2023
4)	6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5)	Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024 CD20230196EA	20 March 2024 23 July 2024
6)	Pressure humidity and Temperature Transmitter	PTU301	F0640003	CL1-P230032 CD20230197EA	4 April 2024 23 July 2024
7)	Performance Audio Analyzer	U8903B	MY56510003	CB20230038EA CK20230072EA	14 February 2024 13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical

- National Institute of Metrology (Thailand)

- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Correction for Microphone Model 40CD (dB)	Effective Calibration Level (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
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5-CAL-005 Ed.1



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230372EA

Calibration Report

Function : 2. Self-generated Noise

Frequency (Hz)	Measured value (dB)
125	17.5

2.2 Microphone replaced by the electrical input signal device

Frequency (Hz)	Measured value (dB)
125	11.7
250	11.5
500	19.3

Function : 3. Acoustical signal tests of frequency weightings (With Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
125	0.0	-0.1	0.0	±1.0
250	0.1	0.1	0.1	±0.7
500	-1.2	-1.2	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
63	0.0	-0.2	0.1	±1.0
125	0.2	-0.1	0.0	±1.0
250	0.2	0.1	0.1	±1.0
500	0.3	0.1	0.2	±0.7
1000	0.2	0.2	0.2	±1.0
2000	0.2	0.1	0.1	±1.0
4000	0.8	0.8	0.8	±1.0
8000	0.0	-0.1	0.4	+1.5; -2.5
16000	-9.8	-9.7	-4.3	+2.5; -16.0

Certificate No.: CP20230372EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency (Hz)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
125	94.0	0.0	±0.2
250	94.0	0.0	±0.2
500	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time (min)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	108.9	-0.1	±0.8
114.0	113.8	-0.2	±0.8
119.0	118.8	-0.2	±0.8
124.0	123.8	-0.2	±0.8
129.0	128.8	-0.2	±0.8



Certificate No.: CP20230372EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
84.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.8	-0.2	±0.8
29.0	28.8	-0.2	±0.8
24.0	24.0	0.0	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	134.0	0.0	±0.5
	2	117.0	0.0	+1.0 ; -1.5
Slow	0.25	107.8	-0.2	+1.0 ; -3.0
	200	127.6	0.0	±0.5
	2	108.0	0.0	+1.0 ; -3.0
LAE	200	128.0	0.0	±0.5
	2	108.0	0.0	+1.0 ; -1.5
	0.25	99.0	0.0	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	133.4	134.6	1.2	±2.0
Positive half cycle	132.4	131.5	-0.9	±1.0
Negative half cycle	132.4	131.5	-0.9	±1.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.4	±1.5
139.2	139.6		

Certificate No.: CP20230372EA

Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	137.0	137.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. Indication at the calibration check frequency can not measured because customer does not provide a sound calibrator.
2. The acceptance limit is for the deviated value.
3. Acceptance limits was IEC61672-3:2013 Class 1.
4. The coverage factor $k = 200$

-- End of Report --



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Certificate No.: CP20230386EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone installed

Measured value (dB)
14.5

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	9.9
C-weighting	15.9
Z-weighting	21.9

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.4
1000	0.0	0.0	0.0
8000	-3.3	-3.4	-3.4
			Acceptance limits (dB)
			±1.5
			±1.0
			±5.0

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.0	-0.1	0.0
250	-0.1	-0.1	0.0
500	0.0	0.0	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.0	0.0
8000	0.1	0.1	0.0
			Acceptance limits (dB)
			±2.0
			±1.5
			±1.0
			±3.0
			±5.0

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

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Calibration Report

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability
Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.3

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
99.0	99.0	0.0	±1.1
104.0	104.0	0.0	±1.1
109.0	109.0	0.0	±1.1
114.0	114.0	0.0	±1.1
119.0	119.0	0.0	±1.1
124.0	124.0	0.0	±1.1
129.0	129.0	0.0	±1.1
130.0	130.0	0.0	±1.1
131.0	131.0	0.0	±1.1
132.0	132.0	0.0	±1.1
133.0	133.0	0.0	±1.1
134.0	134.0	0.0	±1.1
135.0	135.0	0.0	±1.1
136.0	136.0	0.0	±1.1
137.0	137.0	0.0	±1.1

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1



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Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	33.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±1.0
	2	109.0	0.0	+1.0 ; -2.5
	0.25	99.9	-0.1	+1.5 ; -5.0
Slow	200	119.6	0.0	±1.0
	2	100.0	0.0	+1.0 ; -5.0
	200	120.0	0.0	±1.0
LAE	2	100.0	0.0	+1.0 ; -2.5
	0.25	90.9	-0.1	+1.5 ; -5.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±3.0
Positive half cycle	124.4	124.1	-0.3	±2.0
Negative half cycle	124.4	124.1	-0.3	±2.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.0	±1.5
139.5	139.5		

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Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.3

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.

2. Acceptance limits was IEC61672-3:2013 Class 2.

3. The coverage factor $k = 2.00$

--- End of Report ---



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สถาบันพัฒนาและวิจัยการวัด
การประเมิน จาก MICROS ประทับ

Certificate No.: CP20230386EA

Calibration Report

Equipment: Sound Level Meter

Manufacturer: RION

ModelType: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)

Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preamplifier)

ID No.:

Ambient Temperature: $(23 \pm 2)^\circ\text{C}$

Relative Humidity:
(50 ± 15) %

Pressure:
(101.3 ± 1.5) kPa

Method of Calibration :-

IEC 61672-3:2013.

Condition of this result of calibration

	Instrument	Model	Serial No.	Cert. No.	Due Date
1)	Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2)	Arbitrary Function Generator	AFG201	C010063	CK20230040EA	26 June 2024
3)	Programmable Attenuator	PA5	27155	EF-0040-23	1 October 2024
4)	6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5)	Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6)	Pressure humidity and Temperature Transmitter	PTU301	F0640003	CD022030196EA	23 July 2024
				CL1-P230032	4 April 2024
				CD022030197EA	23 July 2024
7)	Performance Audio Analyzer	U8903B	MY56510003	CB20230038EA	14 February 2024
				CK20230072EA	13 September 2024

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
94.1	94.1	0.0	± 1.0



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Certificate No.: CP20230386EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Frequency (Hz)	Measured value (dB)
A-weighting	14.5
C-weighting	
Z-weighting	

2.2 Microphone replaced by the electrical input signal device

Frequency (Hz)	Measured value (dB)
A-weighting	9.9
C-weighting	15.9
Z-weighting	21.9

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.4
1000	0.0	0.0	0.0
8000	-3.3	-3.4	-3.4

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.0	-0.1	0.0
250	-0.1	-0.1	0.0
500	0.0	0.0	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.0	0.0
8000	0.1	0.1	0.0

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency (Hz)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
A-weighting	94.0	0.0	±0.2
C-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

Certificate No.: CP20230386EA

Calibration Report

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.3

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Value (dB)	Reference SPL (dB)		
94.0	94.0	94.0	0.0	±1.1
99.0	99.0	99.0	0.0	±1.1
104.0	104.0	104.0	0.0	±1.1
109.0	109.0	109.0	0.0	±1.1
114.0	114.0	114.0	0.0	±1.1
119.0	119.0	119.0	0.0	±1.1
124.0	124.0	124.0	0.0	±1.1
129.0	129.0	129.0	0.0	±1.1
130.0	130.0	130.0	0.0	±1.1
131.0	131.0	131.0	0.0	±1.1
132.0	132.0	132.0	0.0	±1.1
133.0	133.0	133.0	0.0	±1.1
134.0	134.0	134.0	0.0	±1.1
135.0	135.0	135.0	0.0	±1.1
136.0	136.0	136.0	0.0	±1.1
137.0	137.0	137.0	0.0	±1.1

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Value (dB)	Reference SPL (dB)		
94.0	94.0	94.0	0.0	±1.1
89.0	89.0	89.0	0.0	±1.1
84.0	84.0	84.0	0.0	±1.1
79.0	79.0	79.0	0.0	±1.1
74.0	74.0	74.0	0.0	±1.1
69.0	69.0	69.0	0.0	±1.1
64.0	64.0	64.0	0.0	±1.1
59.0	59.0	59.0	0.0	±1.1



Certificate No.: CP20230386EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	33.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±1.0
	2	109.0	0.0	+1.0 ; -2.5
	0.25	99.9	-0.1	+1.5 ; -5.0
Slow	200	119.6	0.0	±1.0
	2	100.0	0.0	+1.0 ; -5.0
	200	120.0	0.0	±1.0
LAE	2	100.0	0.0	+1.0 ; -2.5
	0.25	90.9	-0.1	+1.5 ; -5.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±3.0
Positive half cycle	124.4	124.1	-0.3	±2.0
Negative half cycle	124.4	124.1	-0.3	±2.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.0	±1.5
139.5	139.5		

