

ภาคผนวก ง-1

เอกสารรับรองห้องปฏิบัติการวิเคราะห์เอกชน



ที่ อก ๐๓๑๐(๑)/ ๕ ๘ ๗ ๖

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒ ๒ มิถุนายน ๒๕๖๖

เรื่อง ต่อบัญชีหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

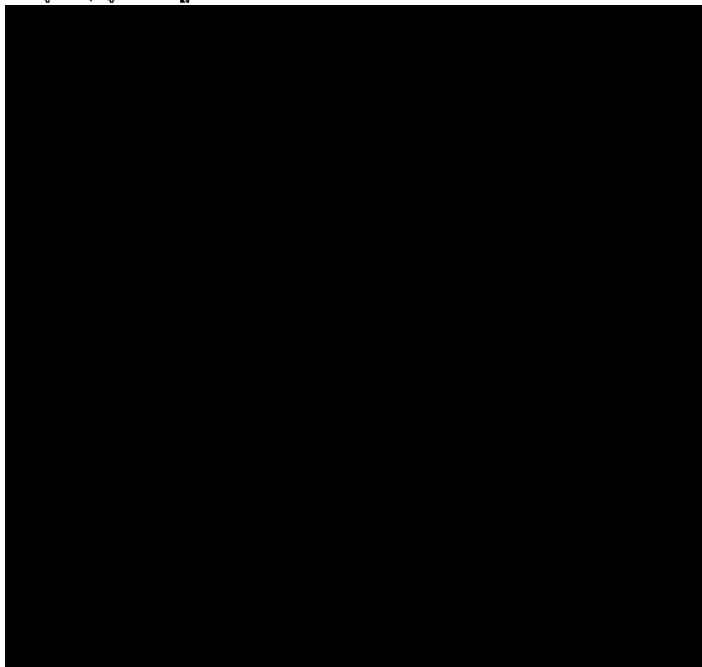
อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓ มีนาคม ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด จำนวน ๒๘ แผ่น

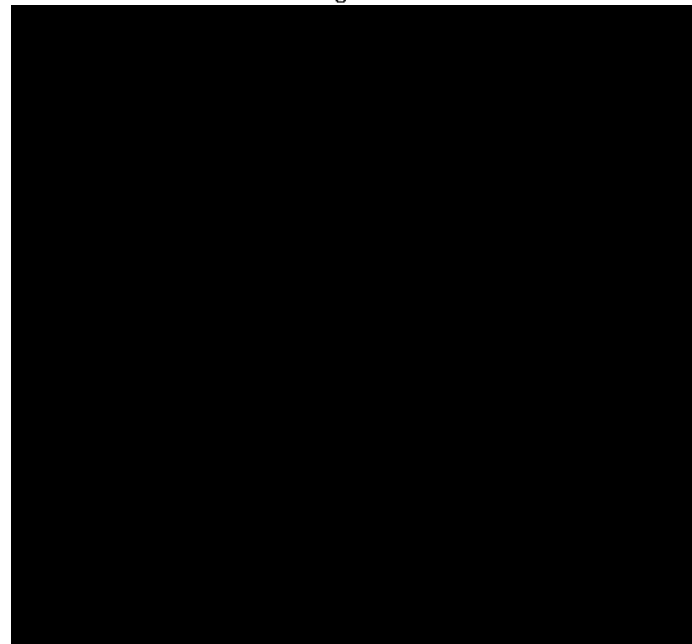
ตามหนังสือที่อ้างถึง บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๓๖ สถานที่ตั้งเลขที่ ๑/๖ ซอยรามคำแหง ๑๔๕ แขวงสะพานสูง
เขตสะพานสูง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด ต่ออายุหนังสือรับขึ้น
ทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์



- ๒ -



ค. ขอบข่ายสารมลพิษที่ตรวจพบพบให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูลหรือ
วัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๓๑ มีนาคม ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

กมล งาม

(นายประสม ดำรงพงษ์)

ผู้อำนวยการกองวิจัยและพัฒนากลุ่มพิษโรงงาน
ปฏิบัติการแผนงานอัตรากำลังกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนากลุ่มพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๓๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๓๔๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

เลขทะเบียน ๖-๒๓๖

ที่ กก ๐๓๑๐(๑)/ ๕ ๘ ๗ ๖

ลงวันที่ ๒๒ มิถุนายน ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๓๗ รายการ

น้ำเสีย จำนวน 40 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
2	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁴⁾
3	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
4	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
5	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
6	Biochemical Oxygen Demand	5-Day BOD Test, Azide Modification Method ⁽⁴⁾
7	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
8	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method ⁽⁴⁾
9	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
10	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
11	Color	ADMI Weighted-Ordinate Spectrophotometric Method ⁽⁴⁾
12	Copper	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
13	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
14	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
15	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
16	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾

17 Endosulfan I...

- ๒ -

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
18	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
19	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
20	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
21	Formaldehyde	Distillation, Colorimetric Method ⁽⁴⁾
22	Free Chlorine	DPD Ferrous Titrimetric Method ⁽⁴⁾
23	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
24	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
25	Hexavalent Chromium	Colorimetric Method ⁽⁴⁾
26	Lead	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
27	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
28	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾
29	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
30	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽⁴⁾ 2) Soxhlet Extraction Method ⁽⁴⁾
31	pH	Electrometric Method ⁽⁴⁾
32	Phenols	Distillation, Direct Photometric Method ⁽⁴⁾
33	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁴⁾
34	Sulfide	1) Iodometric Method ⁽⁴⁾ 2) Methylene Blue Method ⁽⁴⁾
35	Temperature	Laboratory and Field Methods ⁽⁴⁾
36	Total Dissolved Solids	Dried at 180 °C ⁽⁴⁾
37	Total Kjeldahl Nitrogen	Macro-Kjeldahl Method ⁽⁴⁾
38	Total Suspended Solids	Dried at 103-105 °C ⁽⁴⁾

39 Trivalent Chromium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
39	Trivalent Chromium	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾
40	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾

น้ำใต้ดิน จำนวน 122 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
2	Acetone	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
5	Antimony	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
6	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁴⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
8	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
10	Benzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

13 Benzoic acid...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
16	Beryllium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
20	Bromoform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
21	Butanol	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
23	Cadmium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
25	Carbon disulfide	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
26	Carbon tetrachloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
29	Chlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
31	Chloroform	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

32 Chromium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
32	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
33	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾
34	Chromium (VI)	Colorimetric Method ⁽⁴⁾
35	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
36	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
37	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
38	DDD	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
39	DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
40	DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
41	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
42	Di-n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
43	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
44	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
45	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
46	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
47	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
48	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
49	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

50 trans-1,2-Dichloroethylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
50	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
51	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
52	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
53	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
54	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
55	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
56	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
57	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
58	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
59	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
60	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
61	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
62	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
63	Ethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
64	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
65	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
66	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
67	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
68	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
69	n-Hexane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
70	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
71	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
72	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
73	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾

74 Hexachloroethane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
74	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
75	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
76	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
77	Lead	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
78	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
79	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾
80	Methanol	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
81	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
82	Methyl bromide	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
83	Methylene chloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
84	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
85	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
86	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
87	Naphthalene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
88	Nickel	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
89	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
90	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾ <i>Small</i>

91 N-Nitrosodi-n-propylamine...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
91	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
92	Polychlorinated Biphenyls PCB-1016 PCB-1221 PCB-1232 PCB-1242 PCB-1248 PCB-1254 PCB-1260	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
93	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
94	pH	Electrometric Method ⁽⁴⁾
95	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
96	Phenol	1) Distillation, Direct Photometric Method ⁽⁴⁾ 2) Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
97	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
98	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁴⁾
99	Silver	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
100	Styrene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
101	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
102	Tetrachloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
103	Toluene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
104	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
105	TPH (C ₅ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(12,22) <i>Small</i>

106 TPH (C₅-C₁₆)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
106	TPH (C ₈ -C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
107	TPH (C ₁₆ -C ₃₅)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(9,22)
108	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
109	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
110	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
111	Trichloroethylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
112	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
113	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽⁴⁾
114	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
115	Vanadium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾
116	Vinyl acetate	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
117	Vinyl chloride	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
118	m-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
119	o-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
120	p-Xylene	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
121	Xylene (Total)	Purge and Trap Gas Chromatographic/Mass Spectrometric Method ⁽⁴⁾
122	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾

อากาศเสีย...

อากาศเสีย (ปล่อยระบาย) จำนวน 18 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 3) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ⁽⁵⁾
2	Arsenic	Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽⁵⁾
3	Carbon monoxide	Instrumental Analyzer Method ⁽⁵⁾
4	Chlorine	Absorption Sampling, Ion Chromatographic Method ⁽⁵⁾
5	Copper	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾
6	Cresol	Adsorption Sampling, Gas Chromatographic Method ⁽⁵⁾
7	Dioxins/Furans	Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ⁽⁵⁾
8	Hydrogen Chloride	Absorption Sampling, Ion Chromatographic Method ⁽⁵⁾
9	Hydrogen Fluoride	Absorption Sampling, Ion Chromatographic Method ⁽⁵⁾
10	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁽⁵⁾
11	Lead	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁽⁵⁾ 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ⁽⁵⁾ 3) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ⁽⁵⁾
12	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁵⁾
13	Opacity	Ringelmann's Method ⁽²⁾
14	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method ⁽⁵⁾ 2) Instrumental Analyzer Method ⁽⁵⁾

15 Sulfur dioxide...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Sulfur dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾ 2) Instrumental Analyzer Method ⁽⁵⁾
16	Sulfuric acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ⁽⁵⁾
17	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ⁽⁵⁾
18	Xylene	Adsorption Sampling, Gas Chromatographic Method ⁽⁵⁾

สิ่งปลูกสรหรือวัสดุที่ไม่ใช่แล้ว จำนวน 36 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
2	Antimony	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(1,6,17) 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,17)
4	Barium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14)

4) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
5	Beryllium	4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14) 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
6	Cadmium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
7	Chlordane	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16)

3) Waste Extraction...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Chromium (III)	3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14) 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^(1,6,15,18) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^(1,6,16,18) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation ^(1,6,14,18) 4) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,15,18) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,16,18) 6) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,14,18)
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1,18) 2) Alkaline Digestion, Colorimetric Method ^(8,18)
11	Cobalt	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)

12 Copper...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
14	DDD	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
15	DDE	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
16	DDT	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
17	Dieldrin	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)

18 Endrin...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Endrin	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
19	Heptachlor	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
21	Lindane	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1,6,19) 2) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽²⁰⁾
23	Methoxychlor	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24)

3) Soxhlet...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
24	Mirex	3) Soxhlet Extraction, Gas Chromatographic Method ^(11,24) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
25	Molybdenum	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
26	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
27	Polychlorinated Biphenyls Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 2,4,4'-Trichlorobiphenyl 2,2',5,5'-Tetrachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,9,25) 2) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,25) 3) Soxhlet Extraction, Gas Chromatographic Method ^(11,25)

2,2',4,5,5'...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	2,2',4,5,5'-Pentachlorobiphenyl 2,2',3,4,4',5'-Hexachlorobiphenyl 2,2',4,4',5,5'-Hexachlorobiphenyl 2,2',3,4,4',5,5'-Heptachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1,9,24) 2) Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
29	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(1,6,21) 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,21)
30	Silver	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
31	Thallium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)

32 Toxaphene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
32	Toxaphene	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,10,24) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(10,24) 3) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
33	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,12,28) 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,28)
34	Vanadium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)
35	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,28)
36	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,6,15) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,6,16) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,6,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 6) Digestion, Inductively Coupled Plasma Method ^(7,14)

กษ...

ดิน จำนวน 121 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
3	Aldrin	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
4	Anthracene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
5	Antimony	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,14)
6	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,17)
7	Atrazine	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
8	Barium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,14)
9	Benz(a)anthracene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
11	Benzo(b)fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
12	Benzo(k)fluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
13	Benzoic acid	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
14	Benzo(a)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
15	Benzo(g,h,i)perylene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
16	Beryllium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15)

2) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
		2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,14)
17	Bis(2-chloroethyl)ether	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
18	Bis(2-ethylhexyl)phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
22	Butyl benzyl phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,14)
24	Carbazole	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
27	Chlordane	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
28	p-Chloroaniline	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
32	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15)

2) Digestion...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
33	Chromium (III)	2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,14) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,15,18) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,16,18) 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^(7,8,14,18)
34	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8,18)
35	Chrysene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
36	Cyanide	1) Extraction, Distillation, Titrimetric Method ^(28,29,30) 2) Extraction, Distillation, Colorimetric Method ^(28,29,30)
37	2,4-D	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
38	DDD	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
39	DDE	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
40	DDT	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
41	Dibenz(a,h)anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
42	Di-n-butyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
43	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
44	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
45	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
46	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
47	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
48	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)

49 cis-1,2-Dichloroethylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
49	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
50	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
51	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
52	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
53	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
54	Dieldrin	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
55	Diethyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
56	2,4-Dimethylphenol	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
57	2,4-Dinitrophenol	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
58	2,4-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
59	2,6-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
60	Di-n-Octyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
61	Endosulfan	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
62	Endrin	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
63	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
64	Fluoranthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
65	Fluorene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(11,27)
66	Heptachlor	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
67	Heptachlor epoxide	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
68	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
69	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,26)
70	α-HCH	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
71	β-HCH	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
72	γ-HCH	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)

73 Hexachlorocyclopentadiene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
73	Hexachlorocyclopentadiene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
74	Hexachloroethane	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
75	Indeno(1,2,3-cd)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
76	Isophorone	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
77	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,16)
78	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,16)
79	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽²⁰⁾
80	Methanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
81	Methoxychlor	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
82	Methyl bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
83	Methylene chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
84	2-Methylphenol	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
85	2-Methylnaphthalene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
86	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
87	Naphthalene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
88	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,16)

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
89	Nitrobenzene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
90	N-Nitrosodiphenylamine	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
91	N-Nitrosodi-n-propylamine	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
92	Polychlorinated Biphenyls Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 2,2',5,5'-Tetrachlorobiphenyl 2,2',4,5,5'-Pentachlorobiphenyl 2,2',3,4,4',5'- Hexachlorobiphenyl 2,2',4,4',5,5'- Hexachlorobiphenyl 2,2',3,4,4',5,5'- Heptachlorobiphenyl	Soxhlet Extraction, Gas Chromatographic Method ^(11,25)
93	Pentachlorophenol	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
94	Phenanthrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
95	Phenol	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
96	Pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11,27)
97	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7,21)
98	Silver	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,16)
99	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
100	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
101	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
102	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
103	Toxaphene	Soxhlet Extraction, Gas Chromatographic Method ^(11,24)
104	TPH (C ₅ -C ₈)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
105	TPH (C ₉ -C ₁₆)	Soxhlet Extraction, Gas Chromatographic Method ^(11,22)
106	TPH (C ₁₆ -C ₃₆)	Soxhlet Extraction, Gas Chromatographic Method ^(11,22)
107	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
108	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
109	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
110	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
111	2,4,5-Trichlorophenol	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
112	2,4,6-Trichlorophenol	Soxhlet Extraction, Gas Chromatographic Method ^(11,23)
113	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
114	Vanadium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,14)
115	Vinyl acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
116	Vinyl chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
117	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
118	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
119	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)

120 Xylene (Total)

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
120	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(13,26)
121	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7,15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7,16) 3) Digestion, Inductively Coupled Plasma Method ^(7,14)

เอกสารอ้างอิง

- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2548. เรื่อง การกำจัดสิ่งปฏิกูลหรือ
วัสดุที่ไม่ใช้แล้ว.ราชกิจจานุเบกษา. 25 มกราคม 2549. เล่มที่ 123 ตอนพิเศษ 114.
- กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2549. เรื่อง กำหนดค่าปริมาณเคมี
ควันทันเจือปนในอากาศที่ระบายออกจากปล่องของหม้อน้ำโรงสีข้าวที่ใช้กลบเป็นเชื้อเพลิง.
ราชกิจจานุเบกษา. 4 ธันวาคม 2549. เล่มที่ 123 ตอนพิเศษ 1254.
- สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4. กรุงเทพฯ:
เรือนแก้วการพิมพ์, 2547.
- APHA, AWWA, WEF. Standard Methods for the Examination of Water and
Wastewater. 23rd ed. Washington, DC: APHA, 2017.
- United States Environmental Protection Agency. Standards of Performance for
New Stationary Sources. 40 CFR 60. Appendix A, 2022.
- United States Environmental Protection Agency. Test Methods for Evaluation
Solid Waste Physical/Chemical Methods. SW-846, 1997.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid
Waste Physical/Chemical Methods. Acid Digestion of Sludges and Sediments and Soils.
SW-846 Method 3050B, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid
Waste Physical/Chemical Methods. Alkaline Digestion for Hexavalent Chromium. SW-846
Method 3060A, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid
Waste Physical/Chemical Methods. Separatory Funnel Liquid-Liquid Extraction. SW-846
Method 3510C, 1996.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid
Waste Physical/Chemical Methods. Solid Phase Extraction. SW-846 Method 3535A, 2007.
- United States Environmental Protection Agency. Test Methods for Evaluation Solid
Waste Physical/Chemical Methods. Soxhlet Extraction. SW-846 Method 3540C, 1996.

12. United States...

12. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Purge-and-Trap for Aqueous Samples. SW-846 Method 5030C, 2003.

13. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples. SW-846 Method 5035A, 2007.

14. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Inductively Coupled Plasma-Optical Emission Spectrometry. SW-846 Method 6010D, 2018.

15. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B, 2007.

16. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Graphite Furnace Atomic Absorption Spectrophotometry. SW-846 Method 7010, 2007.

17. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Arsenic (Atomic Absorption, Gaseous Hydride). SW-846 Method 7061A, 1992.

18. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Chromium, Hexavalent (Colorimetric). SW-846 Method 7196A, 1992.

19. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Mercury in Liquid Waste (Manual Cold-Vapor Technique). SW-846 Method 7470A, 1994.

20. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique). SW-846 Method 7471A, 1994.

21. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Selenium (Atomic Absorption, Borohydride Reduction). SW-846 Method 7742, 1994.

22. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Nonhalogenated Organics Using GC/FID. SW-846 Method 8015D, 2003.

23. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Phenols by Gas Chromatography. SW-846 Method 8041, 1996. *Small*

24. United States...

24. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Organochlorine Pesticides by Gas Chromatography. SW-846 Method 8081B, 2007.

25. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Polychlorinated Biphenyls (PCBs) by Gas Chromatography. SW-846 Method 8082A, 2007.

26. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS). SW-846 Method 8260C, 2006.

27. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry. SW-846 Method 8270D, 2014.

28. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Total and Amenable Cyanide: Distillation. SW-846 Method 9010C, 2004.

29. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Cyanide Extraction Procedure for Solids and Oil. SW-846 Method 9013A, 1996.

30. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. Cyanide in Waters and Extracts Using Titrimetric and Manual Spectrophotometric Procedures. SW-846 Method 9014, 2014. *Small*

ที่ อก ๐๓๑๐(๑)/ ๑ ๖ ๔ ๕ ๗



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒ ๘ พฤศจิกายน ๒๕๖๖

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

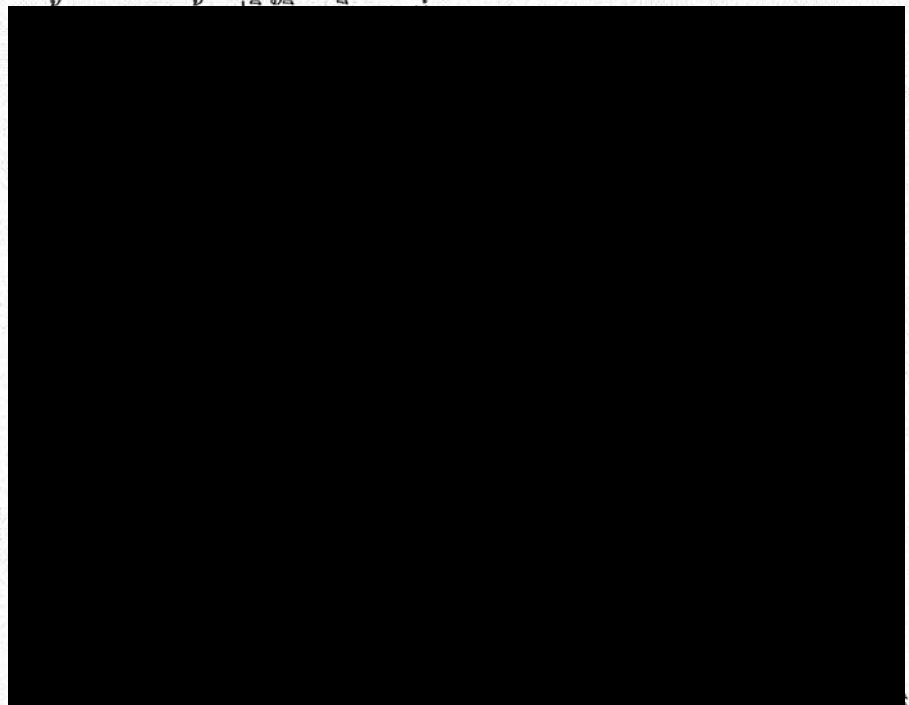
เรียน กรรมการผู้จัดการ บริษัท เอส. พี. เจ. โซลันติฟิค จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๘ สิงหาคม ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอส. พี. เจ. โซลันติฟิค จำกัด จำนวน ๓ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอส. พี. เจ. โซลันติฟิค จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๖ สถานที่ตั้งเลขที่ ๘๐ ซอยนักกีฬาแหลมทอง ๓ แขวงทับช้าง
เขตสะพานสูง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอส. พี. เจ. โซลันติฟิค จำกัด ต่ออายุหนังสือรับ
ขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้



ค. ขอบข่ายสารมลพิษที่ตรวจขึ้นทะเบียนแล้ววิเคราะห์ได้แล้ว อาทิ เคมี และสิ่งปนเปื้อน
หรือวัสดุที่ไม่ใช่แล้ว ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒๖ กันยายน ๒๕๖๙ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

จรินทร์ อภิระพาส์

(นายประสม ตีรังพงษ์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙
ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอส. พี. เจ. ไชยแอนติฟิค จำกัด

เลขทะเบียน ว-๒๐๖

ที่ อก ๐๓๑๐(๑)/ ๑ ๖ ๔ ๕ ๗

ลงวันที่ ๒๘ พฤศจิกายน ๒๕๖๖

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๔ รายการ

น้ำเสีย จำนวน 23 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ^[3] 2) 5-Day BOD Test, Membrane Electrode Method ^[3]
2	Cadmium	Digestion, Direct Air-Acetylene Flame Method ^[3]
3	Chemical Oxygen Demand	Closed Reflux, Colorimetric Method ^[3]
4	Chromium	Digestion, Direct Air-Acetylene Flame Method ^[3]
5	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[3]
6	Copper	Digestion, Direct Air-Acetylene Flame Method ^[3]
7	Cyanide	Distillation, Colorimetric Method ^[3]
8	Formaldehyde	Distillation, Colorimetric Method ^[2]
9	Free Chlorine	Iodometric Method ^[3]
10	Hexavalent Chromium	Colorimetric Method ^[3]
11	Lead	Digestion, Direct Air-Acetylene Flame Method ^[3]
12	Manganese	Digestion, Direct Air-Acetylene Flame Method ^[3]
13	Nickel	Digestion, Direct Air-Acetylene Flame Method ^[3]
14	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ^[3] 2) Soxhlet Extraction Method ^[3]
15	pH	Electrometric Method ^[3]
16	Phenols	Distillation, Chloroform Extraction Method ^[3]
17	Sulfide	Iodometric Method ^[3]
18	Temperature	Laboratory and Field Methods ^[3]
19	Total Dissolved Solids	Dried at 180 °C ^[3]
20	Total Kjeldahl Nitrogen	Macro-Kjeldahl, Titrimetric Method ^[3]
21	Total Phosphorous	Digestion, Colorimetric Method ^[3]
22	Total Suspended Solids	Dried at 103-105 °C ^[3]
23	Zinc	Digestion, Flame Atomic Absorption Method ^[3]

อากาศเสีย (ปล่อยระบาย) จำนวน 4 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Carbon Monoxide	Instrumental Analyzer Method ^[8]
2	Oxides of Nitrogen	Instrumental Analyzer Method ^[8]
3	Sulfur Dioxide	1) Absorption, Barium-Thorin Titrimetric Method ^[8] 2) Instrumental Analyzer Method ^[8]
4	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^[8]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 7 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Cadmium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,4,5] 2) Digestion, Flame Atomic Absorption Spectrometric Method ^[4,5]
2	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,4,5] 2) Digestion, Flame Atomic Absorption Spectrometric Method ^[4,5]
3	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,4,5] 2) Digestion, Flame Atomic Absorption Spectrometric Method ^[4,5]
4	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,4,5] 2) Digestion, Flame Atomic Absorption Spectrometric Method ^[4,5]
5	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,4,5] 2) Digestion, Flame Atomic Absorption Spectrometric Method ^[4,5]
6	pH	Electrometric Method ^[6,7]
7	Zinc	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,4,5] 2) Digestion, Flame Atomic Absorption Spectrometric Method ^[4,5]

เอกสารอ้างอิง

1. กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2566. เรื่องการจัดการสิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว. ราชกิจจานุเบกษา. 31 พฤษภาคม 2566. เล่ม 140 ตอนพิเศษ 126 ง.
2. สมาคมวิศวกรรมสิ่งแวดล้อมแห่งประเทศไทย. คู่มือวิเคราะห์น้ำเสีย. พิมพ์ครั้งที่ 4 กรุงเทพฯ : เรือนแก้วการพิมพ์, 2547.
3. APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 23rd ed. Washington, DC: APHA, 2017.
4. United States Environmental Protection Agency. Test Method of Evaluating Solid Waste, Physical/Chemical Method. Acid Digestion of Sediments, Sludges, and Soils. SW-846 Method 3050B, 1996.
5. United States Environmental Protection Agency. Test Method of Evaluating Solid Waste, Physical/Chemical Method. Flame Atomic Absorption Spectrophotometry. SW-846 Method 7000B, 2007.
6. United States Environment Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. pH Electrometric Measurement. SW-846 Method 9040C, 2004.
7. United States Environment Protection Agency. Soli and Waste pH. SW-846 Method 9045D, 2004.
8. United States Environmental Protection Agency. Standards of Performance for New Stationary Sources. 40 CFR 60. Appendix A, 2022. *Smf*

ที่ อก ๐๓๑๐(๑)/ ๗ ๐๑๑



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๖ กรกฎาคม ๒๕๖๗

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอส. พี. เจ. โซแอนติฟิค จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๘ กรกฎาคม ๒๕๖๗

ตามคำขอที่อ้างถึง บริษัท เอส. พี. เจ. โซแอนติฟิค จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-๒๐๖ สถานที่ตั้งเลขที่ ๘๐ ซอยนักกีฬาแหลมทอง ๓ แขวงทับช้าง เขตสะพานสูง กรุงเทพมหานคร
ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๑ ราย ได้แก่ นายภาณุวัฒน์ รongราช ทะเบียนเลขที่ ว-๒๐๖-จ-๐๐๐๔

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรยศ กลั่นกรอง)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๔

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



ที่ อก ๐๓๑๐(๑)/ ๒ ๕ ๑ ๘



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๕ มีนาคม ๒๕๖๘

เรื่อง เปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด

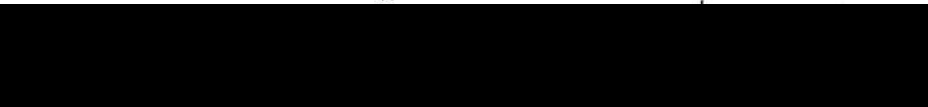
- อ้างถึง ๑. คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๗ มกราคม ๒๕๖๘
๒. คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๕ มีนาคม ๒๕๖๘

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์
บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด จำนวน ๑ แผ่น

ตามคำขอที่อ้างถึง ๑ และ ๒ บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-๒๐๖ สถานที่ตั้งเลขที่ ๘๐ ซอยนักกีฬาแหลมทอง ๓ แขวงทับช้าง เขตสะพานสูง กรุงเทพมหานคร
ขอเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์ ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ ราย



๒. ให้เพิ่มขอบข่ายชนิดสารมลพิษที่วิเคราะห์ในอากาศเสีย ตามส่งทส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะสิ้นอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒๖ กันยายน ๒๕๖๙

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรทัศน์ อิศรางกูร ณ อยุธยา)

รองอธิบดี ปฏิบัติราชการแทน

อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงบุคลากรและสารมลพิษที่วิเคราะห์

บริษัท เอส. พี. เจ. ไฮแอนต์ฟิค จำกัด

เลขทะเบียน ว-๒๐๖

ที่ อก ๐๓๑๐(๑)/ ๒ ๕ ๑ ๘

ลงวันที่ ๒๔ มีนาคม ๒๕๖๘

ขอข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑ รายการ

อากาศเสีย จำนวน 1 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Opacity	Ringelmann's Method

เอกสารอ้างอิง

กระทรวงอุตสาหกรรม. ประกาศกระทรวงอุตสาหกรรม, พ.ศ. 2549. เรื่อง กำหนดค่าปริมาณเขม่า
ควันที่เจือปนในอากาศที่ระบายออกจากปล่องของหม้อน้ำโรงสีข้าวที่ใช้กลายเป็นเชื้อเพลิง.