Certificate No.: CP20230386EA

Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.3

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload Indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 2.
3. The coverage factor $k = 2.00$

- - End of Report - -



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ISO 9001:2015
CALIBRATION 0119

Certificate No.: CP20230386EA
Operation No.: CP2023100007

Certificate of Calibration


Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preampifier)
ID No.: -
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023

Calibrated Date: 6 - 8 November 2023

Issued Date: 9 November 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.
The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k)
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อุตสาหกรรมไทย

ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230386EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preampifier)
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration
1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PAS	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and	PTU301	F0640002	CL1-P230024	20 March 2024
6) Temperature Transmitter	PTU301	F0640003	CD20230196EA	23 July 2024
7) Temperature Transmitter	PTU301	F0640003	CD20230197EA	4 April 2024
8) Performance Audio Analyzer	U8903B	MY56510003	CB20230038EA	23 July 2024
9) Performance Audio Analyzer	U8903B	MY56510003	CK20230072EA	14 February 2024
10) Performance Audio Analyzer	U8903B	MY56510003	CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
 - Reference standards instrument for Electrical function
 - National Institute of Metrology (Thailand)
 - Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference	Measured value	Deviation	Acceptance limits
Acoustic Signal (dB)	(dB)	(dB)	(dB)
94.1	94.1	0.0	±1.0

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 34904949.



Certificate No.: CP20230386EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
14.5

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	9.9
C-weighting	15.9
Z-weighting	21.9

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.4
1000	0.0	0.0	0.0
8000	-3.3	-3.4	-3.4

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.0	-0.1	0.0
250	-0.1	-0.1	0.0
500	0.0	0.0	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.0	0.0
8000	0.1	0.1	0.0

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

Certificate No.: CP20230386EA

Calibration Report

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability
Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.3

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
99.0	99.0	0.0	±1.1
104.0	104.0	0.0	±1.1
109.0	109.0	0.0	±1.1
114.0	114.0	0.0	±1.1
119.0	119.0	0.0	±1.1
124.0	124.0	0.0	±1.1
129.0	129.0	0.0	±1.1
130.0	130.0	0.0	±1.1
131.0	131.0	0.0	±1.1
132.0	132.0	0.0	±1.1
133.0	133.0	0.0	±1.1
134.0	134.0	0.0	±1.1
135.0	135.0	0.0	±1.1
136.0	136.0	0.0	±1.1
137.0	137.0	0.0	±1.1

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1



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Certificate No.: CP20230386EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	33.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±1.0
	2	109.0	0.0	+1.0 ; -2.5
	0.25	99.9	-0.1	+1.5 ; -5.0
Slow	200	119.6	0.0	±1.0
	2	100.0	0.0	+1.0 ; -5.0
	200	120.0	0.0	±1.0
LAE	2	100.0	0.0	+1.0 ; -2.5
	0.25	90.9	-0.1	+1.5 ; -5.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±3.0
Positive half cycle	124.4	124.1	-0.3	±2.0
Negative half cycle	124.4	124.1	-0.3	±2.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle	0.0	±1.5
139.5	139.5		

Certificate No.: CP20230386EA

Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.3

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 8kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload Indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks:

1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 2.
3. The coverage factor $k = 2.00$

- - End of Report - -



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INSTITUTES 17025
CALIBRATION 0119

Certificate No.: CP20230386EA
Operation No.: CP2023100007

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preamplifier)
ID No.: -
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023
Calibrated Date: 6 - 8 November 2023
Issued Date: 9 November 2023
Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swakunyawong)
Group Manager

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Certificate No.: CP20230386EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preamplifier)
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration
1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PAS	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU301	F0640003	CL1-P230032	23 July 2024
7) Performance Audio Analyzer	U8903B	MY56510003	CD20230197EA	4 April 2024
			CB20230038EA	23 July 2024
			CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- National Institute of Metrology (Thailand)

- Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference	Measured value	Deviation	Acceptance limits
Acoustic Signal (dB)	(dB)	(dB)	(dB)
94.1	94.1	0.0	±1.0

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 34904949.



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Certificate No.: CP20230386EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone installed

Measured value (dB)
14.5

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	9.9
C-weighting	15.9
Z-weighting	21.9

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.4
1000	0.0	0.0	0.0
8000	-3.3	-3.4	-3.4

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.0	-0.1	0.0
250	-0.1	-0.1	0.0
500	0.0	0.0	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.0	0.0
8000	0.1	0.1	0.0

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

Certificate No.: CP20230386EA

Calibration Report

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability
Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.3

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
99.0	99.0	0.0	±1.1
104.0	104.0	0.0	±1.1
109.0	109.0	0.0	±1.1
114.0	114.0	0.0	±1.1
119.0	119.0	0.0	±1.1
124.0	124.0	0.0	±1.1
129.0	129.0	0.0	±1.1
130.0	130.0	0.0	±1.1
131.0	131.0	0.0	±1.1
132.0	132.0	0.0	±1.1
133.0	133.0	0.0	±1.1
134.0	134.0	0.0	±1.1
135.0	135.0	0.0	±1.1
136.0	136.0	0.0	±1.1
137.0	137.0	0.0	±1.1

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1



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Certificate No.: CP20230386EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	33.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1

Function : 8. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±1.0
	2	109.0	0.0	+1.0 ; -2.5
	0.25	99.9	-0.1	+1.5 ; -5.0
Slow	200	119.6	0.0	±1.0
	2	100.0	0.0	+1.0 ; -5.0
	200	120.0	0.0	±1.0
LAE	2	100.0	0.0	+1.0 ; -2.5
	0.25	90.9	-0.1	+1.5 ; -5.0

Function : 9. Peak C sound level

Number of cycles	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
In test signal				
Complete cycle	125.4	125.2	-0.2	±3.0
Positive half cycle	124.4	124.1	-0.3	±2.0
Negative half cycle	124.4	124.1	-0.3	±2.0

Function : 10. Overload indication

Measured value (dB)	Deviated value (dB)		Acceptance limits (dB)
	Positive one-half cycle	Negative one-half cycle	
139.5		139.5	±1.5

Certificate No.: CP20230386EA

Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.3

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks:

1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 2.
3. The coverage factor $k = 2.00$

- - End of Report - -



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ISO 9001:2015
CALIBRATION 0119

Certificate No.: CP20230386EA
Operation No.: CP2023100007

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preamplifier)
ID No.: -
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chugnern,
Amphur Muang, Rayong 21000

Received Date: 24 October 2023
Calibrated Date: 6 - 8 November 2023
Issued Date: 9 November 2023
Calibrated by: Ms. Juntaporn Kunhakom

Approved by:
(Mr. Sittichai Svaksuriyawong)
Group Manager

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มูลนิธิวิศวกรรม
อุตสาหกรรมไทย

Certificate No.: CP20230386EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preamplifier)
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration
1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and	PTU301	F0640002	CL1-P230024	20 March 2024
6) Temperature Transmitter	PTU301	F0640003	CD20230196EA	23 July 2024
7) Temperature Transmitter	PTU301	F0640003	CD20230197EA	4 April 2024
8) Performance Audio Analyzer	U8903B	MY56510003	CB20230038EA	23 July 2024
9) Performance Audio Analyzer	U8903B	MY56510003	CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- National Institute of Metrology (Thailand)

- Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference	Measured value	Deviation	Acceptance limits
Acoustic Signal (dB)	(dB)	(dB)	(dB)
94.1	94.1	0.0	±1.0

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 34904949.



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ELECTRICAL AND ELECTRONICS INSTITUTE
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Certificate No.: CP20230386EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Frequency Weighting	Measured value (dB)
A-weighting	9.9
C-weighting	15.9
Z-weighting	21.9

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	9.9
C-weighting	15.9
Z-weighting	21.9

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.4
1000	0.0	0.0	0.0
8000	-3.3	-3.4	-3.4

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.0	-0.1	0.0
250	-0.1	-0.1	0.0
500	0.0	0.0	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.0	0.0
8000	0.1	0.1	0.0

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

Certificate No.: CP20230386EA

Calibration Report

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.3

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
99.0	99.0	0.0	±1.1
104.0	104.0	0.0	±1.1
109.0	109.0	0.0	±1.1
114.0	114.0	0.0	±1.1
119.0	119.0	0.0	±1.1
124.0	124.0	0.0	±1.1
129.0	129.0	0.0	±1.1
130.0	130.0	0.0	±1.1
131.0	131.0	0.0	±1.1
132.0	132.0	0.0	±1.1
133.0	133.0	0.0	±1.1
134.0	134.0	0.0	±1.1
135.0	135.0	0.0	±1.1
136.0	136.0	0.0	±1.1
137.0	137.0	0.0	±1.1

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1



Certificate No.: CP20230386EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	33.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±1.0
	2	109.0	0.0	+1.0 ; -2.5
	0.25	99.9	-0.1	+1.5 ; -5.0
Slow	200	119.6	0.0	±1.0
	2	100.0	0.0	+1.0 ; -5.0
	200	120.0	0.0	±1.0
LAE	2	100.0	0.0	+1.0 ; -2.5
	0.25	90.9	-0.1	+1.5 ; -5.0

Function : 9. Peak C sound level

Number of cycles	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
In test signal				
Complete cycle	125.4	125.2	-0.2	±3.0
Positive half cycle	124.4	124.1	-0.3	±2.0
Negative half cycle	124.4	124.1	-0.3	±2.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle		
139.5	139.5	0.0	±1.5

Certificate No.: CP20230386EA

Calibration Report

Function : 11. High-Level Stability
High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.3

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.