ที่ อก ๐๓๑๐(๑)/๕๕๕๕



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๒ พฤษภาคม ๒๕๖๕

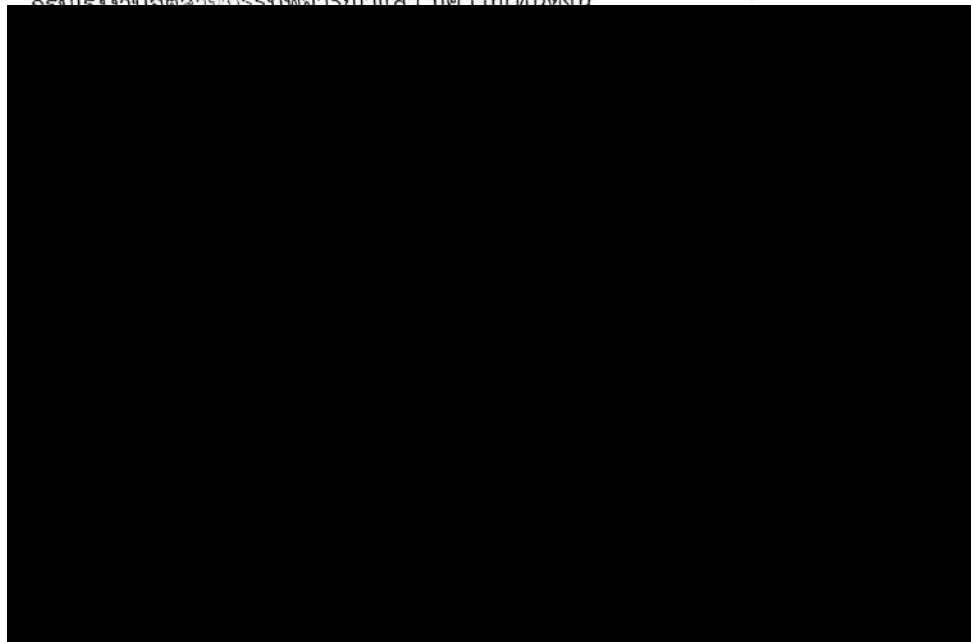
เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑ เมษายน ๒๕๖๕

ตามคำขอที่อ้างถึง บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-๒๐๖ สถานที่ตั้งเลขที่ ๘๐ ซอยนักกีฬาแหลมทอง ๓ แขวงทับช้าง เขตสะพานสูง กรุงเทพมหานคร
ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้



อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒๖ กันยายน ๒๕๖๕

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประสม ดำรงพงษ์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

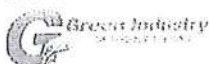
กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๕๕

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



ที่ อก ๐๓๑๐(๑)/ ๕๙ ๖ ๓



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๖ กรกฎาคม ๒๕๖๘

เรื่อง เปลี่ยนแปลงสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๑ พฤษภาคม ๒๕๖๘

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์
บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด จำนวน ๑ แผ่น

ตามคำขอที่อ้างถึง บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-๒๐๖ สถานที่ตั้งเลขที่ ๘๐ ซอยนักกีฬาแหลมทอง ๓ แขวงทับช้าง เขตสะพานสูง
กรุงเทพมหานคร ขอเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด เพิ่มขอขยาย
ชนิดสารมลพิษที่วิเคราะห์ในอากาศเสีย ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะสิ้นสุดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒๖ กันยายน ๒๕๖๙

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประสม ดำรงพงษ์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวหน้า ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท เอส. พี. เจ. ไฮแอนด์ฟิค จำกัด เลขทะเบียน ว-๒๐๖

ที่ ออก ๐๓๑๐(๑)/ ๕๙ ๖ ๓


ลงวันที่ ๑๖ กรกฎาคม ๒๕๖๘

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑ รายการ

อากาศเสีย (ปล่องระบาย) จำนวน 1 รายการ

ลำดับ	สารมลพิษ	วิธีวิเคราะห์
1	Xylene	Adsorption sampling, Gas Chromatographic Method

เอกสารอ้างอิง

United States Environmental Protection Agency. Standards of Performance for New Stationary Sources. 40 CFR 60. Appendix A, 2023. 

ที่ อก ๐๓๑๐(๑)/ ๑ ๐ ๓ ๓ ๘



กรมโรงงานอุตสาหกรรม

ถนนพระรามที่ ๖ แขวงทุ่งพญาไท

เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๕ ธันวาคม ๒๕๖๘

เรื่อง เปลี่ยนแปลงสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๗ ตุลาคม ๒๕๖๘

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์
บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด จำนวน ๑ แผ่น

ตามคำขอที่อ้างถึง บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-๒๐๖ สถานที่ตั้งเลขที่ ๘๐ ซอยนักกีฬาแหลมทอง ๓ แขวงทับช้าง เขตสะพานสูง กรุงเทพมหานคร
ขอเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอส. พี. เจ. ไฮแอนติฟิค จำกัด เพิ่มขอขยาย
ชนิดสารมลพิษที่วิเคราะห์ในน้ำ/น้ำเสีย น้ำใต้ดิน และอากาศเสีย ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะสิ้นอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ในวันที่ ๒๖ กันยายน ๒๕๖๙

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางสาวปัทมวรรณ คุณประเสริฐ)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์

บริษัท เอส. พี. เจ. โซลิวชัน จำกัด

เลขทะเบียน ว-๒๐๖

ที่ อก ๐๓๑๐(๑)/ ๑ ๐ ๓ ๓ ๘

ลงวันที่

๒๕ ธันวาคม ๒๕๖๘

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓ รายการ

น้ำ/น้ำเสีย จำนวน 1 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[1]

น้ำใต้ดิน จำนวน 1 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[1]

อากาศเสีย (ปล่องระบาย) จำนวน 1 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[2]

เอกสารอ้างอิง

1. APHA, AWWA, WEF. Standard Methods for the Examination of Water and Wastewater. 24th ed. Washington, DC: APHA, 2023.

2. United States Environmental Protection Agency. Standards of Performance for New Stationary Sources. 40 CFR 60. Appendix A, 2023.

อนุมัติ

ภาคผนวก ง-2

เอกสารสอบเทียบเครื่องมือตรวจวัด

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
1.	Ambient Air	TSP	ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	17/08/2023	April 2024
			High Volume Air Sampler/TET	S/N TSP-30	01/07/2024	July 2025
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
		PM-10	ORIFICE TRANSFER STANDARD/Tisch	S/N 0068	17/08/2023	April 2024
			High Volume Air Sampler/TET	S/N PM10-31	03/07/2024	July 2025
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
		NO ₂	CERTIFICATE OF ANALYSIS: Linde	S/N A00917SK	05/07/2023	July 2025
			NO _x Analyzer/API 200E	S/N 1281	22/04/2024	October 2024
		SO ₂	CERTIFICATE OF ANALYSIS: Linde	S/N D636157	18/09/2023	September 2027
			SO _x Analyzer/API 100A	S/N 1563	25/04/2024	October 2024
2.	Stack Air	WS & WD	Wind speed and wind direction/Weather Wizard II	S/N WC80609A09	24/10/2023	October 2024
		Particulate	Dry Gas Meter/SK25	S/N 8004294	08/02/2024	February 2025
			Digital Barometer/PHB-318	S/N B011412	15/03/2024	March 2025
			Digital Thermometer/DP-52	S/N L411635	04-10/04/2024	April 2025
			Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
		NO _x as NO ₂	Gas Analyzer (E-instrument)/E6000-SDS	S/N 1339	01/06/2024	December 2024
			Gas Analyzer (E-instrument)/E6000-SDS	S/N 1339	01/06/2024	December 2024
		Al	Dry Gas Meter/SK25	S/N 8004294	08/02/2024	February 2025
			Digital Barometer/PHB-318	S/N B011412	15/03/2024	March 2025
			Digital Thermometer/DP-52	S/N L411635	04-10/04/2024	April 2025
			ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	28/03/2024	September 2024
		HF	Personal Air Sampler/Gilian	S/N 20110505116	11/09/2024	October 2024
			Ion Chromatograph/ICS-1100	S/N 10010987	28/03/2024	September 2024

1/4



TET

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์ (ต่อ)

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
2.	Stack Air (Cont.)	Xylene	Personal Air Sampler/Gilian	S/N 20110803069	11/09/2024	October 2024
			Gas Chromatograph/GC7890B	S/N C416343040	25/09/2023	September 2024
		Toluene	Personal Air Sampler/Gilian	S/N 20110803069	11/09/2024	October 2024
			Gas Chromatograph/GC7890B	S/N C416343040	25/09/2023	September 2024
3.	Water	Temperature	pH Meter/Horiba F-71G	S/N V3B1F8H3	31/10/2024	October 2025
		pH	pH Meter/Horiba F-71G	S/N V3B1F8H3	31/10/2024	October 2025
		TSS	Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
		TDS	Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
		BOD	BCD Incubator/Model 1250	S/N 0408-0115-0008	09/04/2024	April 2025
		Oil & Grease	Electronic Balance/METTLER TOLEDO	S/N 1116392227	10/04/2024	April 2025
		Conductivity	Conductivity Meter/Horiba	S/N D66G0003	29/01/2024	January 2025
4.	Working Air	Aluminum Oxide as Aluminum	Personal Air Sampler/Gilian	S/N 20080703009	09/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20111203054	09/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20110803069	09/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20110505116	09/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20151003041	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20120103076	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20140505076	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20151102088	14/09/2024	October 2024
		HF	ICP394/PerkinElmer/OPTIMA8000	S/N 078N1310024C	28/03/2024	September 2024
			Personal Air Sampler/Gilian	S/N 20140505104	09/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20120103076	09/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20151102088	09/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20151102097	09/09/2024	October 2024

2/4



TET

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์ (ต่อ)

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
4.	Working Air (Cont.)	Toluene	Personal Air Sampler/Gilian	S/N 20140505104	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20140505029	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20110803069	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20140705060	14/09/2024	October 2024
			Gas Chromatograph/GC7890B	S/N CN16343040	25/09/2023	September 2024
		Xylene	Personal Air Sampler/Gilian	S/N 20140505104	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20140505029	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20110803069	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20140705060	14/09/2024	October 2024
			Gas Chromatograph/GC7890B	S/N CN16343040	25/09/2023	September 2024
		Oil Mist	Personal Air Sampler/Gilian	S/N 20080703013	14/09/2024	October 2024
			Personal Air Sampler/Gilian	S/N 20151102097	14/09/2024	October 2024
			Electronic Balance/XP 205	S/N 1129273885	10/04/2024	April 2025
			Electronic Balance/XP 205	S/N 1129273885	10/04/2024	April 2025
5.	Sound Level	Leq 24 hr	Sound Level Calibrator/Tenmars TM-100	S/N 180501628	13/08/2024	August 2025
			Integrated Sound Level/ACO TYPE 6226	S/N 110102	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 222037	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 160211	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 222039	01/09/2024	30/09/2024
6.	Occupational Safety and Health	Leq 8 hr	Sound Level Calibrator/Tenmars TM-100	S/N 180501628	13/08/2024	August 2025
			Integrated Sound Level/ACO TYPE 6226	S/N 160213	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 110097	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 110100	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 160098	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6226	S/N 130127	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6326	S/N 152075	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6326	S/N 152077	01/09/2024	30/09/2024
			Integrated Sound Level/ACO TYPE 6326	S/N 152077	01/09/2024	30/09/2024

3/4



TET

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

ตารางการสอบเทียบเครื่องมือที่ใช้ในการตรวจวัดและวิเคราะห์ (ต่อ)

Item	Description	Parameter	List of Equipment	Equipment No.	Calibration	Next Calibration
6.	Occupational Safety and Health (Cont.)	Noise Dose	Noise Dose Meter/SOUNDTEK ST-130	S/N 170400165	23/02/2024	February 2025
			Noise Dose Meter/SOUNDTEK ST-130	S/N 170800191	08/02/2024	February 2025
			Noise Dose Meter/SOUNDTEK ST-130	S/N 170800193	08/02/2024	February 2025
			Noise Dose Meter/SOUNDTEK ST-130	S/N 170800207	23/02/2024	February 2025
			Noise Dose Meter/SOUNDTEK ST-130	S/N 220100050	15/02/2024	February 2025
			Noise Dose Meter/SOUNDTEK ST-130	S/N 220100051	15/02/2024	February 2025
			Noise Dose Meter/SOUNDTEK ST-130	S/N 220100055	11/03/2024	March 2025
		Heat	Thermal Environment Monitor/JANTYTECH/JT2011-E2A	S/N 3522210143	18/03/2024	March 2025
			Thermal Environment Monitor/JANTYTECH/JT2011-E2A	S/N 3522210146	19/03/2024	March 2025
		Light Intensity	Digital Lux Meter/DIGICOM/LX-50	S/N Q066345	17/07/2024	July 2025

4/4



TET

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

**TET**THAI ENVIRONMENTAL TECHNIC LIMITED
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด**CONTROL UNIT CALIBRATION**

(Metric units , mm)

Date **8-Feb-24**Barometric press, Pb
Initial Final Average
759.2 759.3 759.25 mmHg

Dry Gas Meter Data

Console No. **M50-04**

Metering System ID

DGM Number **S004294**DGM Model **SK 25**

Reference Dry Gas Meter Data

Serial No. **913428**Model **S-110**Correction factor(Yr) **1.0209**Last Calibration Date **26-May-23**

Orifice manometer setting ΔH mm H ₂ O	Ref , DMG Volume V _m Liters	DGM Volume V _m Liters	Temperature (° C)				Time min	DGM Correction factor (Y)	ΔH@ mm H ₂ O
			Ref DGM T _r	Dry Gas Meter					
				Inlet T _i	Outlet T _o	Avg T _m			
15.00	100.00	100.20	29.20	30.10	30.20	30.15	8.36	1.0206	46.1326
25.00	100.00	100.10	29.20	30.10	30.20	30.15	6.49	1.0206	46.3824
50.00	100.00	99.90	29.20	30.10	30.20	30.15	4.58	1.0202	46.3097
80.00	100.00	99.55	29.20	30.10	30.20	30.15	3.59	1.0208	45.6567
100.00	100.00	99.40	29.20	30.10	30.20	30.15	3.23	1.0204	46.2875

Average **1.0205** **46.1538**Dued Date of Calibrate **9-Feb-25**Calibrated by : *JWS*Approved : *Pramual M.*

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ± 0.01 .

Note: For ΔH_0 , Orifice pressure differential that equates to 0.75cfm (0.0012m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ± 0.2 inches (5.08mm).

Thai Environmental Technic Limited 145 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
Tel : +66(0)2373-7995(Auto) Fax : +66(0)2373-7999 E-mail: admin@tect1995.com www.tect1995.com



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATANAKARN ROAD SOI 14, SUANLIUANG, SUANLIUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484

**Certificate of Calibration**

Certificate No. : 24P896

Page : 1 of 2

Equipment : Humidity/Barometer/Temp.

Manufacturer: Lutron

Model : PHB-318

Serial No.: B011412

ID No.: NO.5

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 15 March 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (23 \pm 2) °CRelative Humidity: (50 \pm 15) %

Atmospheric Pressure: 1012 mbar

1/5 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung,
Bangkok 10240

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments
Standard according to calibration procedure CP-P10, using " DKD-R 6-1 : Calibration of Pressure Gauges " as
a guidelines.

Condition of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Barometer	DP1142	1422505046	MP-0094-23	03 May 2024

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

3. Scale and conversion factor is 1 kPa = 7.50062 mmHg

4. This result of calibration instrument was in absolute pressure.

5. This instrument was used clean air as pressure media.

6. This instrument was installed in vertical orientation and center of the device was used as the reference level.

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

8. This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suksan Khankhaew

Issue Date : 18 March 2024

Approved Signatory : *Attapol P.*

[] Phalinee Prabpalpal

[] Sura Suwanasri

[x] Attapol Panurach

B 0337434



Cert.No.: 24P896
Page: 2 of 2

Result of calibration:- Without adjustment

Range: 730 mmHg to 770 mmHg

Function:- Absolute Pressure Measurement

Resolution: 0.1 mmHg

Increasing Pressure

Applied Pressure (mmHg)	729.80	739.80	749.89	759.89	769.89
UUC* Indication (mmHg)	730.5	740.5	750.5	760.5	770.5
Error (mmHg)	0.60	0.60	0.61	0.61	0.61

Decreasing Pressure

Applied Pressure (mmHg)	769.89	759.89	749.89	739.90	729.90
UUC* Indication (mmHg)	770.5	760.5	750.5	740.5	730.5
Error (mmHg)	0.61	0.61	0.61	0.60	0.60

The uncertainty of measurement was ± 0.12 mmHg

* UUC = Unit Under Calibration

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

-000-

Attapol P.

a 1206581



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
5344 PATTANAKARN ROAD SOI 15, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484



Certificate of Calibration

Certificate No.: 24T625
Page: 1 of 2

Equipment: Digital Thermometer With Sensor

Manufacturer: Digicon

Model: DP-52

Serial No.: 1.411635

ID No.: No.10

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 04 April 2024
to 10 April 2024

Reference: 2403-0381DSC

Ambient Temperature: $(25 \pm 3) ^\circ\text{C}$

Relative Humidity: $(50 \pm 20) \%$

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-T01 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into liquid bath temperature controller and comparison with Standard Thermocouple (Type R/S) into high temperature furnace.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1.Reference standards instruments:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Digital Thermometer	1529	A4B760	2311123	21 Sep 2024
2) Industrial Platinum Resistance Thermometer	5827	824302	2311123	21 Sep 2024
3) Digital Multimeter	2700	4016315	23EH24	06 Oct 2024
4) Standard Thermocouple Probe (Type S)	TCS	TCS-001	TT-0004-24	09 Jan 2025

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 through:-

- Technology Promotion Association (Thailand-Japan), NSQ-ONSQ Accredited No. Calibration 0008
- National Institute of Metrology Thailand (NIMT)

Calibrated by: Anuchit Pangchata
Issue Date: 19 April 2024

Approved Signatory:

☐ Pitsinee Prabpaipal
☐ Chatchawan Khunpluek
☒ Wanlop Larphern

B 0339236



Cert. No.: 24T625
Page.: 2 of 2

Result of Calibration:-

Without Adjustment

Function: Temperature measurement for Channel T1

This equipment was connected with Thermocouple Type K S/N. 11005001 ID No. NO.10

Dimension of probe : Diameter 8 mm., Length 1030 mm. Sheath material : Stainless Steel

Immersion Depth (mm.)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (± °C)
180	200.0012	200.0	-0.0012	0.74
180	400.0019	399.9	-0.1019	1.4
180	599.98	601.9	1.9200	3.1

UUC* : Unit Under Calibration

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

-o-o-

a 1210754



JIRARATTEE ASSOCIATES CO., LTD.

Jirarattee Associates Co., Ltd.
63/14-15, 67/35-36
Petchakarn 7/71, Rd. Wanhapa, Banglinkhyai,
Bangkok 10600 (Thailand)
Tel: +6686080912
Mobile: +6686399453
E-mail: jnac-calibration@jirarattee.com
Web site: www.jirarattee.com

Accredited calibration laboratory
ISO/IEC 17025:2017
NSC-TISI-TIS 17025
CALIBRATION 0367

Flow measurement laboratory
Calibration services department.



CERTIFICATE OF CALIBRATION

Certificate No. : CQF-086-66

Page 1 of 2 Pages

MEASUREMENT ITEM

: Top Load Orifice

MANUFACTURER

: TISCH

MODEL/TYPE

: TE-S025A

SERIAL NUMBER

: 0068

ID NUMBER

: -

CONDITION AS-RECEIVED

: Used item

CUSTOMER

: Thai Environmental Technic. Limited,
1/6 Soi Ramkhamhaeng 145, Khwong/Khet Saphan Sung,
Bangkok 10240

RECEIVED DATE

: 08 Aug 2023

MEASUREMENT DATE

: 17 Aug 2023

ISSUE DATE

: 17 Aug 2023

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH
Atmospheric Pressure : 1010 ± 10 hPa

CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.

Measurement Condition : The average values during measurement are 23.8 °C and 54.3 %RH.

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

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:

The Orifice gas flow device was calibrated against
Standard Rotary Displacement Meter (Roots
Meter) Model 6R5/IMC/N2-dp. The WI-CL-004
was used as a calibration guideline.