2. Acceptance limits was IEC61672-3:2013 Class 2.

3. The coverage factor $k = 2.00$

- - End of Report - -



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NSC 112/16 17026
CALIBRATION 0119

Certificate No.: CP20230386EA
Operation No.: CP2023100007

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preamplifier)
ID No.: -
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tambon Chungnarn,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023
Calibrated Date: 6 - 8 November 2023
Issued Date: 9 November 2023
Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksunyawong)
Group Manager

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FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230386EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-42 (Meter), UC-52 (Microphone), NH-24 (Preamplifier)
Serial No.: 00546401 (Meter), 152917 (Microphone), 46612 (Preamplifier)
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration
1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PAS	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU301	F0640003	CD20230196EA	23 July 2024
7) Performance Audio Analyzer	U8903B	MY56510003	CD20230197EA	4 April 2024
			CB20230038EA	23 July 2024
			CK20230072EA	14 February 2024
				13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

Reference standards instrument for Acoustic function

- National Institute of Metrology (Thailand)

Reference standards instrument for Electrical function

- National Institute of Metrology (Thailand)

- Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:

Function : 1. Indication at the calibration check frequency

Reference	Measured value	Deviation	Acceptance limits
Acoustic Signal (dB)	(dB)	(dB)	(dB)
94.1	94.1	0.0	±1.0

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 39909499.



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ELECTRICAL AND ELECTRONICS INSTITUTE
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Certificate No.: CP20230386EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
14.5

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	9.9
C-weighting	15.9
Z-weighting	21.9

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.4
1000	0.0	0.0	0.0
8000	-3.3	-3.4	-3.4

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	-0.1	-0.1	0.0
125	0.0	-0.1	0.0
250	-0.1	0.0	0.0
500	0.0	0.0	0.0
1000	0.0	0.0	0.0
2000	0.0	0.1	0.0
4000	0.0	0.0	0.0
8000	0.1	0.1	0.0

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

Certificate No.: CP20230386EA

Calibration Report

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability
Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.3

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Value (dB)	Record SPL at Conclusion of Time Period (dB)		
94.0	94.0	94.0	0.0	±1.1
99.0	99.0	99.0	0.0	±1.1
104.0	104.0	104.0	0.0	±1.1
109.0	109.0	109.0	0.0	±1.1
114.0	114.0	114.0	0.0	±1.1
119.0	119.0	119.0	0.0	±1.1
124.0	124.0	124.0	0.0	±1.1
129.0	129.0	129.0	0.0	±1.1
130.0	130.0	130.0	0.0	±1.1
131.0	131.0	131.0	0.0	±1.1
132.0	132.0	132.0	0.0	±1.1
133.0	133.0	133.0	0.0	±1.1
134.0	134.0	134.0	0.0	±1.1
135.0	135.0	135.0	0.0	±1.1
136.0	136.0	136.0	0.0	±1.1
137.0	137.0	137.0	0.0	±1.1

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Value (dB)	Record SPL at Conclusion of Time Period (dB)		
94.0	94.0	94.0	0.0	±1.1
89.0	89.0	89.0	0.0	±1.1
84.0	84.0	84.0	0.0	±1.1
79.0	79.0	79.0	0.0	±1.1
74.0	74.0	74.0	0.0	±1.1
69.0	69.0	69.0	0.0	±1.1
64.0	64.0	64.0	0.0	±1.1
59.0	59.0	59.0	0.0	±1.1



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Certificate No.: CP20230386EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower (Cont.)

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	33.9	-0.1	±1.1
29.0	28.9	-0.1	±1.1

Function : 8. Tone burst response

Time Weighting	Tone Burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±1.0
	2	109.0	0.0	+1.0 ; -2.5
Slow	0.25	99.9	-0.1	+1.5 ; -5.0
	200	119.6	0.0	±1.0
LAE	2	100.0	0.0	+1.0 ; -5.0
	200	120.0	0.0	±1.0
	2	100.0	0.0	+1.0 ; -2.5
	0.25	90.9	-0.1	+1.5 ; -5.0

Function : 9. Peak C sound level

Number of cycles	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
In test signal				
Complete cycle	125.4	125.2	-0.2	±3.0
Positive half cycle	124.4	124.1	-0.3	±2.0
Negative half cycle	124.4	124.1	-0.3	±2.0

Function : 10. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative one-half cycle		
139.5	139.5	0.0	±1.5

Certificate No.: CP20230386EA

Calibration Report

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.3

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.

2. Acceptance limits was IEC61672-3:2013 Class 2.

3. The coverage factor $k = 2.00$

-- End of Report --

Certificate No.: CP20230387EA
Operation No.: CP2023100008

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.: -
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tambon Chungnern, Amphor Muang, Rayong 21000
Received Date: 24 October 2023
Calibrated Date: 6 - 8 November 2023
Issued Date: 9 November 2023
Calibrated by: Ms. Juntaporn Kunhakom

Certificate of Calibration

Approved by: (Mr. Sittichai Swaksuriyawong)
Group Manager

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Certificate No.: CP20230387EA
Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.
Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1)Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2)Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3)Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4)6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5)Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6)Pressure humidity and Temperature Transmitter	PTU301	F0640003	CD20230196EA	23 July 2024
7)Performance Audio Analyzer	U89038	MY56510003	CD20230197EA	23 July 2024
			CB20230038EA	14 February 2024
			CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.
3. This certification is traceable to the international system of unit maintained at :-
Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
Reference standards instrument for Electrical function
- National Institute of Metrology (Thailand)
- Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:-
Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
94.1	94.1	0.0	±0.7

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 34904949.



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Certificate No.: CP20230387EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Frequency Weighting	Measured value (dB)
A-weighting	15.7
C-weighting	15.7
Z-weighting	20.4

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	10.4
C-weighting	15.7
Z-weighting	20.4

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.				
Deviation from various Frequency Weighting Response Curve				
Frequency (Hz)	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
125	0.3	0.2	0.3	±1.0
1000	0.0	0.0	0.0	±0.7
8000	-0.6	-0.6	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.				
Deviation from various Frequency Weighting Response Curve				
Frequency (Hz)	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	Acceptance limits (dB)
63	0.0	0.0	0.0	±1.0
125	0.0	-0.1	0.0	±1.0
250	0.0	0.0	-0.1	±1.0
500	0.0	0.0	-0.1	±1.0
1000	0.0	0.0	0.0	±0.7
2000	0.0	0.1	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.1	0.0	+1.5; -2.5
16000	-1.4	-1.3	0.0	+2.5; -16.0

Certificate No.: CP20230387EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
95.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	109.0	0.0	±0.8
114.0	114.0	0.0	±0.8
119.0	119.0	0.0	±0.8
124.0	124.0	0.0	±0.8
129.0	129.0	0.0	±0.8
130.0	130.0	0.0	±0.8
131.0	131.0	0.0	±0.8
132.0	132.0	0.0	±0.8
133.0	133.0	0.0	±0.8
134.0	134.0	0.0	±0.8
135.0	135.0	0.0	±0.8
136.0	136.0	0.0	±0.8
137.0	137.0	0.0	±0.8



Certificate No.: CP20230387EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±0.5
	2	109.0	0.0	+1.0 ; -1.5
	0.25	99.9	-0.1	+1.0 ; -3.0
Slow	200	119.6	0.0	±0.5
	2	100.0	0.0	+1.0 ; -3.0
	200	120.0	0.0	±0.5
L/AE	2	100.0	0.0	+1.0 ; -1.5
	0.25	90.9	-0.1	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±2.0
Positive half cycle	124.4	124.1	-0.3	±1.0
Negative half cycle	124.4	124.1	-0.3	±1.0

Certificate No.: CP20230387EA

Calibration Report

Function : 10. Overload indication

Function : 10. Overload indication	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Positive	Negative		
	one-half cycle	one-half cycle		
	139.5	139.5	0.0	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings - Free-field sound pressure response level	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 1.
3. The coverage factor $k = 2.00$

-- End of Report --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT
9/5 Moo 4, Bangpoo Industrial Estate, Soi 8, Sukhumvit Road km 37,
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ISO 9001:2015
CERTIFIED
QUALITY MANAGEMENT

Certificate No.: CP20230387EA
Operation No.: CP2023100008

Certificate of Calibration

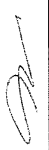
Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.:
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnem,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023

Calibrated Date: 6 - 8 November 2023

Issued Date: 9 November 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by: 
(Mr. Sittichai Swaksuriyawong)
Group Manager

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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230387EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.:
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU301	F0640003	CL1-P230032	23 July 2024
7) Performance Audio Analyzer	U89038	MY56510003	CD20230197EA	23 July 2024
			CB20230038EA	14 February 2024
			CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument: for Acoustic function
 - National Institute of Metrology (Thailand)
- Reference standards instrument: for Electrical function
 - National Institute of Metrology (Thailand)
 - Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
94.1	94.1	0.0	±0.7

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 34900949.