Traceability:

This certificate provides a traceability of The
measurement to recognized the national
standards, and to realization of the international
system of units (SI) through the VSL (National
Metrology Institute of Netherlands) via Certificate
number: G2211901

Uncertainty of Measurement:

The reported uncertainty of measurement is based
on the standard uncertainty multiplied by a
coverage factor $k=2$, which for a normal
distribution corresponds to a coverage probability
of approximately 95%. The standard uncertainty
has been determined in accordance with the GUM
(Evaluation of measurement
data - Guide to the expression of uncertainty in
measurement)

Calibrated by:

Mr. Sorawit Thachabud
Miss Jittaporn Lertsomphol



Approved signatory:

Mr. Parinya Bebecharoen
Calibration Department Manager

THIS CERTIFICATE REPORT MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION HAS BEEN OBTAINED
IN WRITING FROM THE LABORATORY

MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roots Meter). The humid air was used as a medium in the system. The standard conditions are 25°C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of Q Standard calibration data

Plate	Flow rate m ³ /min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Ap_meter mmHg	Ap_Orifice inH ₂ O	Y	Standard Flow [Qs] m ³ /min
1	0.700	754.191	23.89	23.40	50.276	1.674	1.291	0.651
2	1.005	754.148	23.80	23.70	54.969	2.395	1.839	0.929
3	1.118	754.084	23.88	23.81	37.064	4.407	2.094	1.058
4	1.175	754.076	23.87	23.79	27.625	5.018	2.236	1.127
5	1.420	754.047	23.89	23.81	27.348	7.362	2.708	1.368

Slope (m): 1.99045
Intercept (b): -0.00789
Correlation coefficient (r): 0.99979
Uncertainty (k=2): 0.015 m³/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m ³ /min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Ap_meter mmHg	Ap_Orifice inH ₂ O	Y	Standard Flow [Qs] m ³ /min
1	0.700	754.191	23.89	23.40	50.276	1.674	0.812	0.654
2	1.005	754.148	23.80	23.70	54.969	2.395	1.156	0.932
3	1.118	754.084	23.88	23.81	37.064	4.407	1.318	1.062
4	1.175	754.076	23.87	23.79	27.625	5.018	1.406	1.132
5	1.420	754.047	23.89	23.81	27.348	7.362	1.703	1.368

Slope (m): 1.24671
Intercept (b): -0.09497
Correlation coefficient (r): 0.99979
Uncertainty (k=2): 0.015 m³/min

End of Certificate of Calibration



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Technic

Site ID: Bangkok

Date: 1-Jul-24

ITEM: TSP

Serial No: (No. 30)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg): 760.00

Corrected Pressure (mm Hg): 760.0

Temperature (°C): 25.0

Temperature (deg K): 298.0

Average Press. (mm Hg): 754.4

Corrected Average (mm Hg): -

Average Temp (°C): 29.8

Average Temp. (deg K): -

Calibration Orifice

Make: Tisch
Model: JS-5025A
Serial: 0068

Qstd Slope: 1.99045
Qstd Intercept: -0.00789
Calibration Due Date: 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope: 29.6691 Intercept: 5.6700 Corr. Coeff: 0.9893 # of Observations: 5
1	12.60	1.787	60.0	57.00	
2	9.30	1.536	54.0	52.00	
3	7.40	1.371	50.0	48.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Q_{std} = 1/m(\sqrt{(1420(Pa/Pstd)(Tstd/Ta))}) - b$$

$$IC = (Q_{std}(Pa/Pstd)(Tstd/Ta))$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m((1/(\sqrt{(1420(Tav/Pav)(Pav/760))}) - b))$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Calibrate By:

Approve By:

**TET**

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

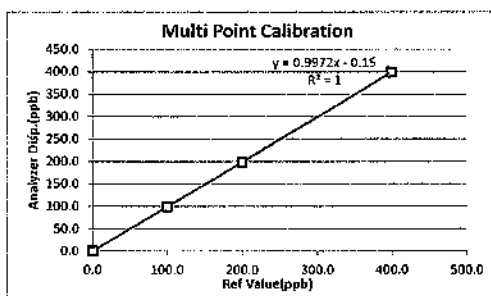
Calibrate Date	: 22-Apr-24	Temperature (°C)	: 25 °C
Analyzer Type	: NOx	Barometer (mmHg)	: 759.9
Brand	: API	Humidity (50±15 %)	: 50.1 %RH
Model	: 200 E	Dilutor	: API M700 S/N 625
Serial Number	: 1281 (No. 20)	Zero Air	: API M701 S/N 1926
Range	: 500 ppb	Standard gas	: A00917 SK

Calibration of Span

Supply Gas	Ref Value (ppb)	Before of Span (ppb)			After of Span (ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0
Span	400.0	392.0	395.0	-3.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value (ppb)	Analyzer Disp (ppb)			Output Difference		
	NOx	NO	NO ₂	Diff (ppb)	% Diff	Abs (%) Diff
0.0	0.4	0.4	0.1	0.35	0.001	0.09
100.0	99.8	99.3	0.5	-0.70	-0.007	0.70
200.0	199.2	198.7	0.5	-1.30	-0.007	0.65
400.0	399.3	399.1	0.2	-0.90	-0.002	0.22
Average Diff (%)						0.42



Calibrate by:

Approved by:

วันที่ตรวจ: 00

วันที่สอบ: 02/09/15

เจ้าหน้าที่: QF-Q116-06

Thai Environmental Technic Limited 2/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung, Bangkok 10240 Thailand
Tel: +66(0)2373-7799(Auto) Fax: +66(0)2373-7979 • admin@tet1995.com • www.tet1995.com

THE LINDE GROUP

Certificate Of Analysis Special Gases Mixture

Customer Details		Certificate Details	
Name:	Address:	Number:	Date of issue:
Thai Environmental Technic Limited.	1/6 Soi Ramkhamhaeng 45, Sapansoong, Khet Saphan Sung, Bangkok 10240	2500/23	18-Sep-2023
Customer Tag No.:		Material Details	Expiry date:
		Production Order:	18-Sep-2027
		Gas content:	Material Code:
		5.520 M ³	608400-SK-44
		Cylinder Owner:	Filling pressure:
		LINDE	145 bar
		Cylinder Material:	Valve:
		Spectra seal	CGA 660 SS
		Cylinder Size:	Cylinder Size:
		40 L	40 L

Laboratory Report

		Analytical Result			Assay Date
Component	Nominal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ²	
Sulphur Dioxide in Nitrogen	40.0 ppm	41.1 ppm	± 1% relative	(6) I-PB-352	8-Sep & 18-Sep-23

Reference Standard		Reference Standard used in Assay	
		Cylinder number	Concentration
Sulphur Dioxide in Nitrogen		BOC 15062956	25.35 ± 0.25 ppm
		Expiry date:	
		9-Jun-2024	

Analytical Instruments used in Assay		Last Multipoint Calibration
Instrument/Make/Model	Analytical Principle	
FIR Spectrometers Nicolet 550	FTIR-SO2	6-Sep-2023

Recommend usage condition

Minimum utilization: 5% of actual content or before expiry date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

- All results expressed in this report are on mole/mole basis, unless otherwise specified. The Assay of this Standard has been performed in accordance with the LPA Traceability Protocol FPA-600/R-12/331 for the Assay and Certification of Gaseous Calibration Standards using procedure G4.
- The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95% (the measurement of this material is traceable to the Sulphur gas standard which is traceable to Swiss National Standard of Mass or other recognized national metrology institutes).
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Ion Chromatography, (6) Other - Specified

Page: 1 of 1

This report shall not be reproduced except in full

Sukanya Parinyasornlorn
Signatory for and on behalf of Linde (Thailand) Co., Ltd.

PB-002/1006

Iss: 1/2, 01 August 2023

บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

Linde (Thailand) Public Company Limited

15 ชั้น, ถนนสุขุมวิท 23 (สุขุมวิท) 15, ถนนสุขุมวิท 23, แขวง 6-5 เขต สุขุมวิท

เลขที่ 15 ถนนสุขุมวิท 23 (สุขุมวิท) 15, ถนนสุขุมวิท 23, แขวง 6-5 เขต สุขุมวิท

โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

Linde (Thailand) Public Company Limited

Linde (Thailand) Public Company Limited

15 ชั้น, ถนนสุขุมวิท 23 (สุขุมวิท) 15, ถนนสุขุมวิท 23, แขวง 6-5 เขต สุขุมวิท

เลขที่ 15 ถนนสุขุมวิท 23 (สุขุมวิท) 15, ถนนสุขุมวิท 23, แขวง 6-5 เขต สุขุมวิท

โทรศัพท์ (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

โทรสาร (66) 2338-6100 โทรสาร (66) 2338-6333

**TET**

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Analyzer Calibration Report

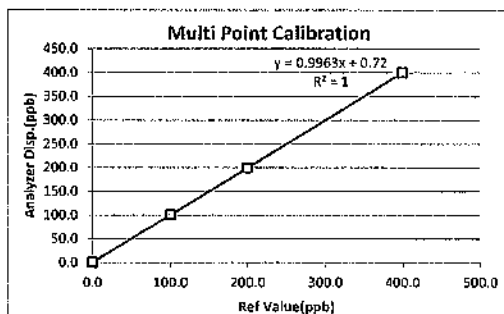
Calibrate Date	25-Apr-24	Temperature (°C)	25.0
Analyzer Type	SO ₂	Barometer (mmHg)	755.0
Brand	API	Humidity (50±15 %)	50.0 %RH
Model	100A	Dilutor	API M700 S/N 625
Serial Number	1563 (No. 15)	Zero Air	API M701 S/N 1926
Range	500 ppb	Standard gas	D636157

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span(ppb)	After of Span(ppb)	Abs% diff of Span
Zero	0.0	2.4	0.0	0.0
Span	400.0	384.0	400.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)	Output Difference		
		Diff (ppb)	Percent Diff	Abs Percent Diff
0.0	0.7	0.7	0.00	0.18
100.0	100.5	0.5	0.01	0.50
200.0	199.8	-0.2	0.00	0.10
400.0	399.3	-0.7	0.00	0.17
Average Diff (%)				0.24



Calibrate by:

Approved by:

แก้ไขครั้งที่: 00

วันที่อนุมัติ: 02/09/15

เลขที่แบบฟอร์ม: QF-QP16-06

Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145 Khwaeng/Khet Saphan Sung Bangkok 10240 Thailand
Tel: +66(0)2373-7799(Auto) Fax: +66(0)2373-7979 • admin@tet1995.com • www.tet1995.com



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by: Calibration & Test Section: Meteorological Instruments Bureau

Date of Issue: 24 October, 2023

Certification No. 375/23

Page: 1 of 2

Object: Wind speed and wind direction

Manufacturer: Davis Instruments Inc.

Type: Weather Wizard II

Serial No.: WC80609A09 ID No.: No. 27

Customer: Thai Environmental Technic Limited.

1/6 Soi Ramkhamhaeng 145,

Khwaeng/Khet Saphan Sung, Bangkok 10240.

Calibration Condition: Temperature 25.1 °C Barometric Pressure 1012.1 hPa

NATIONAL STANDARD WIND TUNNEL:

: Thermal Anemometer 642 S/N 91563

: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460

: Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION

: Standard Velocity at 0 - 20 m/sec

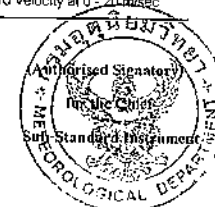
Calibrated by:

Mr. Watchapol Subwat

Mechanical Engineer

Signed:

Mr. Pichet Promsut





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 375/23

24 October, 2023

Page : 2 of 2

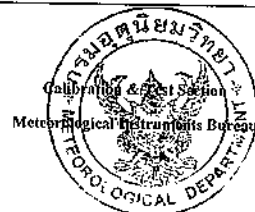
Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
Ultrasonic Anemometer	inches H ₂ O	inches H ₂ O	mi/sec	mi/sec	mi/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.8	0.21
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Watcharapol

Mr. Watcharapol Subwat
Mechanical Engineer



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Portable Gas Calibration Report

Manufacturer : E-Instruments
Instrument Model : B5000-SDS
Instrument serial no. : 1339
Instrument ID : 11

Date of Calibration : 1-Jun-24

Ambient Condition

Temperature (23±5 °C) : 25.0 °C
Humidity (55±15 % RH) : 50.0 % RH
Barometer (mmHg) : 758.4 mmHg

Standard gas References

Standard gas	Cylinder No.	Traceability	Due date
Oxygen (O ₂)	36232	Linde	June 26, 2031
Nitric Oxide(NO)	D824463	Linde	June 5, 2026
	D824524	Linde	August 22, 2025
Nitrogen Dioxide(NO ₂)	CC518873	Airgas	August 17, 2024
	CC518878	Airgas	August 18, 2024
Sulfur Dioxide (SO ₂)	D824500	Linde	October 11, 2024
	D271305	Linde	October 11, 2024
Carbon Monoxide(CO)	D824500	Linde	October 11, 2024
	D271305	Linde	October 11, 2024

Calibration Results

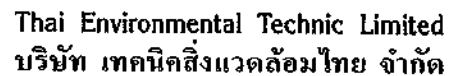
Parameter	Standard gas	Reading	Actual Error	Test Limit	Results
O ₂ (%vol)	0.0	0.0	0.0	±0.2 % vol	PASS
	14.0	14.0	0.0		
NO (ppm)	0.0	0.0	0.0	±5.0 ppm 0...100 ppm ±5% measured Value 101...5000 ppm	PASS
	198.0	199.0	1.0		
	392.0	392.5	0.5		
NO ₂ (ppm)	0.0	0.0	0.0		PASS
	40.1	40.9	0.8		
	82.2	82.1	-0.1		
SO ₂ (ppm)	0.0	0.0	0.0		PASS
	406.0	406.0	0.0		
	804.0	803.0	-1.0		
CO (ppm)	0.0	0.0	0.0		PASS
	404.0	405.0	1.0		
	793.0	794.0	1.0		

Calibrate by :

Janet Jant

Approved by :

Banual M



Equipment Type	:	Personal Pump/Parameter
Equipment Range	:	0.1-7.0 l/min
Calibration Range	:	0.1-4.0 l/min
Calibration Type	:	Drycal
Calibration S/N	:	4491

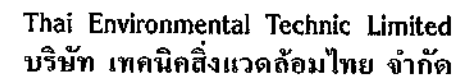
[illegible]

Calibration Date 11 / 09 / 67

Calibration By WJY

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

: SD = Standard deviation
: \bar{X} = Mean



<i>Equipment Type</i>	:	Personal Pump/Parameter
<i>Equipment Range</i>	:	0.1-7.0 l/min
<i>Calibration Range</i>	:	0.1-4.0 l/min
<i>Calibration Type</i>	:	Drycal
<i>Calibration S/N</i>	:	4491

[illegible]

Calibration Date 09 / 09 / 67

Calibration By me

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

: SD = Standard deviation
: \bar{X} = Mean

**TET**

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Personal Pump Calibration Report

Equipment Type : Personal Pump/Parameter
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.	20140505104	0.2	0.1984	0.1986	0.1988	0.1986	±0.0002
2.	20140505029	0.2	0.1988	0.1991	0.1994	0.1991	±0.0003
3.	20110803069	0.2	0.1981	0.1983	0.1985	0.1983	±0.0002
4.	20140705060	0.2	0.1979	0.1981	0.1983	0.1981	±0.0002
5.	20151003041	2.0	1.9970	1.9980	1.9980	1.9980	±0.0006
6.	20120103076	2.0	1.9960	1.9970	1.9980	1.9970	±0.0010
7.	20140505076	2.0	1.9970	1.9980	1.9990	1.9980	±0.0010
8.	20151102088	2.0	1.9960	1.9960	1.9970	1.9960	±0.0006
9.	20080703013	2.0	1.9970	1.9980	1.9990	1.9980	±0.0010
10.	20151102097	2.0	1.9950	1.9970	1.9990	1.9970	±0.0020

Calibration Date 14 / 09 / 67

Calibration By กฤษ

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

: SD = Standard deviation

: \bar{X} = Mean



FSR1223

MAINTENANCE REPORT

OPTIMA 8000

Customer : บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด
Address : 1/6 ซอยรามคำแหง 145, แขวงสะพานสูง, เขตสะพานสูง, กรุงเทพฯ 10240 TH
User Name: คุณ กฤษพงศ์
Phone: 02-3737799, 081-1303495
E-mail: Kelsarin.Chuayphan@eurofinsasia.co

Date Tested: March 28, 2024
Recommendation Recertification Period: 6 Months
Recertification Due: September 27, 2567
Date Last Certified: September 29, 2023
Visit Number: 1 OF 2
TH ONE SOURCE Phone: 081-7316733, 081-1086572
E-mail: thonesource@gmail.com

CONFIGURATION TESTED

MODEL
OPTIMA 8000
N0772045

SERIAL NUMBER
07BS1310024C
1F1380368

ACCESSORIES/COMPONENT NOT INCLUDED

WinLab32 Version 5.5.0
PN:6150T21E4Q1E

TESTED EQUIPMENT

IPV Methods

TEST STANDARD USED

Mixed standard 1/10
Mixed standard 1/100

PE NUMBER

N0691579
N9300221

CUSTOMER SUPPLIED

2 % HNO3
10 % HNO3

COMMENTS



FSR1223

MAINTENANCE REPORT OPTIMA 8000

SERIAL NUMBER	078S1310024C	DATE TESTED	March 28, 2024
1. MECHANICAL CHECKS			
A. Inspect and clean all fans and filters.	<input type="checkbox"/>	OK	
B. Inspect and replace as necessary, all torch components including the RF Flat coil	<input type="checkbox"/>	OK	
C. Inspect all tubing for sign of clacking or leaking.	<input type="checkbox"/>	OK	
D. Adjust water and gas pressure regulator settings.	<input type="checkbox"/>	OK	
E. Inspect and leak check pneumatics drawers.	<input type="checkbox"/>	OK	
F. Clean the exterior of the instrument.	<input type="checkbox"/>	OK	
2. OPTICAL CHECKS			
A. Inspect and clean all optical components.	<input type="checkbox"/>	OK	
B. As required, check and replace all purge filters.	<input type="checkbox"/>	OK	
C. Recheck optical alignment.	<input type="checkbox"/>	OK	
3. COOLING SYSTEM CHECKS			
A. Perform preventive maintenance on chiller.	<input type="checkbox"/>	OK	
B. Flush out water the chiller and replace with coolant mix30plus every twelve months	<input type="checkbox"/>	OK	
4. PERFORMANCE CHECKS			
A. Torch View Alignment.	<input type="checkbox"/>	OK	
B. Wavelength Calibration.	<input type="checkbox"/>	OK	

Page 2 of 4



FSR1223

MAINTENANCE REPORT OPTIMA 8000

SERIAL NUMBER	078S1310024C	DATE TESTED	March 28, 2024
PARAMETER	SPECIFICATION	FINAL VAULE	
Precision			
Zn 213.856	% RSD ≤ 1.0	0.33	
Mg 280.260	% RSD ≤ 1.0	0.63	
Mg 285.207	% RSD ≤ 1.0	0.59	
Ba 455.403	% RSD ≤ 1.0	0.28	
Detection Limits: Axial			
	As 193 nm, 3(sd) ≤ 10.0 ppb	1.39	
	Se 196 nm, 3(sd) ≤ 5.0 ppb	5	
	Tl 190 nm, 3(sd) ≤ 10.0 ppb	1.08	
	Pb 220 nm, 3(sd) ≤ 3.0 ppb	0.28	
	Mn 257 nm, ≤ 30 ppb	3.80	
BEC: Axial			
Detection Limits: Radial			
	As 193 nm, 3(sd) ≤ 60.0 ppb	2.53	
	Zn 213 nm, 3(sd) ≤ 2.0 ppb	0.22	
	Mn 257 nm, 3(sd) ≤ 1.0 ppb	0.05	
	La 379 nm, 3(sd) ≤ 3.0 ppb	0.07	
	Ba 455 nm, 3(sd) ≤ 0.3 ppb	0.04	
	Ba 493 nm, 3(sd) ≤ 0.6 ppb	0.02	
	Mn 257 nm, ≤ 30 ppb	10.83	
BEC: Radial			
Spectral Resolution: UV			
	As 193 nm, ≤ 0.009	0.00687	
	Ni 231 nm, ≤ 0.011	0.00792	
	Ni 341 nm, ≤ 0.015	0.01195	
Spectral Resolution: VIS			
	Ba 455 nm, ≤ 0.020	0.01482	

Page 3 of 4



FSR1223

MAINTENANCE REPORT OPTIMA 8000

SERIAL NUMBER 078S1310024C DATE TESTED March 28, 2024

Remarks :

Commissioning follow as commissioning performance sheets.

Calculate MnBEC = IB * STD Conc / IS-IB , where standard conc = 1000 ug/L

IB = Intensity of blank

IS = Intensity of Standard

Used Mira Mist Nebulizer

ตรวจพบว่าLED(green)ในPlasma Control คัดเป็นบางครั้ง แสดงว่าจรวลควบคุมในส่วนของ Neb Flow

บน Pneumatics Controller Board เป็นปกติทุกพ.

This is to certify that the above tests have been performed and the configuration tested



meets



does not meet

This certificate does not modify PerkinElmer's standard terms and condition of sale,
including warranty terms.**Service Department TH One Source Co., Ltd.***Krungchai T.*

(Krungchai Treevichien)

Customer Support Engineer

Page 4 of 4

Method loaded
Method Name: Precision Method Last Saved: 22/4/2554 19:26:08
IFC File: MSF File:
Method Description: N=10- 1.0% RSD

Sequence No.: 3 Autosampler Location:
Sample ID: Precision Date Collected: 28/3/2567 13:45:32
Analyst: Data Type: Original
Initial Sample Wt: Initial Sample Vol:
Dilution: Sample Prep Vol:
Wash Time:

Nebulizer Parameters: Precision
Analyte Back Pressure Flow
All 222.0 kPa 0.55 L/min

Mean Data: Precision

Analyte	Mean Corrected Intensity	Calib. Conc. Units	Std.Dev.	Sample Conc. Units	Std.Dev.	RSD
Zn 206.208	146145.0			482.54	0.33%	
Pg 280.271	1334588.3			8458.45	0.62%	
Pg 285.213	74404.6			440.15	0.59%	
Ba 455.403	3373485.1			9583.39	0.28%	

***** Analysis Begun

Start Time: 28/3/2567 13:57:16 Plasma On Time: 28/3/2567 13:19:06
 Logged In Analyst: TET Technique: ICP Continuous
 Spectrometer: Optima 8000 Autosampler: S10

Sample Information File: C:\Users\Public\PerkinElmer\ICP\Data\Sample Information\24-03-28.sif
 Batch ID:
 Results Data Set: DLRL280324
 Results Library: C:\Users\Public\PerkinElmer\ICP\Data\Results\Results.mdb

 Method Loaded
 Method Name: DLRL-Ca Method Last Saved: 5/10/2552 13:52:49
 IEC File: MSF File:
 Method Description: Calibration for later test

 Sequence No.: 1 Autosampler Location:
 Sample ID: Calib Blank 1 Date Collected: 28/3/2567 13:57:20
 Analyst: Data Type: Original
 Initial Sample Wt: Initial Sample Vol:
 Dilution: Sample Prep Vol:
 Wash Time:

 Nebulizer Parameters: Calib Blank 1
 Analyte Back Pressure Flow
 All 222.0 kPa 0.55 L/min

 Mean Data: Calib Blank 1

Analyte	Mean Corrected Intensity	Std.Dev.	RSD	Calib Conc. Units
As 193.696	20.4	0.64	3.16%	[0.00] mg/L
Zn 213.857	389.8	2.50	0.64%	[0.00] mg/L
Mn 257.610	373.7	31.47	8.42%	[0.00] mg/L
La 379.478	-39.2	19.10	48.73%	[0.00] mg/L
Ba 455.403	565.0	298.22	52.78%	[0.00] mg/L
Ba 493.408	595.9	5.51	0.92%	[0.00] mg/L

 Sequence No.: 2 Autosampler Location:
 Sample ID: Calib Std 1 Date Collected: 28/3/2567 14:00:31
 Analyst: Data Type: Original
 Initial Sample Wt: Initial Sample Vol:
 Dilution: Sample Prep Vol:
 Wash Time:

 Nebulizer Parameters: Calib Std 1
 Analyte Back Pressure Flow
 All 222.0 kPa 0.55 L/min

 Mean Data: Calib Std 1

Analyte	Mean Corrected Intensity	Std.Dev.	RSD	Calib Conc. Units
As 193.696	5829.0	7.43	0.13%	[5.0] mg/L
Zn 213.857	66281.4	370.49	0.54%	[1.0] mg/L
Mn 257.610	682084.8	550.96	0.08%	[1.0] mg/L
La 379.478	151940.7	798.65	0.53%	[1.0] mg/L
Ba 455.403	389420.9	422.28	0.11%	[0.1] mg/L
Ba 493.408	293177.5	436.31	0.15%	[0.1] mg/L

***** Calibration Summary

As 193.696	1	Lin, Calc Int	0.0	1166	0.00000	1.000000
Zn 213.857	1	Lin, Calc Int	0.0	68280	0.00000	1.000000

Mn 257.610	1	Lin, Calc Int	0.0	682100	0.00000	1.000000
La 379.478	1	Lin, Calc Int	0.0	151900	0.00000	1.000000
Ba 455.403	1	Lin, Calc Int	0.0	3894000	0.00000	1.000000
Ba 493.408	1	Lin, Calc Int	0.0	2932000	0.00000	1.000000

 Sequence No.: 3 Autosampler Location:
 Sample ID: 2% Date Collected: 28/3/2567 14:03:02
 Analyst: Data Type: Original
 Initial Sample Wt: Initial Sample Vol:
 Dilution: Sample Prep Vol:
 Wash Time:

 Nebulizer Parameters: 2%
 Analyte Back Pressure Flow
 All 222.0 kPa 0.55 L/min

 Mean Data: 2%

Analyte	Mean Corrected Intensity	Calib Conc. Units	Std.Dev.	Conc. Units	Std.Dev.	RSD
As 193.696	43.7	0.0 mg/L	0.01	37.5 g/L	9.60	25.84%
Zn 213.857	-20.4	-0.0 mg/L	0.00	-0.3 g/L	0.41	136.74%
Mn 257.610	394.8	0.0 mg/L	0.00	0.6 g/L	0.10	16.69%
La 379.478	67.0	0.0 mg/L	0.00	0.4 g/L	0.24	55.45%
Ba 455.403	-236.1	-0.0 mg/L	0.00	-0.1 g/L	0.00	4.98%
Ba 493.408	-38.6	-0.0 mg/L	0.00	-0.0 g/L	0.02	177.50%

 Method Loaded
 Method Name: DLRL-Check Method Last Saved: 25/2/2543 11:12:48
 IEC File: MSF File:
 Method Description: As-C0,Zn-2, Mn1.0,La-3,Ba455-0.3,Ba493-0.6

 Sequence No.: 4 Autosampler Location:
 Sample ID: 2 % HM03 Date Collected: 28/3/2567 14:06:15
 Analyst: Data Type: Original
 Initial Sample Wt: Initial Sample Vol:
 Dilution: Sample Prep Vol:
 Wash Time:

 Nebulizer Parameters: 2 % HM03
 Analyte Back Pressure Flow
 All 222.0 kPa 0.55 L/min

 Mean Data: 2 % HM03

Analyte	Mean Corrected Intensity	Calib Conc. Units	Std.Dev.	Conc. Units	Std.Dev.	RSD
As 193.696	-7.1	-0.0 mg/L	0.01	-6.1 g/L	6.36	104.60%
Zn 213.857	192.0	0.0 mg/L	0.00	2.8 g/L	0.14	4.99%
Mn 257.610	91.2	0.0 mg/L	0.00	0.1 g/L	0.02	15.88%
La 379.478	223.8	0.0 mg/L	0.00	1.5 g/L	0.31	21.20%
Ba 455.403	-86.9	-0.0 mg/L	0.00	-0.0 g/L	0.03	129.07%
Ba 493.408	-179.8	-0.0 mg/L	0.00	-0.1 g/L	0.05	86.77%

===== Analysis Begun

Start Time: 28/3/2567 14:15:49 Plasma On Time: 28/3/2567 13:19:06
 Logged In Analyst: TET Technique: ICP Continuous
 Spectrometer: Optima 8000 Autosampler: S10

Sample Information File: C:\Users\Public\PerkinElmer\ICP\Data\Sample Information\24-03-28.sif
 Batch ID:
 Results Data Set: DLXL_280324
 Results Library: C:\Users\Public\PerkinElmer\ICP\Data\Results\Results.mdb

=====

Method Loaded
 Method Name: DLXL-Cal Method Last Saved: 5/10/2552 13:39:33
 IEC File: MSF File:
 Method Description: Calibration for later test

=====

Sequence No.: 1 Autosampler Location:
 Sample ID: Calib Blank 1 Date Collected: 28/3/2567 14:15:53
 Analyst: Data Type: Original
 Initial Sample Wt: Initial Sample Vol:
 Dilution: Sample Prep Vol:
 Wash Time:

=====

Nebulizer Parameters: Calib Blank 1
 Analyte Back Pressure Flow
 All 223.0 kPa 0.55 L/min

===== Mean Data: Calib Blank 1

Analyte	Mean Corrected Intensity	Std.Dev.	RSD	Conc. Units	Calib
As 193.696	32.0	6.30	25.92%	[0.00] g/L	
Se 196.026	26.5	5.11	19.26%	[0.00] g/L	
Tl 190.801	-38.3	10.38	27.07%	[0.00] g/L	
Pb 220.353	353.9	3.91	1.11%	[0.00] g/L	

=====

Sequence No.: 2 Autosampler Location:
 Sample ID: DL-Standard Date Collected: 28/3/2567 14:18:16
 Analyst: Data Type: Original
 Initial Sample Wt: Initial Sample Vol:
 Dilution: Sample Prep Vol:
 Wash Time:

=====

Nebulizer Parameters: DL-Standard
 Analyte Back Pressure Flow
 All 223.0 kPa 0.55 L/min

===== Mean Data: DL-Standard

Analyte	Mean Corrected Intensity	Std.Dev.	RSD	Conc. Units	Calib
As 193.696	5168.6	94.41	1.83%	[1000] g/L	
Se 196.026	237.1	23.20	9.78%	[500] g/L	
Tl 190.801	6707.8	43.25	0.64%	[1000] g/L	
Pb 220.353	13300.0	22.38	0.17%	[500] g/L	

===== Calibration Summary

Analyte	1	Lin, Calc Int	0.0	5.169	0.00000	1.000000
As 193.696	1	Lin, Calc Int	0.0	0.4743	0.00000	1.000000
Se 196.026	1	Lin, Calc Int	0.0	6.790	0.00000	1.000000
Tl 190.801	1	Lin, Calc Int	0.0	26.60	0.00000	1.000000

=====

Sequence No.: 3 Autosampler Location:
 Sample ID: QC01 MQCS Date Collected: 28/3/2567 14:21:26

Analyst: Data Type: Original
 Initial Sample Wt: Initial Sample Vol:
 Dilution: Sample Prep Vol:
 Wash Time:

=====

Nebulizer Parameters: QC01 MQCS
 Analyte Back Pressure Flow
 All 222.0 kPa 0.55 L/min

===== Mean Data: QC01 MQCS

Analyte	Mean Corrected Intensity	Conc. Units	Std.Dev.	Conc. Units	Std.Dev.	RSD
As 193.696	135.4	30 g/L	4.50	30 g/L	4.50	17.16%
Se 196.026	8.8	20 g/L	37.93	20 g/L	37.93	204.11%
Tl 190.801	2.4	0 g/L	0.03	0 g/L	0.03	9.11%
Pb 220.353	60.4	2 g/L	1.14	2 g/L	1.14	50.36%

=====

Method Loaded
 Method Name: DLXL-Check Method Last Saved: 25/1/2543 10:51:16
 IEC File: MSF File:
 Method Description: Sample Std.Dev As/Tl <=10 g/l, Se<=5 g/l, Pb<=3 g/l

=====

Sequence No.: 4 Autosampler Location:
 Sample ID: 2 % HNO3 Date Collected: 28/3/2567 14:24:11
 Analyst: Data Type: Original
 Initial Sample Wt: Initial Sample Vol:
 Dilution: Sample Prep Vol:
 Wash Time:

=====

Nebulizer Parameters: 2 % HNO3
 Analyte Back Pressure Flow
 All 222.0 kPa 0.55 L/min

===== Mean Data: 2 % HNO3

Analyte	Mean Corrected Intensity	Conc. Units	Std.Dev.	Conc. Units	Std.Dev.	RSD
As 193.696	-1.6	-0.3 g/L	1.39	-0.3 g/L	1.39	459.43%
Se 196.026	10.9	20 g/L	11.69	20 g/L	5.00	50.84%
Tl 190.801	1.1	0.2 g/L	1.08	0.2 g/L	1.08	649.16%
Pb 220.353	-21.4	-0.8 g/L	0.28	-0.8 g/L	0.28	34.35%



**Global Service Training Department
Service Engineer Certification**

Krungchai Treevichien

**This is to certify that the above mentioned
PerkinElmer representative has trained to
service the instrument indicated below:**

ICP-Optima 7X00/8X00 Series

Instructor:-

Geoff Cook

Date:-13 FEB 2011 to 24 FEB 2011

Certified by:

(Manager, Global Training Operations)



Certificate of Calibration

ICS-1100 : Anion (ID#377)

**This certificate is to verify that instrument below are calibrated
by Archemica Lab Co.,Ltd.**

ICS-1100 S/N : 10010987

AS-DV S/N : 10010912

**for
Thai Environmental Technic Co., Ltd**

**ARCHERICA LAB
บริษัท อีเคมิคัล แล็บ จำกัด
ARCHERICA LAB CO.,LTD**

Operator Signature : K. CHANNARONG

Date : Mar 28, 2024

(Mr. Channarong Khiao-Un)

Test Engineer

Qualification Report

PM Check list,CM OQ and PQ

ICS-1100 : Anion (ID#377)

For

Thai Environmental Technic Co.,Ltd.

(1st Contract)

Preventive Maintenance Check List

Dionex Ion Chromatography
Preventive Maintenance Report

Customer/Organization	Name/Department
Thai Environmental Technic Co., Ltd.	Khun, Ketsarin / Lab
Engineer	Date
Mr. Channarong Khiao-Un	28/Mar/2024

Instrument Detail

Instrument Model	Application
ICS-1100 (ID#377)	Anlon
Instrument Components	Serial Number
ICS-1100	10010987
AS-DV	10010912

Consumable Detail

Columns	Guard Columns	Suppressors	Concentrators	Etc.
AS22	AG22	AERS 500	-	-
Remark:				

Perform By Archemica



Archemica

28/Mar/2024

Date

Customer

Date



General ICS Maintenance Checklist

No.	Description	Result			
Power on & Connection		Checked	Cleaned	Replaced	N.A.
1	Instrument power on	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
2	Instrument connection	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
Injection Valve Rebuild		Checked	Cleaned	Replaced	N.A.
3	Rebuilt injection valve 6 port	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	- Rotor seal	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	- Stator face	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(Optional) Auxiliary Valve Rebuild		Checked	Cleaned	Replaced	N.A.
6	Rebuilt auxiliary valve - port	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7	- Rotor seal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8	- Stator face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Check Valve Cartridge		Checked	Cleaned	Replaced	N.A.
9	Inlet check valve assembly	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Outlet check valve assembly	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Verified correct flow orientation	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
Pump Piston Rinse Seal, Piston Seal and Piston		Checked	Cleaned	Replaced	N.A.
12	Piston rinse seal in primary pump head	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Piston seal in primary pump head	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Piston in primary pump head	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Piston rinse seal in secondary pump head	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Piston seal in secondary pump head	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Piston in secondary pump head	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Waste Valve and Priming Valve		Checked	Cleaned	Replaced	N.A.
18	Waste valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Priming valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cell Detector		Checked	Cleaned	Replaced	N.A.
20	Check conductivity cell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Check electrochemical cell	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
22	- Working electrode	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
23	- Reference electrode	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
24	- Gasket	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
25	- Cell body	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other		Checked	Cleaned	Replaced	N.A.
26	Sample Loop Size 25 ul	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27	End-line filter	<input checked="" type="checkbox"/>	-	<input type="checkbox"/>	<input type="checkbox"/>
28	Leak sensor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29	Lubricate pump mechanic	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-	<input type="checkbox"/>
30	Reconnected liquid lines to the valve	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
31	Reconnected liquid lines to pump heads	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
32	Primed pump	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
33	Checked pump for leaks	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
34	Checked gas for leaks	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>



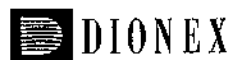
AS-DV Autosampler Preventive Maintenance Checklist

Model	Serial number	Firmware Version
<input checked="" type="checkbox"/> AS-DV	10010987	-

No.	Description	Result			
Power on & Connection		Checked	Cleaned	Replaced	N.A.
1.	AS-DV power on	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
2.	AS-DV connection	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
Sampling Tip		Checked	Cleaned	Replaced	N.A.
3.	Sampling needle	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.	Sampling tubing (Transfer line)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Reconnect sampling needle & tubing	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
Other		Checked	Cleaned	Replaced	N.A.
6.	Check carousel movement	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
7.	Check needle movement	<input checked="" type="checkbox"/>	-	-	<input type="checkbox"/>
8.	Lubricate needle drive	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-	<input type="checkbox"/>
9.	AS-DV cover	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(Optional) High Pressure Valve		Checked	Cleaned	Replaced	N.A.
10.	High pressure valve Port	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11.	- Rotor seal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
12.	- Stator face	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
13.	- Reconnected liquid line to the valve	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Others / comments

Chromeleon Operational Qualification
(CM_OQ)



Chromeleon Operational Qualification

General Information

Computer Name (Server): USERICU
Computer Name (Client): USERICU
Version Number: 6.80 SR8
Operator: Mr.Channarong Khiao-Un

General System Suitability Test: *Test passed*

Comparison Formats:

All Parameters: (Exeptions see below)	Significant Digits: (They must match exactly)	10
Time Related Frac. Coll. Parameters: [The parameters are marked with *.]	Max. Deviation:	0.02 s



Reviewer's Signature # Date

Operator's Signature # Date

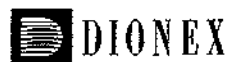


Chromeleon Operational Qualification, Part 1

Verification of Selected Results

Calibration Type: LOff
Integration Type: Area
Standard Method: External
Calibration Mode: Total
Auto Recalibrate: ON

Report Variable	Peak Name	Status
Offset (c0)	n.a.	ok
	n.a.	ok
	n.a.	ok
Slope (c1)	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Correlation Coeffi.	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Variance	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Std. Deviation	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Ref. Std. Dev.	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Variance Coeff.	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok



Chromeleon Operational Qualification, Part 1

Verification of Selected Results

Report Variable	Peak Name	Status
Calibration Point X	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Calibration Point Y	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Amount [ng]	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Resolution (EP)	Methylparabene	ok
	Ethylparabene	ok
Resolution (USP)	Methylparabene	ok
	Ethylparabene	ok
Peak Asymmetry (EP/USP)	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Peak Asymmetry (AIA)	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok



Chromeleon Operational Qualification, Part 1

Verification of Selected Results

Report Variable	Peak Name	Status
Theoretical Plates (EP)	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Theoretical Plates (USP)	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok
Theoretical Plates (JP)	Methylparabene	ok
	Ethylparabene	ok
	Propylparabene	ok

Test Result: **Passed**



KCH Pharma Pte. Ltd. 28/3/2024

Reviewer's Signature // Date

Operator's Signature // Date



Chromeleon Operational Qualification, Part 3

Post-Acquisition Steps: Comparison with Expected Results

Calibration Type: LOI
 Integration Type: Area
 Standard Method: External
 Calibration Mode: Total
 Auto Recalibrate: ON

Channel Name	Report Variable	Peak Name	Status
Extract UV Channel:			
EXT230NM	Area	Methylparabene	ok
	Area	Ethylparabene	ok
	Area	Propylparabene	ok
	Height	Methylparabene	ok
	Height	Ethylparabene	ok
	Height	Propylparabene	ok
	Base Peak Width	Methylparabene	ok
	Base Peak Width	Ethylparabene	ok
	Base Peak Width	Propylparabene	ok
EXT290NM	Area	Methylparabene	ok
	Area	Ethylparabene	ok
	Area	Propylparabene	ok
	Height	Methylparabene	ok
	Height	Ethylparabene	ok
	Height	Propylparabene	ok
	Base Peak Width	Methylparabene	ok
	Base Peak Width	Ethylparabene	ok
	Base Peak Width	Propylparabene	ok
Smooth Data:			
UV_VIS_1_MA_005_001	Noise (1.9-2.4 min)		ok
UV_VIS_1_OI_051_001	Noise (1.9-2.4 min)		ok
EXT290NM_SG_005_010	Noise (1.9-2.4 min)		ok



Chromeleon Operational Qualification, Part 3

Post-Acquisition Steps: Comparison with Expected Results

Channel Name	Report Variable	Peak Name	Status
Arith. Comb. of Channels:			
ADD_UV_VIS_1_UV_VIS_1	Area	Methylparabene	ok
ADD_UV_VIS_1_UV_VIS_1	Area	Ethylparabene	ok
ADD_UV_VIS_1_UV_VIS_1	Area	Propylparabene	ok
MUL_UV_VIS_1_UV_VIS_1	Area	Methylparabene	ok
MUL_UV_VIS_1_UV_VIS_1	Area	Ethylparabene	ok
MUL_UV_VIS_1_UV_VIS_1	Area	Propylparabene	ok

Test Result: **Passed**



Reviewer's Signature # Date

K. Chanharesingh 28/Mar/2024

Operator's Signature # Date



Chromeleon Operational Qualification, Part 4

System Suitability Test: Comparison with Expected Results

Calibration Type: LOff
Integration Type: Area
Standard Method: External
Calibration Mode: Total
Auto Recalibrate: ON

Variable Category	Report Variable	Status
SST	Test No.	ok
	Test Name	ok
	Sample Condition	ok
	Sample Condition Result	ok
	Test Condition	ok
	Peak Condition	ok
	Aggregate Condition	ok
	Compare Operator	ok
	Compare Value	ok
	Result of Compare Value	ok
	Channel	ok
	Aggregated Samples	ok
	List of Aggr. Smp.	ok
	Result List for Aggr. Smp.	ok
	Result of Test Condition or Aggregate	ok
	N.A.	ok
	Test Result	ok
	Fail-Action	ok

Test Result: **Passed**



K. HAMMORONG 28/Mar/2024

Reviewer's Signature // Date

Operator's Signature // Date



Chromeleon Operational Qualification, Part 5

Fraction Collection: Comparison with Expected Results

Calibration Type: LOff
Integration Type: Area
Standard Method: External
Calibration Mode: Total
Auto Recalibrate: ON

Variable Category	Report Variable	Status
Fraction Report	Fract. No.	ok
	Fract. Starttime *)	ok
	Fract. Endtime *)	ok
	No. of Tubes	ok
	Position	ok
	Peak Name	ok
	No. of Peaks	ok
Tube Report	Position	ok
	Tube Starttime *)	ok
	Tube Endtime *)	ok
	Max. Tube Volume	ok
	Peak Name	ok
	No. of Peaks	ok
	Fract. No.	ok
	Fract. Starttime *)	ok
	Fract. Endtime *)	ok
	No. of Tubes	ok
	No. of Peaks	ok

Test Result: **Passed**



K. HAMMORONG 28/Mar/2024

Reviewer's Signature // Date

Operator's Signature // Date

Performance Qualification (PQ) (Anion)

Sequence: PQ_IC_WARM_UP
Sample: Water_WU

Page 1 of 2
Date: 3/29/2024



Performance Qualification Rev. 6.10

• Instruments

Instrument Name	Model	Supplier	Serial Number	Moduleware Version
Pump	ICS-1100	Dionex	10010987	1.1.0
Detector	ICS-1100	Dionex	10010987	1.1.0
Autosampler	AS-DV	Dionex	10010912	1.5.0
Eluent Generator	EG40 with n.a.	Dionex	10010987	1.1.0
Chromeleon	6.80 SR8	Dionex	62483	n.a.

• Accessories

Name	Description		Lot / Serial	Exp. Date
Backpressure Tubing	0.13 mm (0.005") ID PEEK, 13 m (512")	n.a.	n.a.	n.a.
Blank	Water	n.a.	n.a.	n.a.
Sample 1	Nitrate, 5 ppm	Thermo	231226	Dec-2024
Sample 2	Nitrate, 10 ppm	Thermo	231226	Dec-2024
Sample 3	Nitrate, 25 ppm	Thermo	231226	Dec-2024
Sample 4	Nitrate, 50 ppm	Thermo	231226	Dec-2024
Sample 5	Nitrate, 100 ppm	Thermo	231226	Dec-2024
Sample 6	Nitrate, 1000 ppm	Thermo	231226	Dec-2024
Eluent	Water	Water	n.a.	n.a.
Autosampler Reservoir A	Water	Water	n.a.	n.a.
Balance	Mettler Toledo	XP 205	1129273885	n.a.
Temperature Probe	-	-	-	-
IC Validation Test Box	-	-	-	-
Ammeter / Multimeter	-	-	-	-



Customer Signature _____ Date _____

Chromeleon (c) DIONEX 2011
Version 6.8 SR 8

Executer Signature _____ Date _____

OQ_PQ_Integrated_Validation / Specification
Printed: 3/29/2024 1:55 PM

• Limits

Test	Customized Limits	Dionex Recommended Limits
ICS-1100 Conductivity Noise (nS)	<= 2.0	<= 2.0
ICS-1100 Conductivity Drift (nS/hr)	<= 20	<= 20
Injector Precision (Area %RSD)	<= 1.0	<= 1.0
Injector Carryover (Area %)	<= 0.1	<= 0.1
ICS-1100 Detector Linearity (Corr.)	>= 0.999	>= 0.999
ICS-1100 Detector Linearity (%RSD)	<= 5.0	<= 5.0
ICS-1100 Pump Flow Rate Accuracy (mL/min)	<= 0.05	<= 0.05
ICS-1100 Pump Flow Rate Precision (%RSD)	<= 2.0	<= 2.0

• Additional Information

Customer/Company:	Khun.Ketsarin/Thai Environmental Technic Co.,Ltd	Date:	28-Mar-2024
Qualification Executor/Company:	Mr. Channarong / Arche mica	Period between Qualifications:	6 months
		Next Qualification:	Sep-2024



K. Channarong 28/Mar/2024
Executor Signature Date

Customer Signature Date



Performance Qualification Rev. 6.10

Detector Noise and Drift:

• Instruments

Instrument Name	Model	Supplier	Serial Number	Moduleware Version
Pump	ICS-1100	Dionex	10010987	1. 1. 0
Detector	ICS-1100	Dionex	10010987	1. 1. 0
Autosampler	AS-DV	Dionex	10010912	1. 5. 0
Eluent Generator	EG40 with n.a.	Dionex	10010987	1. 1. 0

• Accessories

Name	Description	Lot / Serial
Backpressure Tubing	0.13 mm (0.005") ID PEEK, 13 m (512")	n.a.
Eluent	Water	n.a.

• Additional Information

Customer/Company:	Khun.Ketsarin/Thai Environmental Technic Co.,Ltd	Date:	28-Mar-2024
Qualification Executor/Company:	Mr. Channarong / Arche mica	Next Qualification:	Sep-2024

• Test Results Summary

Test	Result
ICS-1100 Conductivity Noise (nS)	PASS
ICS-1100 Conductivity Drift (nS/hr)	PASS



K. Channarong 28/Mar/2024
Executor Signature Date

Customer Signature Date

Sequence: PQ_IC_NOISE_DRIFT
Sample: Water_ND

Page 2 of 3
Date: 3/29/2024

• Data for detector noise

Segment number	Noise, nS
1	0.46
2	0.38
3	0.46
4	0.51
5	0.40
6	0.54
7	0.51
8	0.44
9	0.48
10	0.38
11	0.50
12	0.38
13	0.57
14	0.42
15	0.41
16	0.36
17	0.41
18	0.43
19	0.44
20	0.44
Average, nS	0.4
Limit, nS	2.0
Result	PASS

• Data for detector drift

20 Minute drift, nS	Drift, nS/hr	Limit, nS/hr	Result
-4.6	13.9	20.0	PASS



K. Gammay 28/Mar/2024
Executor Signature Date

Customer Signature Date

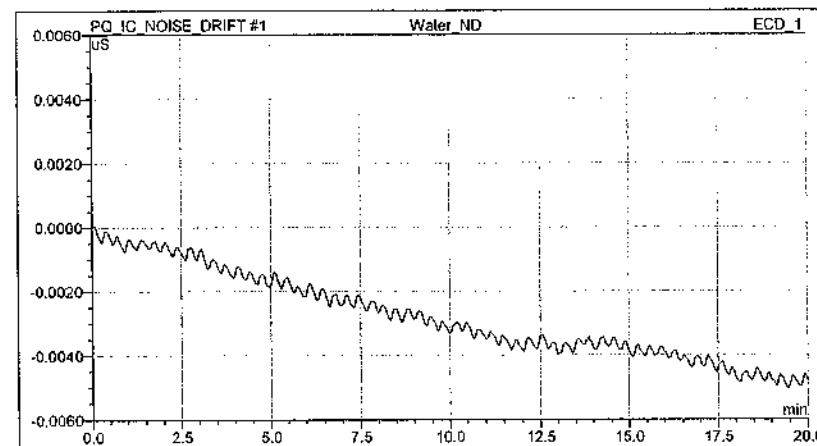
Chromeleon (c) DIONEX 2011
Version 6.8 SR 8

OQ_PQ_Integrated_Validation / Detector Noise and Drift
Printed: 3/29/2024 1:57 PM

Sequence: PQ_IC_NOISE_DRIFT
Sample: Water_ND

Page 3 of 3
Date: 3/29/2024

• Chromatogram of Detector Noise and Drift



K. Gammay 28/Mar/2024
Executor Signature Date

Customer Signature Date

Chromeleon (c) DIONEX 2011
Version 6.8 SR 8

OQ_PQ_Integrated_Validation / Detector Noise and Drift
Printed: 3/29/2024 1:57 PM



Performance Qualification Rev. 6.10

Injector Precision:

• Instruments

Instrument Name	Model	Supplier	Serial Number	Moduleware Version
Pump	ICS-1100	Dionex	10010987	1.1.0
Detector	ICS-1100	Dionex	10010987	1.1.0
Autosampler	AS-DV	Dionex	10010912	1.5.0
Eluent Generator	EG40 with n.a.	Dionex	10010987	1.1.0

• Accessories

Name	Description	Lot / Serial
Backpressure Tubing	0.13 mm (0.005") ID PEEK, 13 m (512")	n.a.
Sample 4	Nitrate, 50 ppm	231226
Eluent	Water	n.a.

• Additional Information

Customer/Company:	Khun.Ketsarin/Thai Environmental Technic Co.,Ltd	Date:	28-Mar-2024
Qualification Executor/Company:	Mr. Channarong / Archemica	Next Qualification:	Sep-2024

• Test Results Summary

Test	Result
Injector Precision (Area %RSD)	PASS



K. Channarong 28/Mar/2024

Customer Signature Date

Chromleon (c) DIONEX 2011
Version 6.8 SR 8

OO_PQ_Integrated_Validation / Injector Precision
Printed: 3/29/2024 2:01 PM

• Data for Injector Precision test

Name	Area uS*min Nitrate ECD_1
Inj Precision_1	2.875
Inj Precision_2	2.841
Inj Precision_3	2.854
Inj Precision_4	2.840
Inj Precision_5	2.808
Inj Precision_6	2.853
Inj Precision_7	2.849
Inj Precision_8	2.867
Inj Precision_9	2.859
Inj Precision_10	2.859
Average:	2.850
Std. Dev:	0.018
% RSD:	0.6
Limit (%)	1.0
Result:	PASS



K. Channarong 28/Mar/2024

Customer Signature Date

Chromleon (c) DIONEX 2011
Version 6.8 SR 8

OO_PQ_Integrated_Validation / Injector Precision
Printed: 3/29/2024 2:01 PM



Performance Qualification Rev. 6.10

Injector Carryover:

• Instruments

Instrument Name	Model	Supplier	Serial Number	Moduleware Version
Pump	ICS-1100	Dionex	10010987	1.1.0
Detector	ICS-1100	Dionex	10010987	1.1.0
Autosampler	AS-DV	Dionex	10010912	1.5.0
Eluent Generator	EG40 with n.a.	Dionex	10010987	1.1.0

• Accessories

Name	Description	Lot / Serial
Backpressure Tubing	0.13 mm (0.005") ID PEEK, 13 m (512")	n.a.
Sample 6	Nitrate, 1000 ppm	231226
Blank	Water	n.a.
Eluent	Water	n.a.

• Additional Information

Customer/Company:	Khun.Ketsarin/Thai Environmental Technic Co.,Ltd	Date:	28-Mar-2024
Qualification Executor/Company:	Mr. Channarong / Archemica	Next Qualification:	Sep-2024

• Test Results Summary

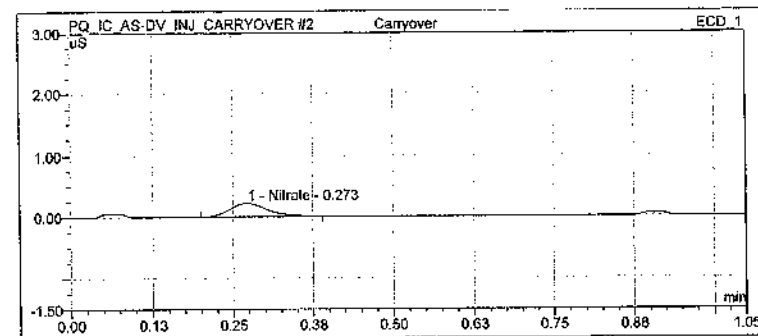
Test	Result
Injector Carryover (Area %)	PASS



K. Channarong 28/Mar/2024
Executor Signature Date

Customer Signature Date

• Chromatogram for Carryover test



• Data for Carryover test

Name	Ret. Time (detected) min Nitrate ECD_1	Area uS*min Nitrate ECD_1
High Level	0.27	52.058
Carryover	0.27	0.015
Water	0.27	0.011
Carryover (%):		0.008
Limit (%):		0.100
Result:		PASS



K. Channarong 28/Mar/2024
Executor Signature Date

Customer Signature Date



Performance Qualification Rev. 6.10

Detector Linearity:

• Instruments:

Instrument Name	Model	Supplier	Serial Number	Moduleware Version
Pump	ICS-1100	Dionex	10010987	1.1.0
Detector	ICS-1100	Dionex	10010987	1.1.0
Autosampler	AS-DV	Dionex	10010912	1.5.0
Eluent Generator	EG40 with n.a.	Dionex	10010987	1.1.0

• Accessories

Name	Description	Lot / Serial
Backpressure Tubing	0.13 mm (0.005") ID PEEK, 13 m (512")	n.a.
Sample 1	Nitrate, 5 ppm	231226
Sample 2	Nitrate, 10 ppm	231226
Sample 3	Nitrate, 25 ppm	231226
Sample 4	Nitrate, 50 ppm	231226
Sample 5	Nitrate, 100 ppm	231226
Eluent	Water	n.a.