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ELECTRICAL AND ELECTRONICS INSTITUTE
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Certificate No.: CP20230387EA

Calibration Report

Function : 2. Self-generated Noise

Microphone Installed	Measured value (dB)
A-weighting	10.4
C-weighting	15.7
Z-weighting	20.4

2.2 Microphone replaced by the electrical input signal device

Frequency (Hz)	Measured value (dB)
125	10.4
1000	15.7
8000	20.4

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.3
1000	0.0	0.0	0.0
8000	-0.6	-0.6	-0.7

Function : 4. Electrical signal tests of frequency weightings

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	0.0	0.0	0.0
125	0.0	-0.1	0.0
250	0.0	0.0	-0.1
500	0.0	0.0	0.0
1000	0.0	0.1	0.0
2000	0.0	0.0	0.0
4000	0.0	0.1	0.0
8000	0.0	-1.3	0.0
16000	-1.4	-1.3	0.0

Certificate No.: CP20230387EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	± 0.2
A-weighting	94.0	0.0	± 0.2
Z-weighting	94.0	0.0	± 0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	± 0.1
Slow	94.0	0.0	± 0.1
LAeq	94.0	0.0	± 0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	± 0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	± 0.8
99.0	99.0	0.0	± 0.8
104.0	104.0	0.0	± 0.8
109.0	109.0	0.0	± 0.8
114.0	114.0	0.0	± 0.8
119.0	119.0	0.0	± 0.8
124.0	124.0	0.0	± 0.8
129.0	129.0	0.0	± 0.8
130.0	130.0	0.0	± 0.8
131.0	131.0	0.0	± 0.8
132.0	132.0	0.0	± 0.8
133.0	133.0	0.0	± 0.8
134.0	134.0	0.0	± 0.8
135.0	135.0	0.0	± 0.8
136.0	136.0	0.0	± 0.8
137.0	137.0	0.0	± 0.8



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ELECTRICAL AND ELECTRONICS INSTITUTE
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Certificate No.: CP20230387EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±0.5
	2	109.0	0.0	+1.0 ; -1.5
	0.25	99.9	-0.1	+1.0 ; -3.0
Slow	200	119.6	0.0	±0.5
	2	100.0	0.0	+1.0 ; -3.0
	200	120.0	0.0	±0.5
LAE	2	100.0	0.0	+1.0 ; -1.5
	0.25	90.9	-0.1	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±2.0
Positive half cycle	124.4	124.1	-0.3	±1.0
Negative half cycle	124.4	124.1	-0.3	±1.0

Certificate No.: CP20230387EA

Calibration Report

Function : 10. Overload indication

Function : 10: Overload indication				
	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Positive one-half cycle	Negative one-half cycle		
	139.5	139.5	0.0	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings - Frequency and time weighting at 1 kHz	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks:

1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 1.
3. The coverage factor $k = 2.00$

-- End of Report --



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NSC 6172-3:2013
CALIBRATION

Certificate No.: CP20230387EA
Operation No.: CP2023100008

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.: -
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnarn,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023

Calibrated Date: 6 - 8 November 2023

Issued Date: 9 November 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by:

(Mr. Sittichai Swaksuriyawong)
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.
The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k)
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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230387EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU301	F0640003	CD20230196EA	23 July 2024
7) Performance Audio Analyzer	U8903B	MY56510003	CD20230197EA	4 April 2024
			CB20230038EA	23 July 2024
			CK20230072EA	14 February 2024
				13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
 - National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
 - National Institute of Metrology (Thailand)
 - Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
94.1	94.1	0.0	±0.7

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 SYN : 34904949.



Certificate No.: CP20230387EA

Calibration Report

Function : 2. Self-Generated Noise

2.1 Microphone Installed
Measured value (dB)
15.7

2.2 Microphone replaced by the electrical input signal device

Frequency (Hz)	Measured value (dB)
A-weighting	10.4
C-weighting	15.7
Z-weighting	20.4

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter: free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.3
1000	0.0	0.0	0.0
8000	-0.6	-0.6	-0.7
			+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	0.0	0.0	0.0
125	0.0	-0.1	0.0
250	0.0	0.0	-0.1
500	0.0	0.0	0.0
1000	0.0	0.1	0.0
2000	0.0	0.0	0.0
4000	0.0	0.1	0.0
8000	-1.4	-1.3	0.0
16000			

Certificate No.: CP20230387EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Weighting	94.0	0.0	±0.1
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAcq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	109.0	0.0	±0.8
114.0	114.0	0.0	±0.8
119.0	119.0	0.0	±0.8
124.0	124.0	0.0	±0.8
129.0	129.0	0.0	±0.8
130.0	130.0	0.0	±0.8
131.0	131.0	0.0	±0.8
132.0	132.0	0.0	±0.8
133.0	133.0	0.0	±0.8
134.0	134.0	0.0	±0.8
135.0	135.0	0.0	±0.8
136.0	136.0	0.0	±0.8
137.0	137.0	0.0	±0.8



Certificate No.: CP20230387EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, T _b (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±0.5
	2	109.0	0.0	+1.0 ; -1.5
Slow	0.25	99.9	-0.1	+1.0 ; -3.0
	200	119.6	0.0	±0.5
LAE	2	100.0	0.0	+1.0 ; -3.0
	200	120.0	0.0	±0.5
	2	100.0	0.0	+1.0 ; -1.5
	0.25	90.9	-0.1	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±2.0
Positive half cycle	124.4	124.1	-0.3	±1.0
Negative half cycle	124.4	124.1	-0.3	±1.0

Certificate No.: CP20230387EA

Calibration Report

Function : 10. Overload indication

Function : 10. Overload indication	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Positive	Negative		
	one-half cycle	one-half cycle		
	139.5	139.5	0.0	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings - Frequency and time weighting at 1 kHz	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 1.
3. The coverage factor $k = 2.00$

-- End of Report --



ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230387EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.: -
Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa
Method of Calibration :-
IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK20230040EA	26 June 2024
3) Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P2300024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU301	F0640003	CL1-P2300032	23 July 2024
7) Performance Audio Analyzer	U89038	MY56510003	CD20230197EA	4 April 2024
			CB20230038EA	23 July 2024
			CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
 - National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
 - National Institute of Metrology (Thailand)
 - Electrical and Electronics Institute; NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
94.1	94.1	0.0	±0.7

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 34904949.



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FOUNDATION FOR INDUSTRIAL DEVELOPMENT

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Phraek Sa, Muang Samut Prakan, Samut Prakan 10280

Tel. 166 2709 4860 Fax 166 2324 0917

Certificate No.: CP20230387EA

Operation No.: CP2023100008

Certificate of Calibration

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.: -
Customer: IRPC Public Company Limited.
Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnarn, Amphor Muang, Rayong 21000

Received Date: 24 October 2023

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Calibrated by: Ms. Juntaporn Kunhakom

Approved by: (Mr. Sittichai Swaksuriyawong)
Group Manager

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ELECTRICAL AND ELECTRONICS INSTITUTE
FOUNDATION FOR INDUSTRIAL DEVELOPMENT

Certificate No.: CP20230387EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Frequency (Hz)	Measured value (dB)
125	15.7

2.2 Microphone replaced by the electrical input signal device

Frequency (Hz)	Measured value (dB)
125	10.4
250	15.7
500	20.4

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.3	0.2	0.3	±1.0
250	0.0	0.0	0.0	±0.7
500	-0.6	-0.6	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	0.0	0.0	0.0	±1.0
125	0.0	-0.1	0.0	±1.0
250	0.0	0.0	-0.1	±1.0
500	0.0	0.0	0.0	±0.7
1000	0.0	0.1	0.0	±1.0
2000	0.0	0.0	0.0	±1.0
4000	0.0	0.1	0.0	+1.5; -2.5
8000	-1.4	-1.3	0.0	+2.5; -16.0