• Additional Information

Customer/Company:	Khun.Ketsarin/Thai Environmental Technic Co.,Ltd	Date:	28-Mar-2024
Qualification Executor/Company:	Mr. Channarong / Archemica	Next Qualification:	Sep-2024

• Test Results Summary

Test	Result
ICS-1100 Detector Linearity (Corr.)	PASS
ICS-1100 Detector Linearity (%RSD)	PASS



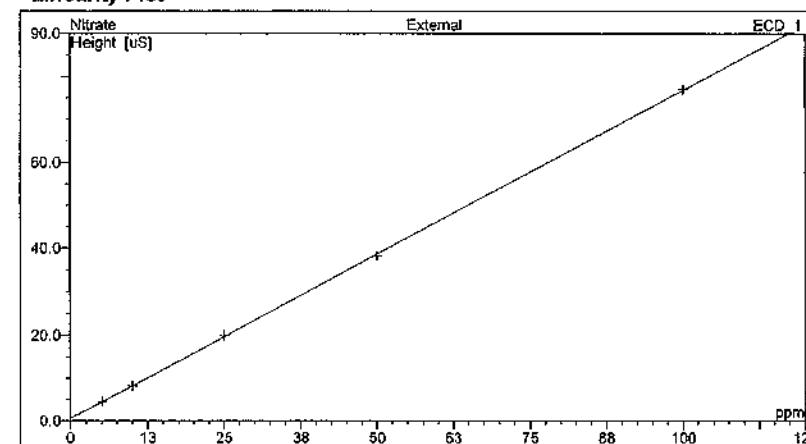
K.Channarong 28/Mar/2024
Executor Signature Date

Customer Signature Date

• Data for Detector Linearity

Name	Amount ppm Nitrate ECD_1	Height uS Nitrate ECD_1
Detector linearity_1	5.000	4.403
Detector linearity_2	10.000	8.153
Detector linearity_3	25.000	19.920
Detector linearity_4	50.000	39.150
Detector linearity_5	100.000	76.964

• Linearity Plot



Calibration Type	Number of Points	Offset	Slope
LOF	5	0.548	0.762

	Correlation Coefficient	% RSD
Linearity:	1.000	1.2
Limit:	0.999	5.0
Result:	PASS	PASS



K.Channarong 28/Mar/2024
Executor Signature Date

Customer Signature Date



Performance Qualification Rev. 6.10

Pump Flow Rate Accuracy and Precision Test:

• Instruments

Instrument Name	Model	Supplier	Serial Number	Moduleware Version
Pump	ICS-1100	Dionex	10010987	1.1.0
Detector	ICS-1100	Dionex	10010987	1.1.0
Autosampler	AS-DV	Dionex	10010912	1.5.0
Eluent Generator	EG40 with n.a.	Dionex	10010987	1.1.0

• Accessories

Name	Description	Lot / Serial
Backpressure Tubing	0.13 mm (0.005") ID PEEK, 13 m (512")	n.a.
Eluent	Water	n.a.
Balance	Mettler Toledo	XP 205 1129273885

• Additional Information

Customer/Company:	Khun.Ketsarin/Thai Environmental Technic Co.,L	Date:	28-Mar-2024
Qualification Executor/Company:	Mr. Channarong / Archemica	Next Qualification:	Sep-2024

• Test Results Summary

Test	Result
ICS-1100 Pump Flow Rate Accuracy (mL/min)	PASS
ICS-1100 Pump Flow Rate Precision (%RSD)	PASS



K. Channarong 28/Mar/2024

Customer Signature _____ Date _____

• Data for Pump Flow Rate Accuracy and Precision Test

Ambient Temperature (°C)	20
--------------------------	----

Segment	Measured Eluent Weight (g)	Calculated Eluent Flow Rate (mL/min)	Deviation from 1.00 mL/min	Limit (mL/min)	Result
0	31.163	-	-	-	-
1	35.996	0.968	0.032	0.05	PASS
2	40.824	0.967	0.033	0.05	PASS
3	45.649	0.967	0.033	0.05	PASS
4	50.479	0.968	0.032	0.05	PASS
6	55.308	0.967	0.033	0.05	PASS
Average		0.968		Overall	PASS
Standard Deviation		0.001			
% RSD		0.1			
Limit (%)		2.0			
Result		PASS			



K. Channarong 28/Mar/2024

Customer Signature _____ Date _____

Certificate of Analysis

Better Separations Through
Better Chemistry

Dionex Nitrate OQ/PQ IC Standards Kit (Set of 6)

Product Number 060254
Certificate of Analysis

Lot Number 231226

Expiration of Certification
December 2024

The Dionex Nitrate Standard was developed to aid the analysis of anions by Ion Chromatography (IC). The single-ion standard was prepared by the dissolution of high-purity salt in ≥ 18.2 megohm deionized water, which was tested by IC for ionic contaminants. The bottle label states the nominal concentration value of the ionic component for informational purposes only. The actual ion concentration value was determined by Ion Chromatography. The IC system was standardized using the National Institute of Standards & Technology (NIST), Standard Reference Material, SRM 3185 (Nitrate Standard Solution). Actual concentration values determined for the single-ion is listed below.

Dionex Nitrate Standard

Vial #	Concentration (mg/L)
1	5.08 ± 0.03
2	10.03 ± 0.14
3	25.16 ± 0.65
4	50.43 ± 0.09
5	99.7 ± 3
6	1014 ± 17

ARCHIMEDIS LAB
VIALS SUPPLIED AND TESTED BY
ARCHIMEDIS LAB CO., LTD.
K. HANNAH 2024
28/Mar/2024

The concentration value is based a proven reliable method of analysis. The estimated uncertainties are two standard deviations of the concentration value. The concentration value is warranted to be stable for one year from the date of manufacture.

The preparation and analyses of the Dionex Nitrate Standard was performed with extreme care by Thermo Scientific Corporation Consumables Manufacturing Department in Sunnyvale California.

Document No. 078690-01

20-Dec-2011

thermoscientific.com/dionex

© 2011 Thermo Fisher Scientific Inc. All rights reserved. All trademarks are the property of Thermo Fisher Scientific and its subsidiaries. Specifications, terms and pricing are subject to change. Not all products are available in all countries. Please consult your local sales representative for details.

XX21149-EN 021SS 031316-10

Thermo Fisher Scientific
1228 Third Way
P.O. Box 9603
Sunnyvale, CA 94089-3603
(408) 737-4000

Thermo Fisher Scientific
Sunnyvale, CA USA
ISO 9001 Certified

thermo
scientific

thermo
scientific

Certificate of Completion

This certifies that

Channarong Khiao-Un

Has successfully completed

eLearn: RPG IC-Specific Qualification Service Training

Valid for 3 years from:

Nov/19/2021



Issued electronically and
approved by:

TFS - Learning Management
System, Training, Mentoring,
and Certification Group
tmc.training@thermofisher.com

P. Channarong Khiao-Un 28/Nov/2024

The world leader in serving science

This certificate is only valid during employment with the Thermo Fisher Scientific including its subsidiaries and certified contractors.

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 models 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	G1534-80680	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

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 Sasnguthai Tanak Customer signature RD 11/10/57

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.0-2719-0484



Certificate of Calibration

Cert.No.: 24CHO573
Page.: 1 of 2

Equipment : pH Meter
Manufacturer : Horiba
Model : F-71G
Serial No. : V3B1F8H3
ID No. : Ins-LAB-025
Condition As-Received: Used Item
Received Date : 30 October 2024
Calibration Date : 31 October 2024
Reference : 2410-0784OC-1
Submitted by : Thai Environmental Technic Limited
1/5 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Calibration Place : Laboratory (Thai Environmental Technic Limited)
Ambient Temperature : (26.1 to 25.8) °C (On-Site)
Relative Humidity : (58.6 to 64.2) % (On-Site)
Calibration Procedure : In - house method :
- CP-OCH2 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
Calibrated by : Saithip Meangmai
Approved by :
() Unnopphol Harachai
(✓) Ponpan Paipim
() Saithip Meangmai
Issue Date : 2 November 2024

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.



Cert.No.: 24CHO573
Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	46530031	130RC098	24E3004	12 Sep 2025
2) Digital Thermometer	307901	70RC137	24I973	01 Sep 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd., ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.006	CPA chem	1034203	27 Sep 2026
pH 6.876	CPA chem	1005301	15 June 2026
pH 9.174	CPA chem	1005302	15 June 2025

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

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N: V3B1F8H3	4.000	177.48	177.5	4.000	0.058	2.00
	6.880	8.28	8.3	6.880	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	9.180	-128.97	-128.9	9.180	0.058	2.00
	10.000	-177.48	-177.4	10.000	0.058	2.00

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,9)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode S/N: 9X2E0223	4.008	4.007	167.0	0.0048	2.00
	6.876	6.855	-0.3	0.0065	2.00
	9.174	9.158	-136.6	0.0096	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-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10255
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 24MM272
Page.: 1 of 3

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : AB204
Serial No. : 1116392227
ID No. : Ins-LAB-033
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Location : Balance Room
Received order : 09 April 2024
Calibration Date : 10 April 2024
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %
Calibrated by : Khit Rutanaprapachai

Approved by :
() Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 12 April 2024

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.



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2404-01130C-14
Procedure used :-

Cert.No.: 24MM272
Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-OB01 based on UKAS LAB 14
according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard Instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	-	70RC138	MM-0020-23	30 Jan 2025

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 External Calibration

Range capacity : 0 g to 210 g Resolution 0.0001 g

Before Adjustment :

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	(± mg)	(k)
100	100.0000	0.0000	0.19	2
200	200.0001	-0.0001	0.30	2

After Adjustment :

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

Applied Weight	Standard Deviation of Reading (g)
(g)	
100	0.00007
200	0.00008



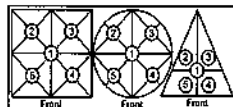
Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2404-0113OC-14

Cert.No.: 24MM272
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

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	(g)
0.0000	+0.0001	0.0000	+0.0001	+0.0003	0.0003

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
Unload	0.0000	0.0000	0.14	2.11
0.01	0.0101	-0.0001	0.14	2.11
0.1	0.1001	-0.0001	0.14	2.11
0.5	0.5002	-0.0002	0.14	2.11
1	1.0002	-0.0002	0.14	2.11
5	5.0000	0.0000	0.14	2.11
10	10.0001	-0.0001	0.14	2.11
25	25.0000	0.0000	0.15	2.07
50	49.9999	+0.0001	0.15	2.06
100	100.0002	-0.0002	0.19	2
200	200.0002	-0.0002	0.30	2

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 %.

-000-



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



Certificate of Calibration

Cert. No.: 24TM702
Page : 1 of 3

Equipment : BOD Incubator
Manufacturer : Accuplus
Model : i250
Serial No. : 0408-0115-0008
ID No. : Ins-LAB-046
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khuwaeng/Khet Saphan Sung,
Bangkok 10240
Location : Laboratory (Thai Environmental Technic Limited)
Received Order : 09 April 2024
Calibration Date : 09 April 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Khit Rutanaprapachai
Approved by : Kunchit
Approved Signatory
() Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 26 April 2024

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.



Equipment : BOD Incubator
 Condition As-Received : Used Item
 Reference : 2404-0113OC-11

Cert. No.: 24TM702
 Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY49001451	24LM44	TPA	17 Mar 2025

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

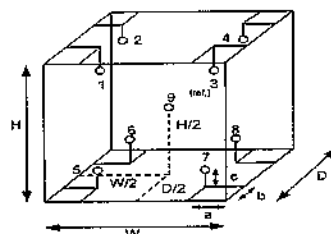
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available



Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	25
REL.Humid. (%)	50	52
AC Supply (Volt)	221	220

Position :	Ref. Std. ID No.:
1	19RTD-2/1
2	19RTD-2/2
3	19RTD-2/3
4	19RTD-2/4
5	19RTD-2/5
6	24-19RTD-2/6
7	19RTD-2/7
8	19RTD-2/8
9 (ref.)	19RTD-2/9

Probe Installation Details :

a = 10 cm
 b = 10 cm
 c = 10 cm

Dimension of Chamber :

D = 0.48 m
 W = 0.50 m
 H = 1.1 m
 Capacity = 0.26 m³



Equipment : BOD Incubator
 Condition As-Received : Used Item
 Reference : 2404-0113OC-11
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 24TM702
 Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.0	20.0	0.30	0.27	0.77	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.232	20.184	20.129	20.214	20.126	20.102	19.987	20.053	20.128	0.49

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

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-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES

554/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

TEL. 0-2717-3000-29 FAX. 0-2719-9484

Cert.No.: 24CH140

Page.: 1 of 2

Certificate of Calibration

Equipment : Conductivity Meter
Manufacturer : Horiba
Model : ES-71
Serial No. : D66G0003
ID No. : No.3
Condition As-Received: Used Item
Received Date : 26 January 2024
Calibration Date : 29 January 2024
Reference : 2401-0902DSC-1
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure: In -house method :
~ CP-CH6 : based on direct measurement with
reference material (RM)

Calibrated by : Watalak Sirthean

Approved by :

Warakorn
Approved Signatory

- () Seithip Meangmai
(☒) Warakorn Lemgatrakul
() Ponpan Paipim

Issue Date : 6 February 2024
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 Calibration and Testing Equipment Services.

A 0012884



Cert.No.: 24CH140

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instrument :-

Instrument	Serial No.	ID No.	Certificate No.	Due date
1) Thermometer	9549224	130RC003	231435	10 Apr 2024

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :-

- Conductivity calibration solution, Thermo Scientific (Traceable to NIST)

Conductivity Solution	Manufacturer	Lot No.	Exp. date
84 µS/cm	Thermo Scientific	193/02	12 May 2024
1.413 mS/cm	Thermo Scientific	392/01	30 Sep 2025
12.88 mS/cm	Thermo Scientific	351/01	03 Sep 2024

- Control Conductivity calibration solution temperature by Water bath (25 ± 0.1) °C

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

Calibration results

Function : Conductivity Measurement

(*) After Adjustment at 1.413 mS/cm

Conductivity Electrode Serial No.: 9C6E0212

Standard Conductivity Solution	Before Adjustment UUC* Reading	After Adjustment UUC* Reading	Uncertainty of Measurement (±)	Coverage factor k
84 µS/cm	90.6 µS/cm	88.0 µS/cm	4.3 µS/cm	2.00
1.413 mS/cm	1.422 mS/cm	1.413 mS/cm	0.015 mS/cm	2.00
12.88 mS/cm	12.54 mS/cm	12.50 mS/cm	0.14 mS/cm	2.00

Remark : - UUC* = Unit Under Calibration

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 %.

-o-o-

Warakorn
a 1201045

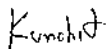


TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 24MM273
Page.: 1 of 3

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : XP205DR
Serial No. : 1129273885
ID No. : Ins-LAB-035
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Location : Balance Room
Received order : 09 April 2024
Calibration Date : 10 April 2024
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %
Calibrated by : Khit Rutanaprapachal
Approved by : 
() Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 12 April 2024

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.



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2404-01130C-15
Procedure used :-

Cert.No.: 24MM273
Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-OB01 based on UKAS LAB 14
according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-

- | Instruments | Model | Serial No. | ID No. | Test report No. | Due date |
|-----------------------------|-------|------------|---------|-----------------|-------------|
| 1) Standard Weight Set (E2) | 15884 | - | 70RC138 | MM-0020-23 | 30 Jan 2025 |
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 :

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	(± mg)	(k)
80	79.99997	+0.00003	0.15	2
200	199.9998	+0.0002	0.28	2

After Adjustment :

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

Applied Weight	Standard Deviation of Reading (g)
(g)	
80	0.000016
200	0.00005



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2404-01130C-15

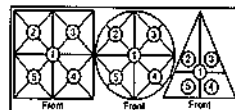
Result of calibration

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

Cert.No.: 24MM273

Page: 3 of 3



Maximum difference between
off-center and central loading

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

0.0001

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
Unload	0.00000	0.00000	0.028	2.28
0.01	0.00999	+0.00001	0.028	2.28
0.05	0.04999	+0.00001	0.029	2.23
1	0.99999	+0.00001	0.030	2.17
2	1.99999	+0.00001	0.030	2.15
5	4.99999	+0.00001	0.034	2.09
10	10.00000	0.00000	0.036	2.06
20	19.99999	+0.00001	0.045	2
50	49.99999	+0.00001	0.080	2
80	79.99999	+0.00001	0.15	2
200	199.9998	+0.0002	0.29	2

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 %.

-000-



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

CALIBRATION CERTIFICATE

Submitted by : THAI ENVIRONMENTAL TECHNIC LIMITED.

Address : 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphansung, Bangkok, 10240, Thailand.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Ambient Environment

Description : Sound Calibrator

Temperature : (23 ± 3) °C

Manufacturer : Tenmars

Relative Humidity : (50 ± 15) %

Model : TM-100

Ambient Pressure : (101.325 ± 1.500) kPa

Serial No. : 180501628

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.

7. Condenser Microphone B&K 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

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

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

Date of Receipt : 1 Aug. 2024

Date of Calibration : 13 Aug. 2024

1/3

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

PM.BLMTC.002 Rev.5

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory
608 Mu 2 Tambon Bangpoo, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Laddao, Chatuchak,
Bangkok, 10900, Thailand
Tel. (66) 0 2579 1121-50 ext. 5219, 5225, 5217
(66) 08 1889 6827



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

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

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions : 101.325 kPa, 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	94.58	0.58	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	990.7	-9.3	± 1.5	$\pm 2.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1.74	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 13 Aug. 2024

2/3

The results relate only to the items tested/calibrated or value assigned.

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

FM.BL.MTC.002 Rev.4

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rump@tistr.or.th Website: www.tistr.or.th

Office/Laboratory
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions : 101.325 kPa, 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	114.61	0.61	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	985.9	-14.1	± 1.5	$\pm 2.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	3.00	± 0.70	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

(Mr. Weerachai Deechaiyae)

Approved by :



Electrical and Electronic Standards Laboratory

Date of Calibration : 13 Aug. 2024

Industrial Metrology and Testing Service Centre

Date of Issue : 15 Aug. 2024

Ref : 2011267080102854001

End of Certificate

3/3

The results relate only to the items tested/calibrated or value assigned.

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

FM.BL.MTC.002 Rev.5

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009

Office/Laboratory
668 Mu 2 Tambon Bangpoo, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ± 0.3 dB and 114.0 ± 0.5 dB
Frequency : at 1,000 Hz $\pm 1\%$
Calibrator Serial NO. : 180501628

Calibration Date : 1-Sep-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23 ± 3)°C : 25.00 °C
Relative Humidity (50 ± 15 %) : 50.0 % RH
Dued Date of Calibrate : 30-Sep-2024

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
35	ACO	6226	110097	94.0	93.7	93.7	93.7	93.7	94.0	0.3	PASS
				114.0	113.7	113.7	113.7	113.7			
36	ACO	6226	110102	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
37	ACO	6226	110101	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
38	ACO	6226	110106	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
39	ACO	6226	110104	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
40	ACO	6226	110100	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
41	ACO	6226	130127	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
42	ACO	6226	130128	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
44	ACO	6226	130130	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
45	ACO	6226	130131	94.0	93.8	93.8	93.8	93.8	94.0	0.2	PASS
				114.0	113.8	113.8	113.8	113.8			

Calibration By : 

Approve by : 



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ± 0.3 dB and 114.0 ± 0.5 dB
Frequency : at 1,000 Hz $\pm 1\%$
Calibrator Serial NO. : 180501628

Calibration Date : 1-Sep-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23 ± 3)°C : 25.00 °C
Relative Humidity (50 ± 15 %) : 50.0 % RH
Dued Date of Calibrate : 30-Sep-2024

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
57	ACO	6226	160099	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
58	ACO	6226	160143	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
59	ACO	6226	160203	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
60	ACO	6226	160204	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
61	ACO	6226	160205	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	113.9	113.9	113.9	113.9			
62	ACO	6226	160211	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
63	ACO	6226	160212	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
64	ACO	6226	160213	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
66	ACO	6226	160215	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	113.9	113.9	113.9	113.9			
67	ACO	6226	160216	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			

Calibration By : 

Approve by : 

**TET**

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ±0.3 dB and 114.0 ±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : 180501628

Calibration Date : 1-Sep-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 %RH
Dued Date of Calibrate : 30-Sep-2024

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust					After Adjust ± dB	Deviation + dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	ครั้งที่ 4	ครั้งที่ 5			
68	ACO	6236	222035	94.0	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0	114.0			
69	ACO	6236	222037	94.0	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0	114.0			
70	ACO	6236	222038	94.0	94.1	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1	114.1			
71	ACO	6236	222039	94.0	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0	114.0			
72	ACO	6236	222040	94.0	94.1	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1	114.1			
74	ACO	6236	222245	94.0	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0	114.0			

Calibration By : Approve by : 

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

CALIBRATION CERTIFICATE

Submitted by : THAI ENVIRONMENTAL TECHNIC LIMITED.
Address : 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphansung, Bangkok, 10240, Thailand.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi IC, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated : Ambient Environment
Description : Sound Calibrator Temperature : (23 ± 3) °C
Manufacturer : Tenmars Relative Humidity : (50 ± 15) %
Model : TM-100 Ambient Pressure : (101.325 ± 1.500) kPa
Serial No. : 180501628

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Briel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone B&K 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

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

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

Date of Receipt : 1 Aug. 2024

Date of Calibration : 13 Aug. 2024

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

FM.BLMTC.002 Rev.5

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9039

Office/Laboratory
668 Mu 2 Tambon Bangpoornai, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 315, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Ladao, Chatuchak,
Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

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

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions : 101.325 kPa, 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	94.58	0.58	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	990.7	-9.3	± 1.5	$\pm 2.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1.74	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 13 Aug. 2024

2 / 3

The results relate only to the items tested/calibrated or value assigned.

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

FM.BLMTC.002 Rev.4

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website: www.tistr.or.th

Office/Laboratory
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions : 101.325 kPa, 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	114.61	0.61	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	985.9	-14.1	± 1.5	$\pm 2.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	3.00	± 0.70	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

(Signature)
(Mr. Weerachai Deechaiyae)

Approved by :



Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 13 Aug. 2024

Date of Issue : 15 Aug. 2024

Ref : 2011267080102854001

End of Certificate

3 / 3

The results relate only to the items tested/calibrated or value assigned.

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

FM.BLMTC.002 Rev.5

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory
668 Mu 2 Tambon Bangpoo, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9400
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827

**TET**


Thai Environmental Technic Limited
บริษัท เทคนิควิเสณสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ±0.3 dB and 114.0 ±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : 180501628

Calibration Date : 1-Sep-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 30-Sep-2024

Item	Instrument Calibrated			Reference	Before Adjust				After Adjust	Deviation	Result
	Brand	Model	Serial NO.	Acoustic dB	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย	± dB	± dB	Calibrate
35	ACO	6226	110097	94.0	93.7	93.7	93.7	93.7	94.0	0.3	PASS
				114.0	113.7	113.7	113.7	113.7			
36	ACO	6226	110102	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
37	ACO	6226	110101	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
38	ACO	6226	110100	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
39	ACO	6226	110104	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
40	ACO	6226	110100	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
41	ACO	6226	130127	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
42	ACO	6226	130128	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
44	ACO	6226	130130	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
45	ACO	6226	130131	94.0	93.8	93.8	93.8	93.8	94.0	0.2	PASS
				114.0	113.8	113.8	113.8	113.8			

Calibration By : 
Approve by : Barun Im

**TET**


Thai Environmental Technic Limited
บริษัท เทคนิควิเสณสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter
Calibrator : TENMARS Sound Calibrator TM-100
Standard : IEC 60942
Accuracy : 94.0 ±0.3 dB and 114.0 ±0.5 dB
Frequency : at 1,000 Hz ±1%
Calibrator Serial NO. : 180501628

Calibration Date : 1-Sep-2024
Barometric pressure (mmHg) : 759.0 mmHg
Temperature (23±3)°C : 25.00 °C
Relative Humidity(50±15 %) : 50.0 % RH
Dued Date of Calibrate : 30-Sep-2024

Item	Instrument Calibrated			Reference	Before Adjust				After Adjust	Deviation	Result
	Brand	Model	Serial NO.	Acoustic dB	ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย	± dB	± dB	Calibrate
46	ACO	6236	112029	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
48	ACO	6236	152074	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
49	ACO	6236	152075	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
50	ACO	6236	152076	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
51	ACO	6236	152077	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
52	ACO	6226	150142	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
53	ACO	6226	160095	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
54	ACO	6226	160096	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
55	ACO	6226	160097	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
56	ACO	6226	160098	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			

Calibration By : 
Approve by : Barun Im

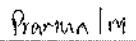
**TET**

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type : Sound Level Meter Calibration Date : 1-Sep-2024
 Calibrator : TENMARS Sound Calibrator TM-100 Barometric pressure (mmHg) : 759.0 mmHg
 Standard : IEC 60942 Temperature (23±3)°C : 25.00 °C
 Accuracy : 94.0±0.3 dB and 114.0±0.5 dB Relative Humidity(50±15 %) : 59.0 %RH
 Frequency : at 1,000 Hz ±1% Due Date of Calibrate : 30-Sep-2024
 Calibrator Serial NO. : 180501628

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
57	ACO	6226	160099	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
58	ACO	6226	160143	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
59	ACO	6226	160203	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
60	ACO	6226	160204	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
61	ACO	6226	160206	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	113.9	113.9	113.9	113.9			
62	ACO	6226	160211	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
63	ACO	6226	160212	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
64	ACO	6226	160213	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
66	ACO	6226	160215	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	113.9	113.9	113.9	113.9			
67	ACO	6226	160216	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			

Calibration By : Approve by : **METROLOGY SYSTEM (THAILAND) CO.,LTD.**

ID LINE: IEC17025



Certificate of Calibration

Certificate Number : SPR24020337-6 Page : 1 of 3
 Customer : Thai Environmental Technic Limited.
 1/6 Soi Ramkhamhaeng 145, Khwaeng Saphan Sung, Khet Saphan
 Sung, Bangkok 10240, Thailand.

Equipment Name : Noise Dose Meter
 Manufacturer : SOUNDTEK
 Model : ST-130
 Serial Number : 170400165
 ID. Number : No.21
 Environmental Conditions
 Ambient Temperature : 23 °C ± 3 °C Received Date : 21 Feb 2024
 Relative Humidity : 50 % ± 15 % Calibration Date : 23 Feb 2024
 Location of Calibration : In-Lab Recommend Due Date : 23 Feb 2025
 Calibration Procedure : SP-CPE-04-01 Date of Issue : 24 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Karoon Pengsalung

Calibration Officer

Approved by : 

(Mr.Nirut Loha)

Authorized Signatory



ID LINE: MEC17925



Calibration Report

Certificate Number : SPR24020337-6

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research



ID LINE: MEC17925



Result of Calibration

Certificate No. : SPR24020337-6

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



ISO/IEC 17025



Certificate of Calibration

Certificate Number : SPR24020097-6 Page : 1 of 3
 Customer : Thai Environmental Technic Limited.
 1/6 Soi Ramkhamhaeng 145, Khwaeng Saphan Sung, Khet Saphan
 Sung, Bangkok 10240, Thailand.

Equipment Name : Noise Dose Meter
 Manufacturer : SOUNDTEK
 Model : ST-130
 Serial Number : 170800191
 ID. Number : No.23
 Environmental Conditions
 Ambient Temperature : 23 °C ± 3 °C Received Date : 07 Feb 2024
 Relative Humidity : 50 % ± 15 % Calibration Date : 08 Feb 2024
 Location of Calibration : In-Lab Recommend Due Date : 08 Feb 2025
 Calibration Procedure : SP-CPE-04-01 Date of Issue : 09 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Karoon Pengsalung

Calibration Officer

Approved by :

(Mr.Yodyaim Chansang)

Authorized Signatory



ISO/IEC 17025



Calibration Report

Certificate Number : SPR24020097-6 Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :
 TISTR - Thailand Institute of Scientific and Technological Research



63/29 Moo 1 Klongsi Klongluang Pathumthani 12120 (Thailand) Tel: (662) 193-2220 E: info@spmetrology.com www.spmetrology.com



Result of Calibration

Certificate No. : SPR24020097-6

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



63/29 Moo 1 Klongsi Klongluang Pathumthani 12120 (Thailand) Tel: (662) 193-2220 E: info@spmetrology.com www.spmetrology.com



Certificate of Calibration

Certificate Number : SPR24020097-7

Page : 1 of 3

Customer

: Thai Environmental Technic Limited.

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

Equipment Name : Noise Dose Meter

Manufacturer : SOUNDTEK

Model : ST-130

Serial Number : 170800193

ID. Number : No.24

Environmental Conditions

Ambient Temperature : 23 °C ± 3 °C

Received Date : 07 Feb 2024

Relative Humidity : 50 % ± 15 %

Calibration Date : 08 Feb 2024

Location of Calibration : In-Lab

Recommend Due Date : 08 Feb 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 09 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Karoon Pengsalung

Approved by :

Calibration Officer

(Mr.Yodyaim Chansang)

Authorized Signatory



Calibration Report

Certificate Number : SPR24020097-7

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 114/0166	17 Feb 2024

Traceability

This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR24020097-7

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.7	113.7	-0.3	-0.3	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	113.9	113.9	-0.1	-0.1	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



ID LINE: IBC17025



Certificate of Calibration

Certificate Number : SPR24020337-7 Page : 1 of 3
 Customer : Thai Environmental Technic Limited.
 1/6 Soi Ramkhamhaeng 145, Khwaeng Saphan Sung, Khet Saphan
 Sung, Bangkok 10240, Thailand.

Equipment Name : Noise Dose Meter
 Manufacturer : SOUNDTEK
 Model : ST-130
 Serial Number : 170800207
 ID. Number : No.26

Environmental Conditions
 Ambient Temperature : 23 °C ± 3 °C Received Date : 21 Feb 2024
 Relative Humidity : 50 % ± 15 % Calibration Date : 23 Feb 2024
 Location of Calibration : In-Lab Recommend Due Date : 23 Feb 2025
 Calibration Procedure : SP-CPE-04-01 Date of Issue : 24 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Karoon Pengsalung
 Calibration Officer

Approved by :
 (Mr.Nirut Loha)
 Authorized Signatory



ID LINE: IBC17025



Calibration Report

Certificate Number : SPR24020337-7 Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

This certification is traceable to the International System of Unit maintained at :
 TISTR - Thailand Institute of Scientific and Technological Research



Result of Calibration

Certificate No. : SPR24020337-7

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



Certificate of Calibration

Certificate Number : SPR24020220-34

Page : 1 of 3

Customer

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

Equipment Name : Noise Dose Meter

Manufacturer : SOUNDTEK

Model : ST-130

Serial Number : 220100050

ID. Number : No.30

Environmental Conditions

Ambient Temperature : 23 °C ± 3 °C Received Date : 14 Feb 2024

Relative Humidity : 50 % ± 15 % Calibration Date : 15 Feb 2024

Location of Calibration : In-Lab Recommend Due Date : 15 Feb 2025

Calibration Procedure : SP-CPE-04-01 Date of Issue : 16 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs.

The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Chumpon Dokpikul

Approved by :

Calibration Officer

(Mr.Prayoon Topart)

Authorized Signatory



SP METROLOGY SYSTEM (THAILAND) CO.,LTD.



ID LINE : IEC17025



ANAB
ACCREDITED
CALIBRATION AND
MEASUREMENT

Calibration Report

Certificate Number : SPR24020220-34

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

This certification is traceable to the International System of Unit maintained at :

TISTR - Thailand Institute of Scientific and Technological Research

65/29 Moo 1 Klongsi Klongluang Pattanutham 12120 (Thailand) Tel: (662) 193-2220 5 จักรู www.abucrense.com



SP METROLOGY SYSTEM (THAILAND) CO.,LTD.



ID LINE : IEC17025



ANAB
ACCREDITED
CALIBRATION AND
MEASUREMENT

Result of Calibration

Certificate No. : SPR24020220-34

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

65/29 Moo 1 Klongsi Klongluang Pattanutham 12120 (Thailand) Tel: (662) 193-2220 5 จักรู www.abucrense.com



NO LINE : REC17025



Certificate of Calibration

Certificate Number : SPR24020220-35 Page : 1 of 3
 Customer : Thai Environmental Technic Limited.
 1/6 Soi Ramkhamhaeng 145, Khwaeng Saphan Sung, Khel Saphan
 Sung, Bangkok 10240, Thailand.

Equipment Name : Noise Dose Meter
 Manufacturer : SOUNDTEK
 Model : ST-130
 Serial Number : 220100051
 ID. Number : No.31
 Environmental Conditions
 Ambient Temperature : 23 °C ± 3 °C Received Date : 14 Feb 2024
 Relative Humidity : 50 % ± 15 % Calibration Date : 15 Feb 2024
 Location of Calibration : In-Lab Recommend Due Date : 15 Feb 2025
 Calibration Procedure : SP-CPE-04-01 Date of Issue : 16 Feb 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Chumpon Dokpikul

Calibration Officer

Approved by :

(Mr.Prayoon Topat)

Authorized Signatory

SP-FM-04-15 rev.0



NO LINE : REC17025



Calibration Report

Certificate Number : SPR24020220-35 Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	26 Jan 2025

Traceability

This certification is traceable to the International System of Unit maintained at :
 TISTR - Thailand Institute of Scientific and Technological Research

SP-FM-04-15 rev.0



METROLOGY SYSTEM (THAILAND) CO.,LTD.



63/29 Moo 1 Klongsi Klongluang Pathumthani 12120 (Thailand) Tel: (662) 193-2220 5 ไลน์ www.spmetrology.co.th



Result of Calibration

Certificate No. : SPR24020220-35

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

SP-FM-04-15 REV.0



METROLOGY SYSTEM (THAILAND) CO.,LTD.



63/29 Moo 1 Klongsi Klongluang Pathumthani 12120 (Thailand) Tel: (662) 193-2220 5 ไลน์ www.spmetrology.co.th



Certificate of Calibration

Certificate Number : SPR24030114-1

Page : 1 of 3

Customer :

Thai Environmental Technic Limited.

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

Equipment Name :

Noise Dose Meter

Manufacturer :

SOUNDTEK

Model :

ST-130

Serial Number :

220100055

ID. Number :

No.35

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Received Date : 08 Mar 2024

Relative Humidity : $50\% \pm 15\%$

Calibration Date : 11 Mar 2024

Location of Calibration : In-Lab

Recommend Due Date : 11 Mar 2025

Calibration Procedure : SP-CPE-04-01

Date of Issue : 12 Mar 2024

Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr.Karoon Pengsalung

Approved by :

Calibration Officer

(Mr.Prayoon Topart)

Authorized Signatory

SP-FM-04-15 rev.0



ISO LINE : IEC17025



Calibration Report

Certificate Number : SPR24030114-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Sound Level Calibrator	ST-120	211203773	EEL.BP. 140/0167	28 Jan 2025

Traceability

This certification is traceable to the International System of Unit maintained at :
TISTR - Thailand Institute of Scientific and Technological Research



ISO LINE : IEC17025



Result of Calibration

Certificate Number : SPR24030114-1

Page : 3 of 3

Range : 94 to 114 dB

Function : @1kHz

Select A

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select C

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Select Z

Unit : dB

Standard Setting	UUC Reading		Error		Uncertainty (±)
	Fast	Slow	Fast	Slow	
94	94.0	94.0	0.0	0.0	0.15
114	114.0	114.0	0.0	0.0	0.15

Note :

The result of calibration was found accurate as show on date and place of calibration only.
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANA KARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL: 0-2717-3000-24 FAX: 0-2719-0484



Certificate of Calibration

Certificate No.: 24H560
Page: 1 of 2

Equipment: Thermal Environment Monitor

Manufacturer: JANTYTECH

Model: JT2011-E2A

Serial No.: 3522210143

ID No.: HD 5

Condition As-Received: Used Item

Received Date: 12 March 2024

Calibration Date: 18 March 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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:

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Handheld Thermometer With Sensor	1521	ASA339	23H1238	15 Oct 2024

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 through:-

-Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

Calibrated by: Somchai Dumwor
Issue Date: 25 March 2024

Approved Signatory:

[✓] Chakrit Waewonjue
[] Ponthippa Tameyakul
[] Unnepphol Marachal

B 0336873



Cert. No.: 24H560
Page: 2 of 2

Result of Calibration: Without Adjustment
Function: Temperature Measurement for Tn

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
20.019	19.8	-0.219	0.42
30.028	29.9	-0.128	0.42
39.998	40.0	0.002	0.42

Result of Calibration: Without Adjustment
Function: Temperature Measurement for Trw

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
20.019	19.9	-0.119	0.42
30.028	29.9	-0.128	0.42
39.998	39.8	-0.198	0.42

Result of Calibration: Without Adjustment
Function: Temperature Measurement for Tg

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
20.019	19.9	-0.119	0.42
30.028	30.0	-0.028	0.42
39.998	39.9	-0.098	0.42

UUC*: Unit Under Calibration

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

-000-

[Signature]

a 1208147



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 TATTANAKARN ROAD SOI 11, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-5000-34 FAX. 0-2719-9484



Certificate of Calibration

Certificate No. : 24H563
Page : 1 of 2

Equipment : Thermal Environment Monitor

Manufacturer: JANTYTECH

Model : JT2011-E2A

Serial No.: 3522210146

ID No.: HD 8

Condition As-Received: Used item

Received Date: 12 March 2024

Calibration Date: 19 March 2024

Reference: 2403-0381DSC

Submitted by: Thai Environmental Technic Limited

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

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 :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Handheld Thermometer With Sensor	1521	ASA339	23H1238	16 Oct 2024


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 through:-

-Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

Calibrated by : Somchai Dumwor
Issue Date : 25 March 2024

Approved Signatory :


[✓] Chakrit Waeuwajua
[] Ponthippa Tameyakul
[] Uanopphol Harachei

B 0336876



Cert. No.: 24H563
Page.: 2 of 2

Result of Calibration:- Without Adjustment
Function: Temperature Measurement for Tn

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
19.970	19.9	-0.070	0.42
29.975	29.8	-0.175	0.42
40.004	39.8	-0.204	0.42

Result of Calibration:- Without Adjustment
Function: Temperature Measurement for Tnw

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
19.970	19.9	-0.070	0.42
29.975	29.7	-0.275	0.42
40.004	39.6	-0.404	0.42

Result of Calibration:- Without Adjustment
Function: Temperature Measurement for Tg

Standard Temperature	UUC* Reading	Error	Uncertainty of Measurement
(°C)	(°C)	(°C)	(±°C)
19.970	19.9	-0.070	0.42
29.975	29.9	-0.075	0.42
40.004	39.8	-0.204	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%.

-000-

a 1208150



Request No. : 22-67 / 0661

MTC No. : PSL-P 0185 / 67

CERTIFICATE OF CALIBRATION

Nomenclature : Digital Lux Meter
Maker : DIGICON

Serial No. : Q066345
Model : LX-50

Customer : THAI ENVIRONMENTAL TECHNIC LIMITED.
Address : 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung, Bangkok 10240

Date of receipt : 9 July 2024

Date of calibration : 17 July 2024

Place of calibration : Photometry and Temperature Standards Laboratory, MTC. (Bangpoo)

Basis of calibration : calibration at 0 ~ 5000 lux.

Condition of calibration : - Ambient temperature : $(25 \pm 2) ^\circ\text{C}$

- Relative humidity : $(60 \pm 20) \%$

Reference Standard : Working Standard Luminous Intensity Lamp, Serial No.: FEL003 and 3501,
can be traceable to international system of units (SI), through calibration certificate
MTC No. PSL-P 0151/67 and PSL-P 0152/67, date of calibration 10 May 2024.

Traceability : This certificate is traceable to SI units through the National Institute of Metrology (Thailand)
calibration certificate No. TP-1010-23, TP-1011-23 and TP-1012-23

Support Equipment : 1. Photometric bench , 3.0 meter long
2. DC power supply, Serial No.: BC - 341006035007/2
3. Digital Multimeter , Model : R 6551 , S/N : 92041186 and 92041192

Calibration Procedure : The measurement was done in accordance with WLCP.10.

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

page 1 of 2

R.P.

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

FM.BL.MTC.002 Rev.5

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory
668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9400
E-mail : mtic@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Ladyao, Chatuchak,
Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827



Request No. : 22-67 / 0661

MTC No. : PSL-P 0185 / 67

Serial No. : Q066345

Results :

UUC Range (lux)	Standard (lux)	*UUC Reading (lux)	Uncertainty of Measurement \pm (lux)
2000	100	103	2.0
	500	504	10
	1000	1002	20
	1500	1502	30
20000 ($\times 10$)	2000	1992	40
	2000	196	40
	3000	295	60
	4000	394	80
50000 ($\times 100$)	5000	490	100
	2000	19	70
	3000	28	90
	4000	38	100
50000 ($\times 100$)	5000	47	120

Note : *UUC = Unit Under Calibration.

...end of certificate...

Calibrated by :

(Ms. Rattanaadee Pholprom)

Approved by :

(Mr. Kainchai Singasapivat)
Director

Photometry and Temperature Standards Laboratory

Ref. : 2042267070902348001

Issued date : 25 July 2024

page 2 of 2

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

FM.BL.MTC.002 Rev.5

Head Office
35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory
668 Mu 2 Tambon Bangpoomai, Amphoe Muang Samutprakan,
Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9400
E-mail : mtic@tistr.or.th Website : www.tistr.or.th

Office
196 Phahonyothin Road, Ladyao, Chatuchak,
Bangkok 10900, Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827



บริษัท ไทยยูนิค จำกัด

THAI UNIQUE CO., LTD.

80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200

80-82 Prachathipatai Rd., Bangkhunphrom, Pranakorn, Bangkok 10200

Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawan@thaiunique.com, Website : www.thaiunique.com

ATOMIC ABSORPTION SPECTROMETER TEST CERTIFICATE

Certificate No : SV2412/22240

Instrument Type : Atomic absorption spectrometer

Model : AA 240

Serial Number : EL0909M072

Organization : S.P.J. Scientific Co., Ltd

Address : No. 80, Soi Nakkilaemthong 3, Saphan Sung Subdistrict, Saphan Sung District, Bangkok 10250

Date : 20 Dec 2024

Hollow cathode lamps used

Element	Lamp number	Comments
Arsenic	56-101003-00	
Copper	56-101014-00	
Potassium	56-101042-00	
Gold	56-101021-00	

Test description	Specification	Result	Comments
Light throughput (%Gain) or (EHT)			
Cu at 324.8 nm	$\leq 64 \%$ or 380 V	42 %	Pass
As at 193.7 nm	$\leq 80 \%$ or 540 V	68 %	Pass
K at 766.5 nm*	$\leq 84 \%$ or 540 V	56 %	Pass
Other.....			
Photometric noise Cu BGC off			
STDV @ 0	≤ 0.0005	0.0001	Pass



บริษัท ไทยยูนิค จำกัด

THAI UNIQUE CO., LTD.

80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200
80-82 Prachathipatai Rd., Bangkhunphrom, Pranakorn, Bangkok 10200

Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

Wavelength accuracy			
Cu at 324.8 nm	323.0 nm – 326.0 nm	324.8 nm	Pass
As 193.7 nm	192.0 nm – 195.0 nm	193.6 nm	Pass
K at 766.5 nm*	765.0 nm – 768.0 nm	766.5 nm	Pass
Other.....			
High solids nebulizer setting**			
Uptake rate	7.2 – 10.6 ml / min	10.0 ml/m	Pass
Max Abs	≥ 0.75 Abs	0.79 Abs	Pass
Precision(%RSD)	≤ 0.5 %	0.3 %	Pass
Zeeman Background Correction Accuracy (%)***			
BCA @ Au 242.8 nm	< 3.7 %	***	***
Zeeman Magnetic Sensitivity Ratio (%)***			
MSR @ Cu 324.7 nm	> 70 %	***	***
Characteristic mass and sensitivity ****			
Sensitivity	≥ 0.21 Abs	*****	*****
Precision (%RSD)	≤ 4.0 %	*****	*****

* for Wideband PMT (Wavelength 190nm – 900nm)

** for Flame system

*** for Zeeman system

***** for Graphite furnace system

CALIBRATED BY :

Signature: _____

Engineer : Suriya Nacharoen

Date : 20 Dec 2024



APPROVED BY :

Signature: _____

Service Manager Suchai Sanguankiattichai

Date : 20 Dec 2024

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-200321-1

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Electronic Balance

Manufacturer : METTLER TOLEDO **Model :** AL204

Serial No. : 1228320221 **ID No. :** SPJ-TE-012

Capacity : 210 g **Resolution :** 0.0001 g

Environment : On site calibration was carried out at the Balance Room, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (26.5 to 26.8) °C

Relative Humidity : (57.8 to 58.2) %

Air Pressure : 1008.0 mbar

Date of Received : 20 June 2025

Date of Calibration : 20 June 2025

Date of Issue : 25 June 2025

Calibrated by : Satja Sangkhum

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14

Edition 7 - November 2022

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Satja Sangkhum)

Supervisor

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 Calibratech Co.,Ltd.



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 68-200321-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

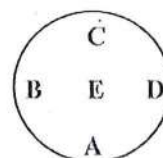
Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.001	0.0000	0.00011
0.01	0.0000	0.00011
0.1	0.0000	0.00011
1	0.0000	0.00011
5	0.0000	0.00011
10	0.0000	0.00011
50	0.0000	0.00014
100	0.0001	0.00020
150	0.0001	0.00038
200	0.0000	0.00038

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%

Eccentric error Load test : 50 g
A B C D E
0.0001 0.0000 -0.0001 -0.0001 0.0000 g

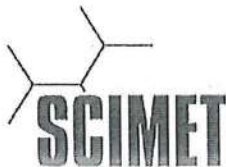


Repeatability Load test : 200 g
Stdev. : 0.00004 g

- o0o -

A handwritten signature in black ink, appearing to be 'Sant'.





SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C12250442

Calibration Certificate

Equipment:	Balance	Job No.:	KSMT2501567
Model:	ME204T/00	Received Date:	30 April 2025
Serial No.(or ID):	B950781446 (SPJ-TE-039)	Issued Date:	30 April 2025
Manufacturer:	Mettler Toledo	Page:	1 of 2
Condition:	In condition		

Customer

S.P.J. SCIENTIFIC COMPANY LIMITED
80 Soi Nakkilalaemthong 3, Thab Chang, Saphansoong, Bangkok 10250

Calibration Place

S.P.J. SCIENTIFIC COMPANY LIMITED (Balance Room)
80 Soi Nakkilalaemthong 3, Thab Chang, Saphansoong, Bangkok 10250

Calibration Date

30 April 2025

Environment Condition

Temperature: 22.5 °C ± 0.4 °C
Humidity: 53.2 %RH ± 2.2 %RH

The Method used

In-house method, W112, based on UKAS Lab 14

Traceability

This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through SCIMET Co., Ltd.
Certificate No. C13240329, C13250234

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.

(Mr. Siwapan Srijan)
Person in charge



(Mr. Thalerngkeat Pongngam)
Authorized signatory

Condition of reference standards Instruments:

Instruments	Model	Serial No. or ID.	Certificate No.	Due date
Standard Weight Set 1mg - 500mg / E2	8.XEHM-711	1160908	C13240329	22 Aug 26
Standard Weight Set 1 g - 200 g / E2	8.XTHM-581	1180908	C13250234	08 Apr 26

Calibration Results:

Without Adjustment (Use Internal calibration adjustment)

Eccentric Error: Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.

			Nominal Test Value	100	(g)
Reference Points (g)					
A	B	C	D	E	
-	-0.0001	0.0001	0.0002	-0.0001	

Repeatability: Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
20	0.00005
200	0.00006

Error of indication from nominal or conventional mass value., Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Displayed Value (g)	Error of indication (g)	Uncertainty (g)	k
0	0.00000	0.0000	0.0000	0.00011	2.04
0.1	0.10000	0.1000	0.0000	0.00011	2.04
0.5	0.49999	0.5000	0.0000	0.00011	2.04
1	0.99999	1.0000	0.0000	0.00011	2.04
2	2.00000	2.0000	0.0000	0.00011	2.04
5	4.99999	5.0000	0.0000	0.00011	2.04
10	10.00000	10.0000	0.0000	0.00011	2.04
20	20.00000	20.0000	0.0000	0.00012	2.03
50	49.99994	50.0000	0.0001	0.00013	2.02
100	99.99990	99.9999	0.0000	0.00017	2.01
120	119.99990	120.0000	0.0001	0.00021	2.00
150	149.99984	149.9999	0.0001	0.00024	2.00
200	199.99992	199.9999	0.0000	0.00030	2.00



Refer to Certificate No.: C12250442

Page: 1 of 2

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The error of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, UKAS Lab14. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

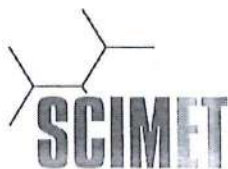
Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule : ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk $< 50\%$ PFA.
- ☒ Choice B Non-binary statement with guard band ($w = 1 U$), Pass or Fail Specific Risk $< 2.5\%$ PFA and Condition Pass or Condition Fail Specific Risk $< 50\%$ PFA.
- ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r U$).
- ; PFA – Probability of False Accept



(Mr. Thalerngkeat Pongngam)

Authorized signatory

**Statements of conformity:**

Without Adjustment (Use Internal calibration adjustment)

Readability; 0.0001 g

Tolerances : 0.0005 g

Nominal Value g	Error of indication g	Guard band (w) g	Tolerance (\pm) g	Conformity
0	0.0000	0.00011	0.0005	Pass
0.1	0.0000	0.00011	0.0005	Pass
0.5	0.0000	0.00011	0.0005	Pass
1	0.0000	0.00011	0.0005	Pass
2	0.0000	0.00011	0.0005	Pass
5	0.0000	0.00011	0.0005	Pass
10	0.0000	0.00011	0.0005	Pass
20	0.0000	0.00012	0.0005	Pass
50	0.0001	0.00013	0.0005	Pass
100	0.0000	0.00017	0.0005	Pass
120	0.0001	0.00021	0.0005	Pass
150	0.0001	0.00024	0.0005	Pass
200	0.0000	0.00030	0.0005	Pass

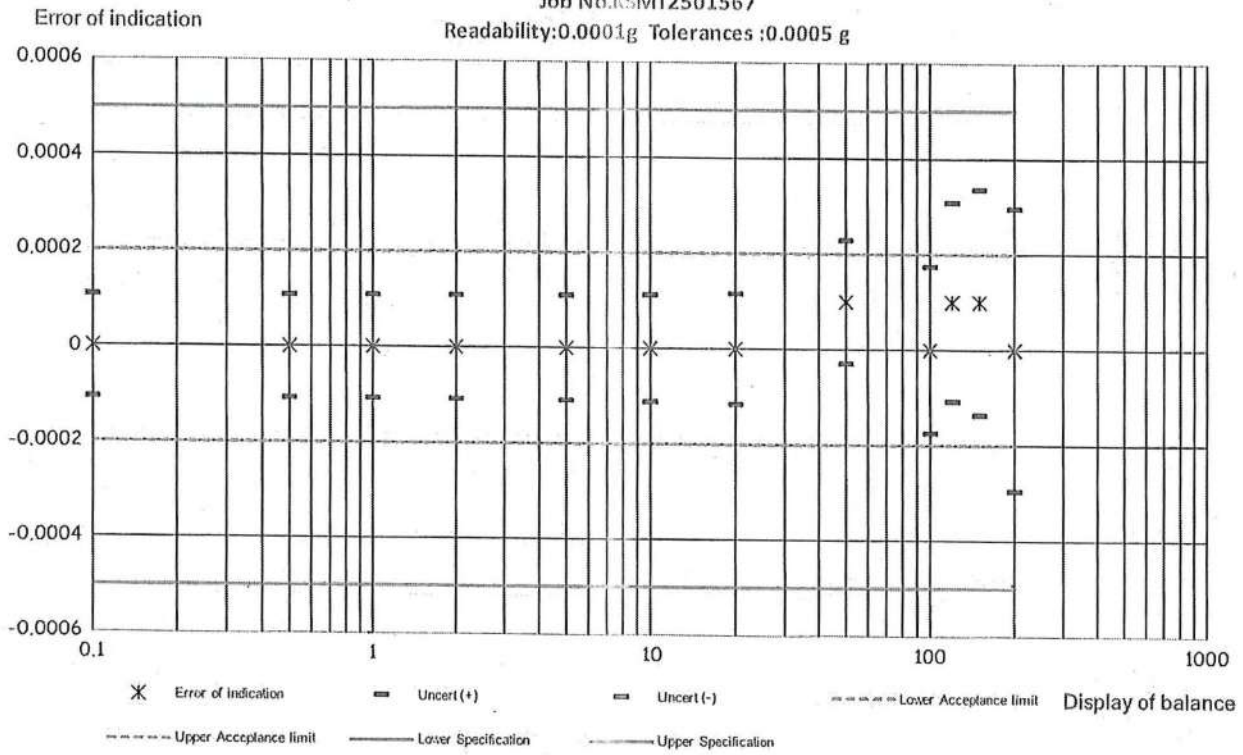
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of conformity

Without Adjustment (Use internal calibration adjustment)

Job No.KSMT2501567

Readability:0.0001g Tolerances :0.0005 g





ใบตรวจสอบสภาพเครื่องชั่ง

ชนิดเครื่องมือ: Balance

รุ่น: ME204T/00

เลขที่ใบงาน: KSMT2501567

หมายเลขเครื่อง: B950781446

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
30 Apr 2025			30 Apr 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ/Adapter, power supply 220/110V	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสมบูรณ์ชุดกระจกกันลม (Cover)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. ความสมบูรณ์ชุดของระดับน้ำ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การปรับระดับของขาตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การตอบสนองของปุ่มกด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. ความสมบูรณ์ของ Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. การแสดงผลของ Display หลังวางน้ำหนัก	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ชุดรองจานชั่ง (Stopper) / pan support	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของ Function Internal / External	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. ความสะอาดของตัวเครื่องภายนอกและแกน load cell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

หมายเหตุเพิ่มเติม/ข้อแนะนำ :

*ลูกน้ำเริ่มเสื่อมสภาพ ตั้งไม่เข้าศูนย์แต่ยังอยู่ในวงศูนย์กลาง ยังสามารถใช้งานได้ปกติ

Mr. Siwapan Srijan

Service Engineer

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-200321-2

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Electronic Balance

Manufacturer : METTLER TOLEDO **Model :** MS105DU

Serial No. : B216861078 **ID No. :** SPJ-TE-013

Capacity : 120 g **Resolution :** 0.00001g/42g, 0.0001g/120g

Environment : On site calibration was carried out at the Balance Room, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (25.2 to 26.0) °C

Relative Humidity : (54.6 to 56.3) %

Air Pressure : 1008.0 mbar

Date of Received : 20 June 2025

Date of Calibration : 20 June 2025

Date of Issue : 25 June 2025

Calibrated by : Satja Sangkhum

Calibration Method : In-house method CAL-M2001 based on UKAS Publication ref : LAB 14

Edition 7 - November 2022

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Weights

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
E261-E2624	C02242009	07 Nov 2025	National Institute of Metrology (Thailand), (NIMT)

Approved by :


(Satja Sangkhum)

Supervisor

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 Calibratech Co.,Ltd.