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Certificate No.: CP20230387EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency (Hz)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
125	94.0	0.0	±0.2
250	94.0	0.0	±0.2
500	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time (min)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
L/Aeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.			
Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)
30	94.0	94.0	0.0

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper			
Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	109.0	0.0	±0.8
114.0	114.0	0.0	±0.8
119.0	119.0	0.0	±0.8
124.0	124.0	0.0	±0.8
129.0	129.0	0.0	±0.8
130.0	130.0	0.0	±0.8
131.0	131.0	0.0	±0.8
132.0	132.0	0.0	±0.8
133.0	133.0	0.0	±0.8
134.0	134.0	0.0	±0.8
135.0	135.0	0.0	±0.8
136.0	136.0	0.0	±0.8
137.0	137.0	0.0	±0.8



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Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±0.5
	2	109.0	0.0	+1.0 ; -1.5
	0.25	99.9	-0.1	+1.0 ; -3.0
Slow	200	119.6	0.0	±0.5
	2	100.0	0.0	+1.0 ; -3.0
	0.25	120.0	0.0	±0.5
L/AE	200	100.0	0.0	+1.0 ; -1.5
	2	90.9	-0.1	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±2.0
Positive half cycle	124.4	124.1	-0.3	±1.0
Negative half cycle	124.4	124.1	-0.3	±1.0

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Calibration Report

Function : 10. Overload indication

Positive one-half cycle	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Negative one-half cycle	139.5		
139.5			0.0	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings		0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Free-field sound pressure response level	0.30	
5) Electrical signal tests of frequency weightings	0.20	0.20
6) Frequency and time weighting at 1 kHz	0.20	0.20
7) Long-Term Stability	0.10	0.10
8) Level Linearity on the reference level range	0.30	0.30
9) Tone burst response	0.20	0.30
10) Peak C sound level	0.20	0.35
11) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 1.
3. The coverage factor $k = 2.00$

-- End of Report --



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Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone Installed

Measured value (dB)
15.7

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	10.4
C-weighting	15.7
Z-weighting	20.4

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve Meter free-field acoustic response at a level of 84 dB.		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
125	0.3	0.2	0.3
1000	0.0	0.0	0.0
8000	-0.6	-0.6	-0.7
			+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve Weighting network response with relative to 1 kHz.		
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)
63	0.0	0.0	0.0
125	0.0	-0.1	0.0
250	0.0	0.0	-0.1
500	0.0	0.0	0.0
1000	0.0	0.1	0.0
2000	0.0	0.0	0.0
4000	0.0	0.1	0.0
8000	-1.4	-1.3	0.0
16000			

Certificate No.: CP20230387EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	109.0	0.0	±0.8
114.0	114.0	0.0	±0.8
119.0	119.0	0.0	±0.8
124.0	124.0	0.0	±0.8
129.0	129.0	0.0	±0.8
130.0	130.0	0.0	±0.8
131.0	131.0	0.0	±0.8
132.0	132.0	0.0	±0.8
133.0	133.0	0.0	±0.8
134.0	134.0	0.0	±0.8
135.0	135.0	0.0	±0.8
136.0	136.0	0.0	±0.8
137.0	137.0	0.0	±0.8



Certificate No.: CP20230387EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±0.5
	2	109.0	0.0	+1.0 ; -1.5
	0.25	99.9	-0.1	+1.0 ; -3.0
Slow	200	119.6	0.0	±0.5
	2	100.0	0.0	+1.0 ; -3.0
	200	120.0	0.0	±0.5
LAE	2	100.0	0.0	+1.0 ; -1.5
	0.25	90.9	-0.1	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±2.0
Positive half cycle	124.4	124.1	-0.3	±1.0
Negative half cycle	124.4	124.1	-0.3	±1.0

Certificate No.: CP20230387EA

Calibration Report

Function : 10. Overload indication

Positive one-half cycle	Measured value (dB)		Deviated value (dB)	Acceptance limits (dB)
	Negative one-half cycle			
139.5	139.5		0.0	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings - Free-field sound pressure response level	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.
2. Acceptance limits was IEC61672-3:2013 Class 1.
3. The coverage factor $k = 2.00$

-- End of Report --



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Tel: +66 2799 4860 Fax: +66 2324 0917

Certificate No.: CP20230387EA
Operation No.: CP2023100008

Certificate of Calibration

Equipment: Sound Level Meter

Manufacturer: RION

Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)

Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)

ID No.: -

Customer: IRPC Public Company Limited.

Address: 299 Moo 5, Sukhumvit Rd., Tumbon Chungnern,
Amphor Muang, Rayong 21000

Received Date: 24 October 2023

Calibrated Date: 6 - 8 November 2023

Issued Date: 9 November 2023

Calibrated by: Ms. Juntaporn Kunhakom

Approved by:
(Mr. Sittichai Swaksuriyawong)
Group Manager

This report was prepared electronically using applicable electronic signature. Printing or copy of file are considered as a copy of the document.
The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor (k) providing a level of confidence of approximately 95%. This certificate may not be reproduced other than in full except with the prior written approval of the Electrical and Electronics Institute, Foundation for Industrial Development.



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มูลนิธิวิศวกรรมศาสตร์
เพื่อการพัฒนาอุตสาหกรรม

Certificate No.: CP20230387EA

Calibration Report

Equipment: Sound Level Meter
Manufacturer: RION
Model/Type: NL-52 (Meter), UC-59 (Microphone), NH-25 (Preamplifier)
Serial No.: 00632063 (Meter), 05230 (Microphone), 32091 (Preamplifier)
ID No.: -

Ambient Temperature: (23 ± 2) °C
Relative Humidity: (50 ± 15) %
Pressure: (101.3 ± 1.5) kPa

Method of Calibration :-

IEC 61672-3:2013.

Condition of this result of calibration

1. Reference standards instrument :-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Standard microphone	4180	2661000	AA-1006-23	7 June 2024
2) Arbitrary Function Generator	AFG2021	C010063	CK202300406A	26 June 2024
3) Programmable Attenuator	PA5	2755	EF-0040-23	1 October 2024
4) 6.5 Digit precision multimeter	8846A	9610014	CB20220223EA	14 November 2023
5) Pressure humidity and Temperature Transmitter	PTU301	F0640002	CL1-P230024	20 March 2024
6) Pressure humidity and Temperature Transmitter	PTU301	F0640003	CD20230196EA	23 July 2024
7) Performance Audio Analyzer	U8903B	MY56510003	CD20230038EA	23 July 2024
			CK20230072EA	13 September 2024

2. This result of calibration was found accurate as shown on date and place of calibration only.

3. This certification is traceable to the international system of unit maintained at :-

- Reference standards instrument for Acoustic function
- National Institute of Metrology (Thailand)
- Reference standards instrument for Electrical function
- National Institute of Metrology (Thailand)
- Electrical and Electronics Institute, NSC Accredited Calibration No.0119

Result of Calibration:-

Function : 1. Indication at the calibration check frequency

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation (dB)	Acceptance limits (dB)
94.1	94.1	0.0	±0.7

Note : Absolute sensitivity was established by the use of the Sound Calibrator RION Type NC-74 S/N : 34904949.



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Certificate No.: CP20230387EA

Calibration Report

Function : 2. Self-generated Noise

2.1 Microphone installed

Measured value (dB)
15.7

2.2 Microphone replaced by the electrical input signal device

Frequency Weighting	Measured value (dB)
A-weighting	10.4
C-weighting	15.7
Z-weighting	20.4

Function : 3. Acoustical signal tests of frequency weightings (Without Windscreen)

Meter free-field acoustic response at a level of 84 dB.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
125	0.3	0.2	0.3	±1.0
1000	0.0	0.0	0.0	±0.7
8000	-0.6	-0.6	-0.7	+1.5; -2.5

Function : 4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various Frequency Weighting Response Curve			Acceptance limits (dB)
	C-Weighting (dB)	A-Weighting (dB)	Z-Weighting (dB)	
63	0.0	0.0	0.0	±1.0
125	0.0	-0.1	0.0	±1.0
250	0.0	0.0	-0.1	±1.0
500	0.0	0.0	-0.1	±1.0
1000	0.0	0.0	0.0	±0.7
2000	0.0	0.1	0.0	±1.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.1	0.0	+1.5; -2.5
16000	-1.4	-1.3	0.0	+2.5; -16.0

Certificate No.: CP20230387EA

Calibration Report

Function : 5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
C-weighting	94.0	0.0	±0.2
A-weighting	94.0	0.0	±0.2
Z-weighting	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Time Weighting	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	94.0	0.0	±0.1
Slow	94.0	0.0	±0.1
LAeq	94.0	0.0	±0.1

Function : 6. Long-Term Stability

Long-term stability over 30 minutes, with steady 1 kHz signal at reference level.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
30	94.0	94.0	0.0	±0.1