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaphrasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 68-200321-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

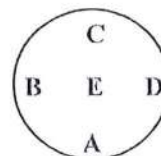
Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.001	0.00000	0.000011
0.01	0.00000	0.000013
0.1	0.00000	0.000015
1	0.00000	0.000026
5	0.00000	0.000043
10	0.00000	0.000053
20	0.00000	0.000071
50	0.0000	0.00014
100	0.0001	0.00020
120	0.0001	0.00038

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.00$, providing a level of confidence of approximately 95%

Eccentric error Load test : 20 g
A B C D E
0.00001 0.00006 0.00009 -0.00003 0.00000 g



Repeatability Load test : 100 g
Stdev. : 0.000000 g

- oOo -



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



Certificate of Calibration

Certificate No. : 68-400357-3

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Temperature controlled enclosure (Ovenr)

Manufacturer : Memmert

Model : UF55

Range : N/A °C

Resolution : 0.1 °C

Serial No. : B221.0746

ID No. : SPJ-TE-049

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (30.0 to 32.0) °C

Relative Humidity : (55 to 60) %

Line Voltage : (232.0 to 233.0) V

Date of Received : 20 June 2025

Date of Calibration : 20 June 2025

Date of Issue : 27 June 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400029 & 400030

68-400216-1

28 Oct 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

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 Calibratech Co.,Ltd.



Certificate of Calibration

Certificate No. : 68-400357-3

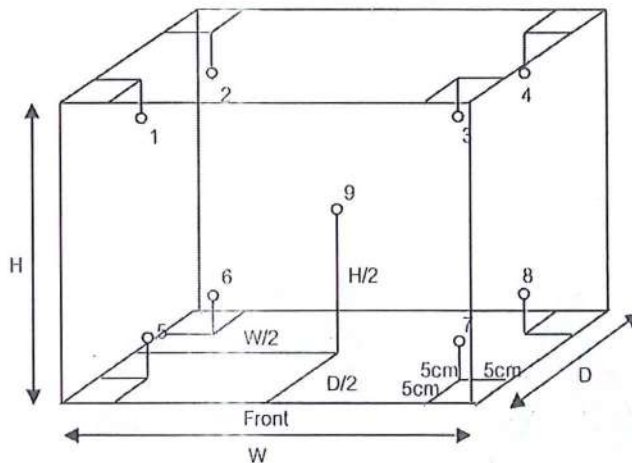
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.40 m

Capacity = 0.05 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
104.0	104.0	104.0	103.9	104.1	104.1	103.7	104.1	104.0	103.7	103.7	103.9	0.69
180.0	180.0	180.0	180.6	180.4	180.3	179.4	180.7	180.5	180.0	179.6	180.4	0.95

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	104.0	104.0	0.3	0.1	0.6
180.0	180.0	180.0	1.1	0.2	1.5

Remark The uncertainty is not combine uniformity of the air chamber

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

- oOo -

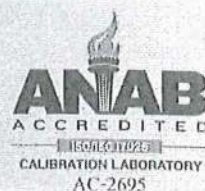




THAI HEART CALIBRATION CO., LTD.

112/1 Mitthi, Phrak Sai, Muang, Samut Prakan 10280

TEL: 01-2394-2162, 01-2757-8335, 01-2757-8496 Fax: 01-2757-8507



CERTIFICATE OF CALIBRATION

Certificate No.: T0-1007020/25

Page 1 of total 4 pages

Customer S.P.J. SCIENTIFIC COMPANY LIMITED
80 Soi Nakkilalaemthong 3, Thap Chang,
Saphansoong, Bangkok 10250 Thailand.

Equipment	COD Reactor		
Manufacturer	HANNA	Model	HI839150
Serial No.	102500013111	ID No.	SPJ-TE-084
Description	Resolution of UUC : 0.1 °C		

Environmental Conditions Ambient Temperature: $(23 \pm 3) ^\circ\text{C}$
Relative Humidity: $(50 \pm 15) \%$
Atmospheric Pressure: -

Calibration Location Blue Devils Laboratory (TL)

Received Date 10 July 2025

Calibration Date 10 July 2025

Date of Issue 11 July 2025

Condition of Artifacts New Item

Checked by

Act as Technical Manager

Approved by

Managing Director

() (Krisyosl K.)	() (Sakda Y.)
() (Patiphan K.)	() (Onnapa P.)
(/) (Pongsak H.)	() (Nitiphong K.)
() (Kanung C.)	() (Nonthachai K.)
() (Pramong P.)	() (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: T0-1007020/25

Page 2 of total 4 pages

Reference Method :

- The calibration method used was CP-142 based on an in-house method.
- The temperature scale used was an ITS-90.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Serial No.	Cert. No.	Due Date	Traceability
Data Logger with Sensors	MY57010605/ MY59005437	I0-0108003/24	Aug. 1, 2025	THC

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- THC, Thai Heart Calibration Co., Ltd.

Certificate No.: T0-1007020/25

Page 3 of total 4 pages

Measurement Results:

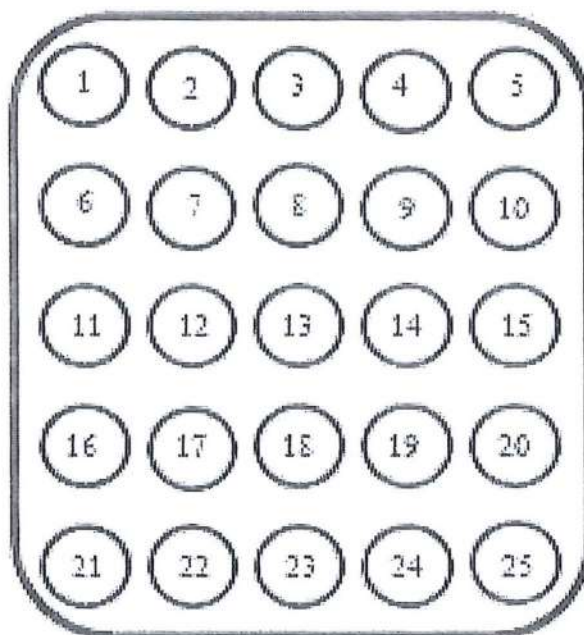
Hole No.	UUC Setting (°C)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Stability of UUC (± °C)	Uncertainty (± °C)
# 1	150.0	150.52	150.0	0.52	0.14	0.36
# 2	150.0	150.17	150.0	0.17	0.16	
# 3	150.0	150.50	150.0	0.50	0.13	
# 4	150.0	150.22	150.0	0.22	0.16	
# 5	150.0	150.46	150.0	0.46	0.13	
# 6	150.0	150.07	150.0	0.07	0.10	
# 7	150.0	150.62	150.0	0.62	0.51	
# 8	150.0	150.81	150.0	0.81	0.14	
# 9	150.0	150.74	150.0	0.74	0.14	
# 10	150.0	150.53	150.0	0.53	0.14	
# 11	150.0	150.70	150.0	0.70	0.14	
# 12	150.0	150.68	150.0	0.68	0.10	
# 13	150.0	150.75	150.0	0.75	0.19	
# 14	150.0	150.63	150.0	0.63	0.14	
# 15	150.0	150.59	150.0	0.59	0.14	
# 16	150.0	150.65	150.0	0.65	0.11	
# 17	150.0	150.57	150.0	0.57	0.15	
# 18	150.0	150.62	150.0	0.62	0.12	
# 19	150.0	150.72	150.0	0.72	0.13	
# 20	150.0	150.48	150.0	0.48	0.08	
# 21	150.0	150.25	150.0	0.25	0.10	
# 22	150.0	150.64	150.0	0.64	0.19	
# 23	150.0	150.71	150.0	0.71	0.09	
# 24	150.0	150.64	150.0	0.64	0.12	
# 25	150.0	150.65	150.0	0.65	0.09	

UUC : Unit Under Calibration

Certificate No.: T0-1007020/25

Page 4 of total 4 pages

Measurement Results (Cont.):



The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com



Certificate of Calibration

Certificate No. : 68-400357-2

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalacmthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : N/A

Model : N/A

Range : N/A °C

Resolution : 0.1 °C

Serial No. : N/A

ID No. : SPJ-TE-028

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (29.0 to 29.5) °C

Relative Humidity : (40 to 45) %

Line Voltage : (232.0 to 233.0) V

Date of Received : 20 June 2025

Date of Calibration : 20 June 2025

Date of Issue : 27 June 2025

Calibrated by : Permpoon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Digital Thermometer with RTD Probe

ID No.

Cert. No.

Due Date

Traceability

400029 & 400043

68-400215-1

26 Oct 2025

National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpoon Chanpu)

Supervisor

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 Calibratech Co.,Ltd.



Certificate of Calibration

Certificate No. : 68-400357-2

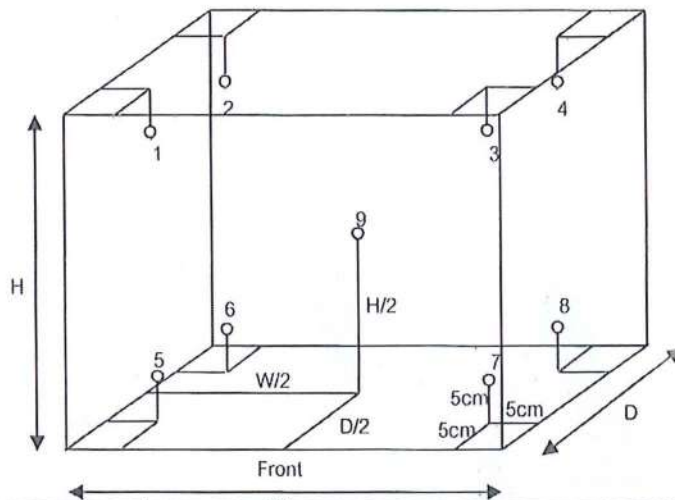
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.68 m

D = 0.55 m

H = 1.27 m

Capacity = 0.47 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
20.0	20.0	20.0	19.99	19.93	20.50	20.55	19.78	20.18	20.42	20.47	20.08	0.33

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.54	0.06	0.87

Remark The uncertainty is not combine uniformity of the air chamber

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2 , providing a level of confidence of approximately 95%

- o0o -

[Signature]



Certificate of Calibration

Certificate No. : 68-420050-1

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : pH Meter with electrode

pH meter

Manufacturer : Hach

Model : HQ11D

Range : 0.00 to 14.00 pH

Resolution : 0.01 pH

Serial No. : N/A

ID No. : SPJ-TE-045

Electrode

Model : PHC101

Serial No. : 220772562511

ID No. : SPJ-TE-045

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (24.5 to 25.0)°C

Relative Humidity : (50 to 55) %

Date of Received : 20 June 2025

Date of Calibration : 20 June 2025

Date of Issue : 27 June 2025

Calibrated by : Permpon Chanpu

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00307/66	23 Aug 2025	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.007	61314276	1081108	28 Feb 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.965	61318175	1081110	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61325043	1081109	28 Feb 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :



(Permpon Chanpu)

Supervisor

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 Calibratech Co.,Ltd.



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaphrachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 68-420050-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (\pm pH)
4, 7, 10	4.007	4.01	0.00	0.0097
	6.965	7.00	-0.03	0.012
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

This reported uncertainty of measurment was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

- 000 -





SCIMET Co., Ltd.
818/124 Udomsuk Rd., Bangna-Nuea,
Bangna, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C08250076

Calibration Certificate

Equipment:	pH METER	Job No.:	KSMT2501568
Model:	FiveEasy F20	Received Date:	30 April 2025
Serial No.(or ID):	C242075213 (SPJ-TE-065)	Issued Date:	30 April 2025
Manufacturer:	Mettler Toledo	Page:	1 of 3
Condition:	In Condition		

Customer

S.P.J. SCIENTIFIC COMPANY LIMITED
80 Soi Nakkilalaemthong 3, Thab Chang, Saphansoong, Bangkok 10250

Calibration Place

S.P.J. SCIENTIFIC COMPANY LIMITED (Lab 4 Cool Room)
80 Soi Nakkilalaemthong 3, Thab Chang, Saphansoong, Bangkok 10250

Calibration Date

30 April 2025

Environment Condition

Temperature: 24.6 °C \pm 0.7 °C
Humidity: 48.6 %RH \pm 2.3 %RH

The Method used

In-house method, WI08, based on ASTM E 70-07

Traceability

This certificate is traceable to SI Units, Sample Test is assured through primary measurement method Harned cell, through CPAchem Ltd. (ISO17034) Certificate No. 1066714, 1001803, 1066716, pH Scale and Temperature test are traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Industrial Foundation Electrical and Electronics Institute Certificate No. CA20240453EA, through SCIMET Co., Ltd. Certificate No.C23240074

(Mr. Siwaporn Srijan)

Person in charge



(Mr. Thalerngkeat Pongngam)

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SCIMET Co., Ltd.

**Condition of reference standards Instruments / CRM:**

<u>Instruments</u>		<u>Model or S/N.</u>	<u>Certificate No.</u>	<u>Due date</u>
Standard Buffer solution	4.007 pH	PH216.L5	1066714	18-Jan-27
Standard Buffer solution	6.987 pH	PH107.L5	1001803	7-Jun-25
Standard Buffer solution	10.010 pH	PH220.L5	1066716	18-Jan-26
DC Voltage and Current Calibrator / XITRON		2000MN	CA20240453EA	29-Aug-25
Digital Thermometer		376	C23240074	30-Jul-25

Calibration Results:**pH Scale**

Input (mV)	pH Meter Reading			Uncertainty of Measurement (mV)	Coverage Factor (<i>k</i>)
	(mV)	Error (mV)	(pH)		
414.12	414	-0.12	0.02	0.58	2.00
354.96	355	0.04	1.02	0.58	2.00
295.80	296	0.20	2.02	0.58	2.00
236.64	237	0.36	3.02	0.58	2.00
177.48	178	0.52	4.01	0.58	2.00
118.32	118	-0.32	5.00	0.58	2.00
59.16	59	-0.16	6.00	0.58	2.00
0.00	0	0.00	7.00	0.58	2.00
-59.16	-59	0.16	8.00	0.58	2.00
-118.32	-118	0.32	8.99	0.58	2.00
-177.48	-177	0.48	9.99	0.58	2.00
-236.64	-237	-0.36	10.98	0.58	2.00
-295.80	-296	-0.20	11.98	0.58	2.00
-354.96	-355	-0.04	12.97	0.58	2.00
-414.12	-414	0.12	13.97	0.58	2.00

**Electrode Test Results***

The three-point calibration using three standard buffer solutions; pH 4.007 , pH 6.987 and pH 10.010

-During calibration, display of pH meter reading pH4.01 , pH7.00 and pH10.01

The practical slope of the pH electrode; 55.28 (mV/pH), 93.44%

The zero point of the pH electrode; 7.11 (pH)

Sample Test Results

Electrode Serial No.: 4131602
Model: LE438
Manufacturer: Mettler Toledo

Standard Buffer Solution (pH)	Unit Under Calibration (pH)	Difference (pH)	Uncertainty of Measurement (pH)	Coverage Factor (<i>k</i>)
4.007	3.99	-0.017	0.014	2.28
6.987	7.02	0.033	0.016	2.21
10.010	10.03	0.020	0.017	2.25

Temperature Electrode**Dimension of Probe;**

Length : 120 mm
Diameter : 12 mm
Immersion Depth : 80 mm

STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Uncertainty of Measurement (±°C)	Coverage Factor (<i>k</i>)
24.97	25.1	-0.13	0.20	2.00

* Calibration Marked for Electrode Test" Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate

Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The error of temperature determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, ASTM E 70-07. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule : ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk $< 50\%$ PFA
- ☒ Choice B Non-binary statement with guard band ($w = 1 U$), Specific Risk $< 2.5\%$ PFA
- ☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r U$).
- ; PFA – Probability of False Accept



(Mr. Thalerngkeat Pounngam)

Authorized signatory

**pH Scale**

Tolerance : 2 mV

Input (mV)	pH Meter Reading			Guard Band (w) (mV)	Tolerance (mV)	Conformity
	(mV)	Error (mV)	(pH)			
414.12	414	-0.12	0.02	0.58	2	Pass
354.96	355	0.04	1.02	0.58	2	Pass
295.80	296	0.20	2.02	0.58	2	Pass
236.64	237	0.36	3.02	0.58	2	Pass
177.48	178	0.52	4.01	0.58	2	Pass
118.32	118	-0.32	5.00	0.58	2	Pass
59.16	59	-0.16	6.00	0.58	2	Pass
0.00	0	0.00	7.00	0.58	2	Pass
-59.16	-59	0.16	8.00	0.58	2	Pass
-118.32	-118	0.32	8.99	0.58	2	Pass
-177.48	-177	0.48	9.99	0.58	2	Pass
-236.64	-237	-0.36	10.98	0.58	2	Pass
-295.80	-296	-0.20	11.98	0.58	2	Pass
-354.96	-355	-0.04	12.97	0.58	2	Pass
-414.12	-414	0.12	13.97	0.58	2	Pass

Sample Test

Tolerance : 0.05 pH

The three-point calibration using three standard buffer solutions; pH 4.007 , pH 6.987 and pH 10.010

Standard Buffer Solution (pH)	Unit Under Calibration (pH)	Difference (pH)	Guard band (w) (pH)	Tolerance (pH)	Conformity
4.007	3.99	-0.017	0.014	0.05	Pass
6.987	7.02	0.033	0.016	0.05	Pass
10.01	10.03	0.020	0.017	0.05	Pass

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity



ใบตรวจสอบสภาพเครื่อง pH Meter

เลขที่ใบงาน: KSMT2501568

ชนิดเครื่องมือ: pH METER

รุ่น: FiveEasy F20

หมายเลขเครื่อง: C242075213

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
30 Apr 2025			30 Apr 2025		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. อิเล็กโทรด (Electrode and Connection Cable)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สายอิเล็กโทรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. ขาจับอิเล็กโทรด (Stand)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ข้อแนะนำ :

Mr. Siwapan Srijan
Service Engineer

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-400357-1

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalacmthong 3, Thapachang, Saphansung, Bangkok 10250

Equipment : Temperature controlled enclosure (Refrigerator)

Manufacturer : N/A

Model : N/A

Range : N/A °C

Resolution : 0.1 °C

Serial No. : N/A

ID No. : SPJ-TE-014

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (31.0 to 32.0) °C

Relative Humidity : (45 to 50) %

Line Voltage : (232.0 to 233.0) V

Date of Received : 20 June 2025

Date of Calibration : 20 June 2025

Date of Issue : 27 June 2025

Calibrated by : Permpon Chanpu

Calibration Method : CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with Thermocouple probe

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400046 & 400023	68-400148-1	02 Oct 2025	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

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 Calibratech Co.,Ltd.



Certificate of Calibration

Certificate No. : 68-400357-1

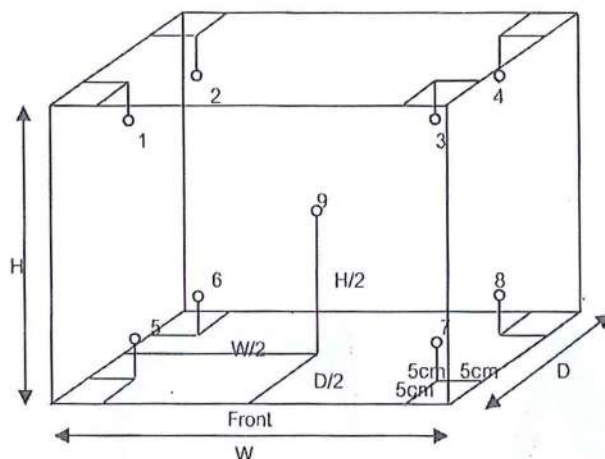
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 1.18 m

D = 0.56 m

H = 1.34 m

Capacity = 0.89 m³

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Temperature (°C) @ Sensor No.									Uncertainty (± °C)
			1	2	3	4	5	6	7	8	9	
4.0	4.0	4.0	4.8	3.8	3.8	3.5	3.7	3.8	3.5	3.4	3.5	0.76

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	4.0	4.0	1.5	0.4	2.0

Remark The uncertainty is not combine uniformity of the air chamber

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

- oOo -



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 68-400357-4

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Water Bath

Manufacturer : Memmert

Model : WTB24

Range : N/A °C

Resolution : 0.1 °C

Serial No. : LD21.0340

ID No. : SPJ-TE-050

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (31.0 to 32.0) °C

Relative Humidity : (45 to 50) %

Line Voltage : (232.0 to 233.0) V

Date of Received : 20 June 2025

Date of Calibration : 20 June 2025

Date of Issue : 27 June 2025

Calibrated by : Permpon Chanpu

Calibration Method : This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-80
The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units
Standard Digital Thermometer with RTD probe

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400046 & 400024	68-400148-2	30 Sep 2025	National Institute of Metrology Thailand (NIMT)

Approved by :

(Permpon Chanpu)

Supervisor

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 Calibratech Co.,Ltd.



Certificate of Calibration

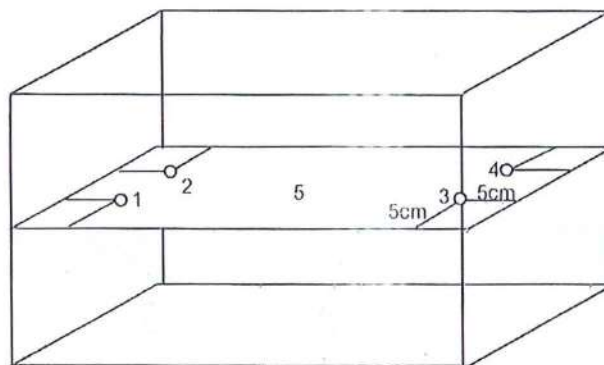
Certificate No. : 68-400357-4

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Temperature (° C) @ Sensor					Uncertainty (± ° C)	Measured Uniformity (° C)	Measured Stability (° C)
			No.							
			1	2	3	4	5			
85.0	85.0	85.0	84.48	84.55	84.50	84.52	84.48	0.18	0.08	0.03
95.0	95.0	95.0	94.46	94.51	94.46	94.47	94.46	0.18	0.08	0.03

Remark The uncertainty is not combine uniformity of the water bath

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%

- o0o -



CERTIFICATE OF CALIBRATION

Certificate No.: C0-0212003/24

Page 1 **of total** 3 **pages**

Customer S.P.J. SCIENTIFIC COMPANY LIMITED
80 Soi Nakkilalaemthong 3, Thap Chang,
Saphansoong, Bangkok 10250 Thailand.

Equipment	Spectrophotometer		
Manufacturer	HACH	Model	DR 3900
Serial No.	2106441	ID No.	SPJ-TE-051
Description	-		

Environmental Conditions

Ambient Temperature:	(20 ± 2) °C
Relative Humidity:	(50 ± 10) %
Atmospheric Pressure:	-

Calibration Location Jayhawks Laboratory (CL&GL)

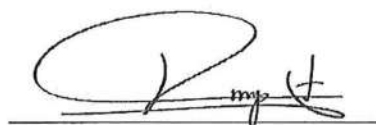
Received Date 2 December 2024

Calibration Date 2 December 2024

Date of Issue 3 December 2024

Condition of Artifacts Used conditions but can be calibrated

Checked by



Act as Technical Manager

Approved by



Representative of Managing Director

- | | |
|--|---|
| <input type="checkbox"/> (Krisyosl K.) | <input type="checkbox"/> (Sakda Y.) |
| <input type="checkbox"/> (Patiphan K.) | <input checked="" type="checkbox"/> (Onnapa P.) |
| <input type="checkbox"/> (Pongsak H.) | <input type="checkbox"/> (Nitiphong K.) |
| <input type="checkbox"/> (Kanung C.) | <input type="checkbox"/> (Nonthachai K.) |
| <input type="checkbox"/> (Pramong P.) | <input type="checkbox"/> (Noppol P.) |

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

Certificate No.: C0-0212003/24

Page 2 of total 3 pages

Reference Method:

- The calibration method used was CP-004 based on an in-house method.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Serial No.	Certificate No.	Due Date	Traceability
Holmium Glass Filter	34645	120895	Mar. 28, 2026	Starna
Didymium Glass Filter	11978	120896	Mar. 28, 2026	
Neutral Density Filter	11562	122869	Jun. 13, 2026	

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- Starna Scientific Ltd.