Function : 7. Level Linearity on the reference level range

7.1 Level Linearity on the reference level range, Upper

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
99.0	99.0	0.0	±0.8
104.0	104.0	0.0	±0.8
109.0	109.0	0.0	±0.8
114.0	114.0	0.0	±0.8
119.0	119.0	0.0	±0.8
124.0	124.0	0.0	±0.8
129.0	129.0	0.0	±0.8
130.0	130.0	0.0	±0.8
131.0	131.0	0.0	±0.8
132.0	132.0	0.0	±0.8
133.0	133.0	0.0	±0.8
134.0	134.0	0.0	±0.8
135.0	135.0	0.0	±0.8
136.0	136.0	0.0	±0.8
137.0	137.0	0.0	±0.8



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Certificate No.: CP20230387EA

Calibration Report

7.2 Level Linearity on the reference level range, Lower

Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
94.0	94.0	0.0	±0.8
89.0	89.0	0.0	±0.8
84.0	84.0	0.0	±0.8
79.0	79.0	0.0	±0.8
74.0	74.0	0.0	±0.8
69.0	69.0	0.0	±0.8
64.0	64.0	0.0	±0.8
59.0	59.0	0.0	±0.8
54.0	54.0	0.0	±0.8
49.0	49.0	0.0	±0.8
44.0	44.0	0.0	±0.8
39.0	39.0	0.0	±0.8
34.0	33.9	-0.1	±0.8
29.0	28.9	-0.1	±0.8

Function : 8. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Fast	200	126.0	0.0	±0.5
	2	109.0	0.0	+1.0 ; -1.5
	0.25	99.9	-0.1	+1.0 ; -3.0
Slow	200	119.6	0.0	±0.5
	2	100.0	0.0	+1.0 ; -3.0
	200	120.0	0.0	±0.5
LAE	2	100.0	0.0	+1.0 ; -1.5
	0.25	90.9	-0.1	+1.0 ; -3.0

Function : 9. Peak C sound level

Number of cycles in test signal	Anticipated Value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limits (dB)
Complete cycle	125.4	125.2	-0.2	±2.0
Positive half cycle	124.4	124.1	-0.3	±1.0
Negative half cycle	124.4	124.1	-0.3	±1.0

Certificate No.: CP20230387EA

Calibration Report

Function : 10. Overload indication

Measured value (dB)	Deviated value (dB)		Acceptance limits (dB)
	Positive one-half cycle	Negative one-half cycle	
139.5	139.5	139.5	±1.5

Function : 11. High-Level Stability

High-level stability over 5 minutes, with steady 1 kHz signal, 1 dB below upper boundary.

Time Period to Apply Signal (min)	Reference SPL (dB)	Record SPL at Conclusion of Time Period (dB)	Deviated value (dB)	Acceptance limits (dB)
5	129.0	129.0	0.0	±0.1

Uncertainty of measurement

Function	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1) Indication at the calibration check frequency	0.30	Not applicable
2) Self-generated Noise	0.10	Not applicable
3) Acoustical signal tests of frequency weightings	0.30	0.60 (10Hz to 4kHz) 0.70 (>4kHz to 10kHz)
4) Electrical signal tests of frequency weightings	0.20	0.20
5) Frequency and time weighting at 1 kHz	0.20	0.20
6) Long-Term Stability	0.10	0.10
7) Level Linearity on the reference level range	0.30	0.30
8) Tone burst response	0.20	0.30
9) Peak C sound level	0.20	0.35
10) Overload indication	0.20	0.25
11) High-Level Stability	0.10	0.10

Remarks: 1. The acceptance limit is for the deviated value.

2. Acceptance limits was EC61672-3:2013 Class 1.

3. The coverage factor $k = 2.00$

-- End of Report --



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CALIBRATION REPORT

Calibration No: WQM-01102023
Page 1 of 2 pages

MEASUREMENT ITEM

: Multi parameter Water Quality Meter

: HORIBA

: Display: U-5000G

: Probe: U-53

: Display: RMGSEN3

: Probe: V390DM6U

SERIAL NUMBER

: : RPEC Public Company Limited

: 555/2, Energy Complex, Building B, 10th Floor,
Vibhavadi Rangsit Road, Chatuchak, Bangkok 10900

ID No.

: :

CUSTOMER

: :

MEASUREMENT DATE

: Oct 25, 2023

: Oct 25, 2023

ENVIRONMENTAL CONDITIONS:

The measurement was carried out in an ambient temperature of (25±3) °C, relative humidity of (50±15) %, and atmospheric pressure of (1008.8±0.5) hPa.

MEASUREMENT METHOD:

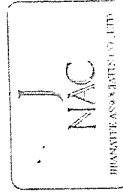
1. The Water Quality meter, Unit Under Calibration (UUC) was calibrated by automatic calibration mode for Conductivity, Turbidity and Dissolved Oxygen (DO) by comparison method with pH 4.01 standard buffer solution.
2. Manual calibration mode was used for calibrated a multi-point pH by comparison with standard buffer solution pH 4.01, 7.00, 10.01. Temperature was calibrated by comparison method with standard digital thermometer in temperature source.

REFERENCE STANDARD EQUIPMENT:

Equipment:	Model	Serial/Lot No.	Due date.
1. pH 4.01 standard buffer solution	500-4	S0323/01	Jan 16, 2025
2. pH 7.00 standard buffer solution	500-7	S5022/01	Dec 03, 2024
3. pH 10.01 standard buffer solution	500-10	S5022/01	Dec 16, 2024
4. Standard Temperature Probe	STS-100 A500	667682-09	Mar 28, 2024
5. Digital Temperature Indicator	DTI-1000-A MK II	671407-00591	July 22, 2023
6. Refrigerated calibration bath	PD15RCAL-A126	1B1670656	Jun 17, 2024

Calibrated by

- ☐ Mr. Sorawit Thachand
☐ Miss Jitrapan Lertsophonphol
☒ Miss Ruangunpal Phononmit



Approved Signature:

Mr. Parinya Boonchroen
Calibration Department Manager

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Continuation of Calibration Report Number

Calibration No: WQM-01102023

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MEASUREMENT RESULTS: ☒ With Adjustment ☐ Without Adjustment

Table 1: Results of automatic calibration of Conductivity, Turbidity and DO by pH 4.01 standard buffer solution are reported in the table below.

Expected Conductivity (mS/cm)	UUC ^{***} Reading (before) (mS/cm)	UUC ^{***} Reading (after) (mS/cm)	Error (mS/cm)
4.49	5.13	4.54	0.05

Expected Turbidity (NTU)	UUC ^{***} Reading (before) (NTU)	UUC ^{***} Reading (after) (NTU)	Error (NTU)
0.0	0.00	0.00	0.00

Expected DO concentration (mg/L)	UUC ^{***} Reading (before) (mg/L)	UUC ^{***} Reading (after) (mg/L)	Error (mg/L)
8.92	10.38	8.74	-0.18

Table 2: Results of Manual calibration of pH and Temperature are reported in the table below.

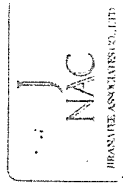
Standard buffer solution (pH)	UUC ^{***} Reading (before) (pH)	UUC ^{***} Reading (after) (pH)	Error (pH)
4.01	3.61	3.97	-0.04
7.00	7.38	7.15	0.15
10.01	9.62	10.16	0.17

Standard Temperature Heading (°C)	UUC ^{***} Reading (before) (°C)	UUC ^{***} Reading (after) (°C)	Error (°C)
25.043	22.78	24.99	-0.05

UUC^{***} Unit Under Calibration

Noted: 1. The Unit under calibration was warmed up for 30 minute prior to the calibration being performed.
2. The report is valid only to the item calibrated on date and place of calibration.

End of Calibration Report





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CALIBRATION REPORT

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

: Multi parameter Water Quality Meter
: HORIBA

: Display: U-5000G
: Probe: U-53

SIGNAL NUMBER
: Display: RMAGSEN3
: Probe: V39CGMGU

ID No.
CUSTOMER
: JRPC Public Company Limited
: 555/2, Energy Complex, Building B, 10th Floor,
: Vibhavadi Rangsit Road, Chatuchak, Bangkok 10900

MEASUREMENT DATE
ISSUED DATE
: Oct 25, 2023
: Oct 25, 2023

ENVIRONMENTAL CONDITIONS:

The measurement was carried out in an ambient temperature of (25±1.5) °C, relative humidity of (50±15) %, and atmospheric pressure of (1008.8±0.5) hPa.

MEASUREMENT METHOD:

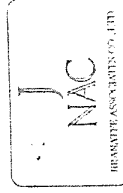
1. The Water Quality meter, Unit Under Calibration (UUC) was calibrated by automatic calibration mode for Conductivity, Turbidity and Dissolved Oxygen (DO) by comparison method with pH 4.01 standard buffer solution.
2. Manual calibration mode was used for calibrated a multi-point pH by comparison with standard buffer solution pH 4.01, 7.00, 10.01. Temperature was calibrated by comparison method with standard digital thermometer in temperature source.

REFERENCE STANDARD EQUIPMENT:

Equipment:	Model	Serial/lot No.	Due date
1. pH 4.01 standard buffer solution	500-4	S0323/01	Jan 16, 2025
2. pH 7.00 standard buffer solution	500-7	S0022/01	Dec 03, 2024
3. pH 10.01 standard buffer solution	500-10	S0022/01	Dec 16, 2024
4. Standard Temperature Probe	ST5-100 A500	667682-09	Mar 28, 2024
5. Digital Temperature Indicator	DTI-1000-A MK II	671407-00691	July 22, 2023
6. Refrigerated calibration bath	P016RCAL-A12C	181670666	Jan 17, 2024

Calibrated by

- ☐ Mr. Sorawit Thachuland
☐ Miss Jitraporn Lertsamphol
☒ Miss Ruangsri Phoommit



Approved Signature:

Mr. Parinya Booncharoen
Calibration Department Manager

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Continuation of Calibration Report Number

Calibration No: WQM-01102023
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MEASUREMENT RESULTS: ☒ With Adjustment ☐ Without Adjustment

Table 1: Results of automatic calibration of Conductivity, Turbidity and DO by pH 4.01 standard buffer solution are reported in the table below.

Expected Conductivity (mS/cm)	UUC* _{reading} (before) (mS/cm)	UUC* _{reading} (after) (mS/cm)	Error (mS/cm)
4.49	5.13	4.54	0.05

Expected Turbidity (NTU)	UUC* _{reading} (before) (NTU)	UUC* _{reading} (after) (NTU)	Error (NTU)
0.0	0.00	0.00	0.00

Expected DO concentration (mg/L)	UUC* _{reading} (before) (mg/L)	UUC* _{reading} (after) (mg/L)	Error (mg/L)
8.92	10.38	8.74	-0.18

Table 2: Results of Manual calibration of pH and Temperature are reported in the table below.

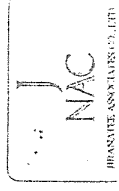
Standard buffer solution (pH)	UUC* _{reading} (before) (pH)	UUC* _{reading} (after) (pH)	Error (pH)
4.01	3.61	3.97	-0.04
7.00	7.38	7.15	0.15
10.01	9.52	10.18	0.17

Standard Temperature Reading (°C)	UUC* _{reading} (before) (°C)	UUC* _{reading} (after) (°C)	Error (°C)
25.043	22.78	24.99	-0.05

UUC* Unit Under Calibration

Note: 1. The Unit under calibration was warmed up for 30 minute prior to the calibration being performed.
2. The report is valid only to the item calibrated on date and place of calibration.

End of Calibration Report





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CALIBRATION REPORT

Calibration No: WQM-01102023
Page 1 of 2 pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE

: Multi parameter Water Quality Meter
: HORIBA

: Display: U-5000G

: Probe: U-53

: Display: BAAGSEN3

: Probe: V39C8M6U

ID No.

CUSTOMER

: JRPC Public Company Limited
555/2, Energy Complex, Building B, 10th Floor,
Vibhavadi Rangit Road, Chatuchak, Bangkok 10900

MEASUREMENT DATE

ISSUED DATE

: Oct 25, 2023

: Oct 25, 2023

ENVIRONMENTAL CONDITIONS:

The measurement was carried out in an ambient temperature of (25±3) °C, relative humidity of (50±15) %, and atmospheric pressure of (1008.8±0.5) hPa.

MEASUREMENT METHOD:

1. The Water Quality meter, Unit Under Calibration (UUC) was calibrated by automatic calibration mode for Conductivity, Turbidity and Dissolved Oxygen (DO) by comparison method with pH 4.01 standard buffer solution.
2. Manual calibration mode was used for calibrated a multi-point pH by comparison with standard buffer solution pH 4.01, 7.00, 10.01. Temperature was calibrated by comparison method with standard digital thermometer in temperature source.

REFERENCE STANDARD EQUIPMENT:

Equipment:	Model	Serial/Lot No.	Due date
1. pH 4.01 standard buffer solution	500-4	S0323/01	Jan 16, 2025
2. pH 7.00 standard buffer solution	500-7	S5022/01	Dec 03, 2024
3. pH 10.01 standard buffer solution	500-10	S5022/01	Dec 16, 2024
4. Standard Temperature Probe	STS-100 A500	667682-09	Mar 28, 2024
5. Digital Temperature Indicator	DTI-1000-A MK II	671407-00691	July 22, 2023
6. Refrigerated calibration bath	PD15RCAL-A12C	181670666	Jun 17, 2024

Checked by

- ☐ Mr. Sarawit Thuchalod
☐ Miss Jitraporn Lertsomphol
☒ Miss Ruangrumpai Phoommit



Approved Signature:

Mr. Parinya Booncharoen
Calibration Department Manager

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Continuation of Calibration Report Number

Calibration No: WQM-01102023
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MEASUREMENT RESULTS: ☒ With Adjustment ☐ Without Adjustment

Table 1: Results of automatic calibration of Conductivity, Turbidity and DO by pH 4.01 standard buffer solution are reported in the table below.

Expected Conductivity (µS/cm)	UUC* _{Reading} (before) (µS/cm)	UUC* _{Reading} (after) (µS/cm)	Error (µS/cm)
4.49	5.13	4.54	0.05

Expected Turbidity (NTU)	UUC* _{Reading} (before) (NTU)	UUC* _{Reading} (after) (NTU)	Error (NTU)
0.0	0.00	0.00	0.00

Expected DO concentration (mg/L)	UUC* _{Reading} (before) (mg/L)	UUC* _{Reading} (after) (mg/L)	Error (mg/L)
8.92	10.38	8.74	-0.18

Table 2: Results of Manual calibration of pH and Temperature are reported in the table below.

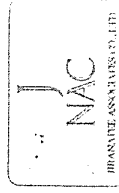
Standard buffer solution (pH)	UUC* _{Reading} (before) (pH)	UUC* _{Reading} (after) (pH)	Error (pH)
4.01	3.61	3.97	-0.04
7.00	7.38	7.15	0.15
10.01	9.52	10.18	0.17

Standard Temperature Reading (°C)	UUC* _{Reading} (before) (°C)	UUC* _{Reading} (after) (°C)	Error (°C)
25.043	22.78	24.99	-0.05

UUC* Unit Under Calibration

Notes: 1. The Unit under calibration was warmed up for 30 minutes prior to the calibration being performed.
2. The report is valid only to the item calibrated on date and place of calibration.

End of Calibration Report





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CALIBRATION REPORT

Calibration No: WGM-01102023
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MEASUREMENT ITEM

MANUFACTURER : HORIBA
MODEL/TYPE : Display: U-5000G
 : Probe: U-53
SERIAL NUMBER : Display: RMGSEN3
 : Probe: V39CGM6U
ID No. :
CUSTOMER : IFPC Public Company Limited
 : 555/2, Energy Complex, Building B, 10th Floor,
 : Vibhavadi Rangsit Road, Chaturchai, Bangkok 10900

MEASUREMENT DATE : Oct 25, 2023
ISSUED DATE : Oct 26, 2023

ENVIRONMENTAL CONDITIONS:

The measurement was carried out in an ambient temperature of (25±3) °C, relative humidity of (50±15) %, and atmospheric pressure of (1008.8±0.5) hPa.

MEASUREMENT METHOD:

1. The Water Quality meter, Unit Under Calibration (UUC) was calibrated by automatic calibration mode for Conductivity, Turbidity and Dissolved Oxygen (DO) by comparison method with pH 4.01 standard buffer solution.
2. Manual calibration mode was used for calibrated a multi-point pH by comparison with standard buffer solution pH 4.01, 7.00, 10.01. Temperature was calibrated by comparison method with standard digital thermometer in temperature source.

REFERENCE STANDARD EQUIPMENT:

Equipment	Model	Serial/Lot No.	Due date
1. pH 4.01 standard buffer solution	500-4	S0323/01	Jan 16, 2025
2. pH 7.00 standard buffer solution	500-7	S5022/01	Dec 03, 2024
3. pH 10.01 standard buffer solution	500-10	S5022/01	Dec 16, 2024
4. Standard Temperature Probe	STS-100 AS500	667682-09	Mar 28, 2024
5. Digital Temperature Indicator	DTI-1000-A MK II	671407-00591	July 22, 2023
6. Refrigerated calibration bath	PD15RCAL-A12C	1B1670656	Jan 17, 2024

Calibrated by

- ☐ Mr. Sorawit Thuchalead
☐ Miss Jitraporn Lertsomphot
☒ Miss Buengrampal Phoommit



Approved / Signed by:
Mr. Parinya Booncharoen
Calibration Department Manager

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Continuation of Calibration Report Number

Calibration No: WGM-01102023
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MEASUREMENT RESULTS: ☒ With Adjustment ☐ Without Adjustment

Table 1: Results of automatic calibration of Conductivity, Turbidity and DO by pH 4.01 standard buffer solution are reported in the table below.

Expected Conductivity (mS/cm)	UUC ^{Testing} (before) (mS/cm)	UUC ^{Testing} (after) (mS/cm)	Error (mS/cm)
4.49	5.13	4.54	0.05

Expected Turbidity (NTU)	UUC ^{Testing} (before) (NTU)	UUC ^{Testing} (after) (NTU)	Error (NTU)
0.0	0.00	0.00	0.00

Expected DO concentration (mg/L)	UUC ^{Testing} (before) (mg/L)	UUC ^{Testing} (after) (mg/L)	Error (mg/L)
8.92	10.38	8.74	-0.18

Table 2: Results of Manual calibration of pH and Temperature are reported in the table below.

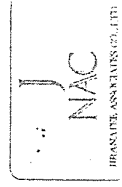
Standard buffer solution (pH)	UUC ^{Testing} (before) (pH)	UUC ^{Testing} (after) (pH)	Error (pH)
4.01	3.61	3.97	-0.04
7.00	7.38	7.15	0.15
10.01	9.52	10.18	0.17

Standard Temperature Reading (°C)	UUC ^{Testing} (before) (°C)	UUC ^{Testing} (after) (°C)	Error (°C)
25.043	22.78	24.99	-0.05

UUC* Unit Under Calibration

Notes: 1. The Unit under calibration was warmed up for 30 minute prior to the calibration being performed.
2. The report is valid only to the item calibrated on date and place of calibration.

End of Calibration Report





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CALIBRATION REPORT

Calibration No: WQM-01102023
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MEASUREMENT ITEM
MANUFACTURER

Model/TYPE
Serial Number

ID No.
Customer

MEASUREMENT DATE
ISSUED DATE

MEASUREMENT RESULTS:
Expected Conductivity (mS/cm)
Expected Turbidity (NTU)
Expected DO concentration (mg/L)

UUC* Testing (before) (mS/cm)
UUC* Testing (after) (mS/cm)
UUC* Testing (before) (NTU)
UUC* Testing (after) (NTU)
UUC* Testing (before) (mg/L)
UUC* Testing (after) (mg/L)

Error (mS/cm)
Error (NTU)
Error (mg/L)

Without Adjustment
With Adjustment

Table 1: Results of automatic calibration of Conductivity, Turbidity and DO by pH 4.01 standard buffer solution are reported in the table below.

Table 2: Results of Manual calibration of pH and Temperature are reported in the table below.

Standard buffer solution (pH)
Standard Temperature Reading (°C)

UUC* Testing (before) (pH)
UUC* Testing (after) (pH)
UUC* Testing (before) (°C)
UUC* Testing (after) (°C)

Error (pH)
Error (°C)

End of Calibration Report

UUC* Unit Under Calibration
Note: 1. The Unit under calibration was warmed up for 30 minute prior to the calibration being performed.
2. The report is valid only to the item calibrated on date and place of calibration.

Approved Signature: _____
Mr. Pinyo Booncharoen
Calibration Department Manager

Calibrated by
☐ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol
☒ Miss Ruangrump Phoommit

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Calibration No: WQM-01102023
Page 2 of 2 pages

MEASUREMENT RESULTS:
Expected Conductivity (mS/cm)
Expected Turbidity (NTU)
Expected DO concentration (mg/L)

UUC* Testing (before) (mS/cm)
UUC* Testing (after) (mS/cm)
UUC* Testing (before) (NTU)
UUC* Testing (after) (NTU)
UUC* Testing (before) (mg/L)
UUC* Testing (after) (mg/L)

Error (mS/cm)
Error (NTU)
Error (mg/L)

Without Adjustment
With Adjustment

Table 1: Results of automatic calibration of Conductivity, Turbidity and DO by pH 4.01 standard buffer solution are reported in the table below.

Table 2: Results of Manual calibration of pH and Temperature are reported in the table below.

Standard buffer solution (pH)
Standard Temperature Reading (°C)

UUC* Testing (before) (pH)
UUC* Testing (after) (pH)
UUC* Testing (before) (°C)
UUC* Testing (after) (°C)

Error (pH)
Error (°C)

End of Calibration Report

UUC* Unit Under Calibration
Note: 1. The Unit under calibration was warmed up for 30 minute prior to the calibration being performed.
2. The report is valid only to the item calibrated on date and place of calibration.

Approved Signature: _____
Mr. Pinyo Booncharoen
Calibration Department Manager

Calibrated by
☐ Mr. Sorawit Thachalad
☐ Miss Jitraporn Lertsomphol
☒ Miss Ruangrump Phoommit

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CALIBRATION REPORT

Calibration No: WQM-01102023
Page 1 of 2 pages

MEASUREMENT ITEM

MANUFACTURER : HORIBA
MODEL/TYPE : Display: U-5000G
Probe: U-53
SERIAL NUMBER : Display: R4MGSN3
Probe: V39CGM6U

ID No.

CUSTOMER : IRPC Public Company Limited
555/2, Energy Complex, Building B, 10th Floor,
Vibhavadi Rangsit Road, Chulachak, Bangkok 10900

MEASUREMENT DATE

ISSUED DATE : Oct 25, 2023
: Oct 26, 2023

ENVIRONMENTAL CONDITIONS:

The measurement was carried out in an ambient temperature of (25±3) °C, relative humidity of (50±15) %, and atmospheric pressure of (1008.8±0.5) hPa.

MEASUREMENT METHOD:

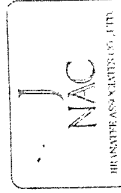
1. The Water Quality meter, Unit Under Calibration (UUC) was calibrated by automatic calibration mode for Conductivity, Turbidity and Dissolved Oxygen (DO) by comparison method with pH 4.01 standard buffer solution.
2. Manual calibration mode was used for calibrated a multi-point pH by comparison with standard buffer solution pH 4.01, 7.00, 10.01. Temperature was calibrated by comparison method with standard digital thermometer in temperature source.

REFERENCE STANDARD EQUIPMENT:

Equipment	Model	Serial/Lot No.	Due date.
1. pH 4.01 standard buffer solution	500-4	\$0323/01	Jun 16, 2025
2. pH 7.00 standard buffer solution	500-7	\$5022/01	Dec 03, 2024
3. pH 10.01 standard buffer solution	500-10	\$5022/01	Dec 16, 2024
4. Standard Temperature Probe	STS-100 A500	667682-09	Mar 28, 2024
5. Digital Temperature Indicator	DTI-1000-A MK II	67407-00591	July 22, 2023
6. Refrigerated calibration bath	PD15RCAL-A12G	1B1670656	Jun 17, 2024

Checked by

- ☐ Mr. Sorawit Thuehual
☐ Miss Jitraporn Lertsomphot
☒ Miss Ruangrampal Phoonmit



Approved Signature:

Mr. Parinye Boorcharoen
Calibration Department Manager

Continuation of Calibration Report Number
Calibration No: WQM-01102023
Page 2 of 2 pages

MEASUREMENT RESULTS: ☒ With Adjustment ☐ Without Adjustment

Table 1: Results of automatic calibration of Conductivity, Turbidity and DO by pH 4.01 standard buffer solution are reported in the table below.

Expected Conductivity (mS/cm)	UUC* _{Testing} (before) (mS/cm)	UUC* _{Testing} (after) (mS/cm)	Error (mS/cm)
4.49	5.13	4.54	0.05

Expected Turbidity (NTU)	UUC* _{Testing} (before) (NTU)	UUC* _{Testing} (after) (NTU)	Error (NTU)
0.0	0.00	0.00	0.00

Expected DO concentration (mg/L)	UUC* _{Testing} (before) (mg/L)	UUC* _{Testing} (after) (mg/L)	Error (mg/L)
8.92	10.38	8.74	-0.18

Table 2: Results of Manual calibration of pH and Temperature are reported in the table below.

Standard buffer solution (pH)	UUC* _{Testing} (before) (pH)	UUC* _{Testing} (after) (pH)	Error (pH)
4.01	3.61	3.97	-0.04
7.00	7.38	7.15	0.15
10.01	9.52	10.18	0.17

Standard Temperature Reading (°C)	UUC* _{Testing} (before) (°C)	UUC* _{Testing} (after) (°C)	Error (°C)
25.043	22.78	24.99	-0.05

UUC* Unit Under Calibration

- Noted: 1. The Unit under calibration was warmed up for 30 minute prior to the calibration being performed.
2. The report is valid only to the item calibrated on date and place of calibration.

End of Calibration Report