Measurement Results:

Function : Scan

Spectral Bandwidth : 5 nm, Scan Speed : -, Data Interval : 1nm

1. Wavelength accuracy

Standard Wavelength (nm)	UUC Reading (nm)	Correction (nm)	Uncertainty (± nm)
361.40	361	0.40	0.59
537.00	536	1.00	0.59
879.68	880	-0.32	0.59

Calibrated by

Onnapa

Certificate No.: C0-0212003/24

Page 3 of total 3 pages

Measurement Results (Cont.):

2. Photometric Accuracy

Visible Region

Wavelength (nm)	Standard Value (A)	UUC Reading (A)	Correction (A)	Uncertainty (± A)
420	1.0550	1.052	0.0030	0.0039
	0.7467	0.743	0.0037	0.0039
	0.5508	0.547	0.0038	0.0039
440	1.0333	1.028	0.0053	0.0039
	0.7297	0.725	0.0047	0.0039
	0.5409	0.536	0.0049	0.0039
465	0.9633	0.964	-0.0007	0.0039
	0.6736	0.674	-0.0004	0.0039
	0.4916	0.491	0.0006	0.0039
546.1	0.9947	0.994	0.0007	0.0039
	0.6839	0.683	0.0009	0.0039
	0.5068	0.506	0.0008	0.0039
590	1.0348	1.032	0.0028	0.0039
	0.7140	0.711	0.0030	0.0039
	0.5358	0.533	0.0028	0.0039
635	0.9873	0.986	0.0013	0.0039
	0.6820	0.680	0.0020	0.0039
	0.5206	0.518	0.0026	0.0039

UUC : Unit Under Calibration.

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E25-040057

Page.: 1 of 6

CERTIFICATE OF CALIBRATION

Customer : S.P.J. Scientific Co., Ltd.

Address : 80 Soi Nakkeera Lamthong 3, Thap Chang, Saphansoong, Bangkok 10250

Description of Equipment : Console meter

Manufacturer : Apex Instrument

Model Number : XC-572-OV

Serial Number : 1305024

ID./Control No. : -

Environment Conditions : Temperature (25 ± 2) °C

: Humidity (50 ± 15) % RH

Cal. Date : 09/04/2025

Issue Date : 09/04/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (IS).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by : (Mr. Mana Fuekhud)
Technical Manger



**METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT**

Meter Console Information		Calibration Conditions				Factors/Conversions		
Console Model Number	XC-572-OV	Date	Time	09/04/2025	09:30A AM	Std Temp	293	K
Console Serial Number	1305024	Calibration Reference No.		SER25-040020		Std Press	760	mm Hg
DGM Model Number	SK25EX	Barometric Pressure		759.66	mmHg	K ₁	0.386	
DGM Serial Number	00009777	Calibration Meter Gamma		1.001		Console Leak Check		PASS

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Q)	(P _m)	(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})	(V _{wi})	(V _{wf})	(t _{wi})	(t _{wf})
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
12.57	13.0	0.1390	0.2790	32	32	304.50906	304.64734	27	27
12.63	13.0	0.2790	0.4190	31	31	304.64734	304.78648	26	26
8.58	26.0	0.4250	0.5650	32	32	304.79532	304.93302	27	27
8.58	26.0	0.5650	0.7050	32	32	304.93302	305.07034	27	27
14.08	40.0	0.7120	0.9920	32	32	305.08310	305.36204	27	27
14.07	40.0	0.9920	1.2720	32	32	305.36204	305.63908	26	26
10.30	70.0	1.2840	1.5640	32	32	305.64570	305.92232	26	26
10.28	70.0	1.5640	1.8440	32	32	305.92232	306.19804	26	26
9.05	90.0	1.8550	2.1350	32	32	306.20242	306.47712	26	26
9.03	90.0	2.1350	2.4150	32	32	306.47712	306.75050	26	26



**METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT**

Meter Console Information	
Console Model Number	XC-572-OV
Console Serial Number	1305024
DGM Model Number	SK25EX
DGM Serial Number	00009777

Calibration Conditions			
Date	Time	09/04/2025	09:30A AM
Calibration Reference No.		SER25-040020	
Barometric Pressure		759.66	mmHg
Calibration Meter Gamma		1.001	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Data								
Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate		
(V _{m(std)})	(Q _{m(std)})	(V _{w(std)})	(Q _{w(std)})	Value	Variation	Std & Corr	.0212 m ³ _{std} /min	Variation
m ³	m ³ /min	m ³	m ³ /min	(Y)	(ΔY)	(Q _{m(std)(corr)})	(ΔH _@)	(ΔH _@)
						m ³ /min	mm H ₂ O	
0.137	0.011	0.135	0.011	0.987	0.005	0.011	49.617	2.607
0.137	0.011	0.136	0.011	0.994	0.011	0.011	49.362	2.352
0.137	0.016	0.135	0.016	0.982	-0.001	0.016	46.803	-0.207
0.137	0.016	0.134	0.016	0.979	-0.003	0.016	47.062	0.053
0.274	0.019	0.273	0.019	0.993	0.011	0.019	47.367	0.358
0.275	0.020	0.272	0.019	0.987	0.004	0.019	47.746	0.736
0.276	0.027	0.271	0.026	0.982	0.000	0.026	45.195	-1.814
0.276	0.027	0.270	0.026	0.979	-0.004	0.026	45.344	-1.666
0.277	0.031	0.269	0.030	0.974	-0.009	0.030	45.664	-1.345
0.277	0.031	0.268	0.030	0.969	-0.014	0.030	45.937	-1.073
				0.983	Y Average		47.010	ΔH _@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

For ΔH_@, orifice pressure differential that equates to 0.75 cfm (0.0212 m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ±0.2 inches (5.1mm) H₂O.



Meter Console Information	
Console Model Number	XC-572-OV
Console Serial Number	1305024
DGM Model Number	SK25EX
DGM Serial Number	00009777

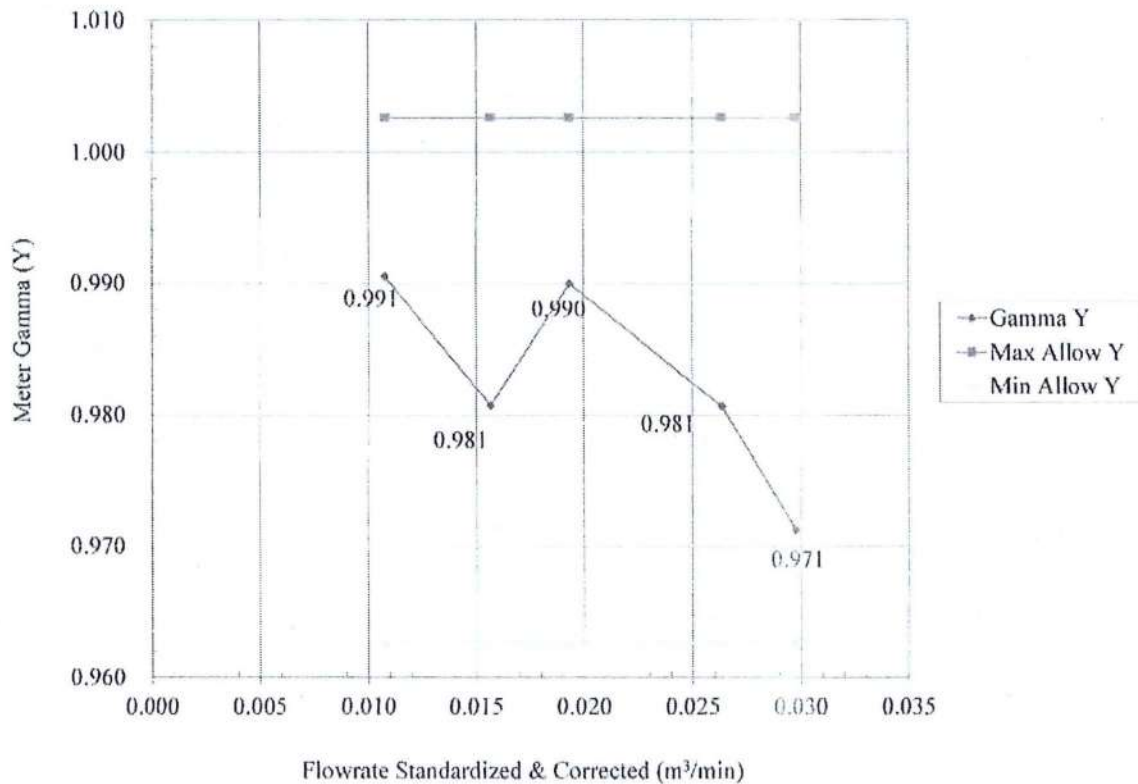
Calibration Conditions			
Date	Time	09/04/2025	09:30A AM
Calibration Reference No.	SER25-040020		
Barometric Pressure	759.66	mmHg	
Calibration Meter Gamma	1.001		

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K _t	0.386	
Console Leak Check	PASS	

Calibration Date: 9-4-2025

Calibration Reference No: SER25-040020

Meter Gamma vs Flowrate



Console Serial: 1305024

Console Model: XC-572-OV



Meter Console Information	
Console Model Number	XC-572-OV
Console Serial Number	1305024
DGM Model Number	SK25EX
DGM Serial Number	00009777

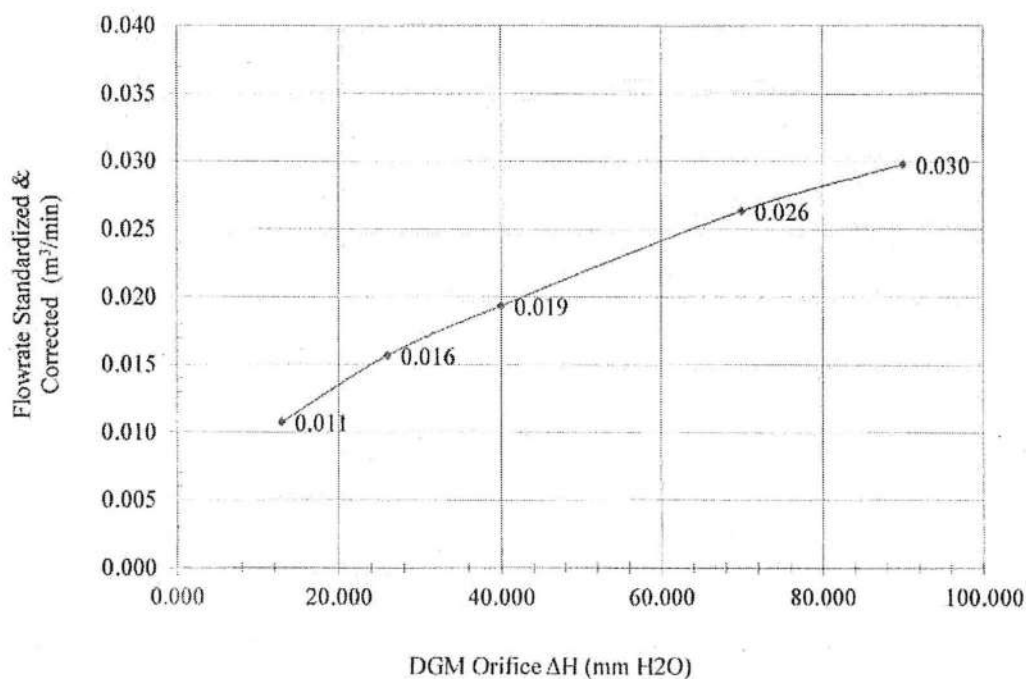
Calibration Conditions			
Date	Time	09/04/2025	09:30A AM
Calibration Reference No.		SER25-040020	
Barometric Pressure		759.66	mmHg
Calibration Meter Gamma		1.001	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Date: 9-4-2025

Calibration Reference No: SER25-040020

Meter Pressure vs Flowrate



Console Serial: 1305024

Console Model: XC-572-OV



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Console Model Number	XC-572-OV
Console Serial Number	1305024
DGM Model Number	SK25EX
DGM Serial Number	00009777
Meter Box Model Number	765-KF
Meter Box Serial Number	JC 13129

Calibration Conditions			
Date	Time	09/04/2025	00:15 PM
Calibration Reference No.		SER25-040020	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Results											
Console Thermocouple Simulator											
Channel and test point	Meter Box Channel Temperature Reading (°C)										
	-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	816.0	1038.0
Stack	-17.0	25.0	37.0	92.0	148.0	256.0	366.0	475.0	585.0	803.0	1023.0
Aux	-17.0	25.0	37.0	92.0	148.0						
Probe	-17.0	25.0	37.0	92.0	148.0						
Filter	-17.0	25.0	37.0	92.0	148.0						
Oven	-17.0	25.0	37.0	92.0	148.0						
Exit	-17.0	25.0	37.0								

Tolerance Range

Stack ± 1.50% Absolute
 Probe ± 3.0 °C
 Filter ± 3.0 °C

Meter ± 3.0 °C
 Exit ± 2.0 °C



Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. : E25-080078

Page. : 1 of 3

CERTIFICATE OF CALIBRATION

Customer : S.P.J. Scientific Co., Ltd.
Address : 80 Soi Nakkeera Lamthong 3, Thap Chang, Saphansoong, Bangkok 10250
Description of Equipment : Standard Probe Method 5
Manufacturer : Apex Instrument
Model Number : PS-6HV
Serial Number : -
ID./Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
 : Humidity (50 ± 15) % RH
Cal. Date : 01/08/2025
Issue Date : 01/08/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)


This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (IS).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by : 
 (Mr. Mana Fueklud)
 Technical Manger



CALIBRATION RESULTS

S-Type Geometric Pitot Tube Calibration

Sampling System Equipment Information

Probe Model : PS-6HV
 Probe Number : -
 Pitot Number : -
 Pitot Tube Type : S-type

Calibration Condition

Date : 01 August 2025
 Barometric Pressure : 756.66 mm Hg
 Digital Caliper : CD-6" ASX
 Serial number : A18008059

Pitot tube/Probe: # PS-6HV			
Parameter	Value	Allowable Range	Check
Assembly level?	Yes	Yes	Pass
Ports Damage?	No	No	Pass
$\alpha 1$	0	$-10^{\circ} < \alpha 1 < +10^{\circ}$	Pass
$\alpha 2$	1	$-10^{\circ} < \alpha 2 < +10^{\circ}$	Pass
$\beta 1$	0	$-5^{\circ} < \beta 1 < +5^{\circ}$	Pass
$\beta 2$	0	$-5^{\circ} < \beta 2 < +5^{\circ}$	Pass
γ	0	N/A	-
σ	0	N/A	-
Dt	0.375	.188 " to .375 "	Pass
A	0.9970	$2.1Dt \leq A \leq 3Dt$	Pass
A/2Dt	1.329	$1.05 \leq P_A/D_t \leq 1.5$	Pass
$Z = A \tan \gamma$	0.042	$Z \leq .125"$	Pass
$W = A \tan \sigma$	0.021	$W \leq .031"$	Pass

Remark:

I certified that probe model: **PS-6HV** meets or exceeds all specifications, criteria and/or applicable design and is hereby assigned a pitot tube certification factor of 0.84. See 40 CFR Pt. 60, App. A, EPA Method 2.



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Probe Model Number	PS-6HV
Probe Serial Number	-
Meter Box Model Number	JENCO 765KF
Meter Box Serial Number	JC 18236

Calibration Conditions			
Date	Time	01/08/2025	03:45 PM
Calibration Reference No.		SER25-080031	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Thermocouple of Standard Probe method 5 = length 8 foot			
Set Point	Reference Thermocouple	Probe Thermocouple	Difference
100	100.0	99.0	0.27
250	250.0	249.0	0.19
300	300.0	298.0	0.35
350	350.0	348.0	0.32



Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E25-020044

Page.: 1 of 2

CERTIFICATE OF CALIBRATION

Customer : S.P.J. Scientific Co., Ltd.

Address : 80 Soi Nakkeera Lamthong 3, Thap Chang, Saphansoong, Bangkok 10250

Description of Equipment : Stainless Steel Nozzle

Manufacturer : Apex Instrument

Model Number : NS-SET

Serial Number : -

ID./Control No. : -

Environment Conditions : **Temperature** (25 ± 2) °C
: **Humidity** (50 ± 15) % RH

Cal. Date : 07/02/2025

Issue Date : 07/02/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)


This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (IS).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by : 
(Mr. Mana Fuekhud)
Technical Manger



CALIBRATION RESULTS

Sampling System Equipment Information

Nozzle Model : NS-SET
Nozzle Number : -
Nozzle Type : Stainless Steel

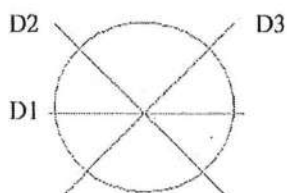
Calibration Condition

Date : 07 February 2025
Barometric Pressure : 759.66 mm Hg
Calibration Device : Vernier, 0-150 mm
Method Reference : US, EPA Method

Nozzle ID	Nozzle Diameter				Different	(D1 + D2 + D3) / 3
Size		D1	D2	D3	ΔD	Davg
	mm	mm	mm	mm	mm	mm
NS-4	3.18	3.21	3.22	3.22	0.010	3.217
NS-6	4.76	4.68	4.69	4.70	0.020	4.690
NS-8	6.35	6.19	6.19	6.19	0.000	6.190
NS-10	7.94	7.78	7.76	7.76	0.020	7.767
NS-12	9.52	9.59	9.59	9.60	0.010	9.593
NS-14	11.11	10.87	10.88	10.88	0.010	10.877
NS-16	12.70	12.65	12.64	12.65	0.010	12.647

Remark:

D1, D2, D3 = There difference nozzle diameters, mm; diameter must be within 0.025 mm
 ΔD = Maximum difference between any two diameters, must be ≤ 0.100 mm
 Davg = $(D1 + D2 + D3) / 3$



Certificate No: G 680016

Date of issue : 14-Jan-25

Instrument description : Flue Gas Analyzer
Instrument model : Testo 350 New
Instrument serial no. : 61946807/0819
Control unit serial no. : 03400290/0819
ID no. or control no. : SPJ-FGA-02
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : S. P. J. SCIENTIFIC CO.,LTD.
Customer address : 80 Soi Nakkilalaemthong 3, Thap Chang, Saphansoong, Bangkok 10250

Total pages of certificate : 2 Pages
Receiving no. : L-250076
Receiving date. : 09-Jan-25
Parameter of calibration : Gas Calibration(Oxygen 2.50,9.984,21.02 %vol, Carbon Monoxide 80.45,302,1007 ppm)
Nitrogen Dioxide 30.68,81.8,201.9 ppm, Nitric Oxide 30.0,151.5,322.5 ppm,
Sulphur Dioxide 50.36,100.7,600.8 ppm)
Condition of UUC. : Used
Ambient condition : All of the Measurment ware caried out the stabilized labotary
Temperature : 23 \pm 5 $^{\circ}$ C
Humidity : 55 \pm 15 %RH
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210
Calibration procedure no : This Instrument was calibrated by comparison with Standard gas mixture according
to calibration Work Instruction no. WI-CL-28-C

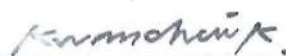
*The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurent
Multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.*

This certificate is applied only to item under test Environmental condition.

*This Calibration Certificate may not be reporduced other than in full except with the permission of the issuing laboratory.
Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.*

*This calibration certificate documents are tracebility to national standards, which realize measurement according to the
International System of Units (SI).*

Date of calibration : 13-Jan-25



Mr. Kwanchai Khamdoun

Calibration Technician



Mrs. Nongluck Wongsettee

Technical Manager

Certificate No.: G 680016

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O ₂) 9.984 % Vol	CG-0113-24	Nimt	01-Aug-29
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.45 ppm	CG-0132-24	Nimt	10-Sep-29
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1007 ppm	1870/24	Linde	17-Jun-26
Nitrogen Dioxide (NO ₂) 30.68 ppm	2832/24	Linde	08-Sep-26
Nitrogen Dioxide (NO ₂) 81.8 ppm	2330/24	Linde	01-Aug-26
Nitrogen Dioxide (NO ₂) 201.9 ppm	1975/23	Linde	17-Jul-25
Nitric Oxide (NO) 30.0 ppm	CG-0065-24	Nimt	06-May-26
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 100.7 ppm	2662/24	Linde	25-Aug-26
Sulphur Dioxide (SO ₂) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 22.1 °C Humidity : 56.9 %RH Pressure : 1012.7 mbar

Calibration conditions

Gas Temperature : 22 °C Flow rate : 1,300 ml/min Gas pressure : 1015.5 mbar

Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.46	-0.04	0.15
O ₂ (%Vol)	9.984	9.92	-0.064	0.20
O ₂ (%Vol)	21.02	21.13	0.11	0.30
CO (ppm)	80.45	79	-1.45	3.0
CO (ppm)	302	301	-1	6.0
CO (ppm)	1007	1005	-2	12
NO ₂ (ppm)	30.68	32.7	2.02	8.0
NO ₂ (ppm)	81.8	82.2	0.4	8.0
NO ₂ (ppm)	201.9	204.8	2.9	12
NO (ppm)	30.0	32	2.0	8.0
NO (ppm)	151.5	154	2.5	8.0
NO (ppm)	322.5	325	2.5	12
SO ₂ (ppm)	50.36	51	0.64	6.0
SO ₂ (ppm)	100.7	100	-0.7	6.0
SO ₂ (ppm)	600.8	599	-1.8	13

Remark : 1 cmol/mol = 1 %vol. 1 µmol/mol = 1 ppm.

End of Report

Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. : E25-080085

Page. : 1 of 2

CERTIFICATE OF CALIBRATION

Customer : S.P.J. Scientific Co., Ltd.

Address : 80 Soi Nakkeera Lamthong 3, Thap Chang, Saphansong, Bangkok 10250

Description of Equipment : Heated Filter Ovens

Manufacturer : Apex Instrument

Model Number : SB-2M-V

Serial Number : 1905023

ID./Control No. : -

Environment Conditions : Temperature $(25 \pm 2) ^\circ\text{C}$

: Humidity $(50 \pm 15) \% \text{ RH}$

Cal. Date : 21/08/2025

Issue Date : 21/08/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (IS).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of $k=2$, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by :



(Mr. Mana Puekhud)

Technical Manger

CALIBRATION RESULTS

Thermocouples System Calibration

Sampling System Equipment Information	
Console Model Number	XD-502-MV
Console Serial Number	A1908163
Filter Oven Model	SB-2M-V
Filter Oven Serial Number	1905023

Calibration Conditions			
Date	Time	21/08/2025	01:45 PM
Calibration Reference No.		SER25-080034	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Result				
System Heat	Control Acceptance	Reference thermometer temperature	Thermocouple potentiometer temperature	Temperature difference
		°C	°C	°C
Heated Oven	120 °C ± 14 °C	120 °C	118 °C	2 °C





CALIBRATION LABORATORY Co., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : ELECTRONIC BALANCE
MANUFACTURER : AND
MODEL / TYPE : FX-2000i
SERIAL NO. : 15630332
CLID. NO. : 262501264
JOB CONTROL NO. : 250809092300
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : S.P.J. SCIENTIFIC COMPANY LIMITED
80 SOI NUKKREELALEMTHONG 3, THAPCHANG
SAPHANSOONG, BANGKOK 10250

DATE OF RECEIVED : 09 August 2025

DATE OF ISSUED : 15 August 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Nattawadce Baengpech
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
15 August 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25092300

F3-011-05/12-23

page 1 of 4



@clccalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : ELECTRONIC BALANCE
MANUFACTURER : AND
MODEL / TYPE : FX-2000i
SERIAL NO. : 15630332
DATE OF CALIBRATION : 13 August 2025

ENVIRONMENT CONDITIONS :

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

Relative Humidity : $(50 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-175 based on EURAMET cg-18 Version 4.0 (11/2015).

The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Weight Set, Mettler Toledo Class F1 S/N. 158910.
2. Weight Set, N/A Class F2 S/N. MNOPL103037, MNOPL103040, MNOPL103041.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).

Certificate No. MM-0224-24, Due Date 17 December 2025.

2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q24015300, Q24015301. Due Date 15 February 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25092300

F3-011-05/12-23

page 2 of 4



@clcalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

Tel. 02-578-0353-4 Fax: 02-578-2672 www.cai-laboratory.com E-mail: sale@cai-laboratory.com



NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : () without adjustment (X) adjustment

CALIBRATION DATA

1. Error of indications [Before Adjustment]

Nominal Test Value (g)	Conventional mass (g)	Display Value (g)	Error of Balance (g)	Uncertainty \pm (g)	Coverage factor <i>k</i>
200.00	200.00	200.12	+0.12	-	-
500.00	500.00	500.22	+0.22	-	-
1000.00	1000.00	1000.31	+0.31	-	-
2000.00	2000.00	2000.43	+0.43	-	-
2200.00	2200.00	OVER LOAD	-	-	-

2. Error of indications [After Adjustment]

Nominal Test Value (g)	Conventional mass (g)	Display Value (g)	Error of Balance (g)	Uncertainty \pm (g)	Coverage factor <i>k</i>
Unload	0.00	0.00	0.00	0.006	2,00
200.00	200.00	200.00	0.00	0.010	2,00
400.00	400.00	400.00	0.00	0.010	2,00
600.00	600.00	600.00	0.00	0.010	2,00
800.00	800.00	800.00	0.00	0.010	2,00
1000.00	1000.00	1000.00	0.00	0.011	2,00
1200.00	1200.00	1200.00	0.00	0.011	2,00
1400.00	1400.00	1400.00	0.00	0.011	2,00
1600.00	1600.00	1600.00	0.00	0.011	2,00
1800.00	1800.00	1800.00	0.00	0.012	2,00
2000.00	2000.00	2000.00	0.00	0.019	2,00
2200.00	2200.00	2200.00	0.00	0.019	2,00

3. Repeatability of indications

Nominal Test Value (g)	Standard Deviation of Reading (g)
2000.00	0.003

Certificate No. Q25092300

F3-011-05/12-23

page 3 of 4



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

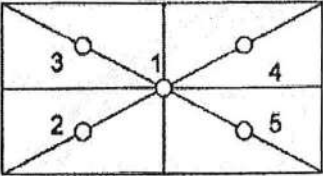
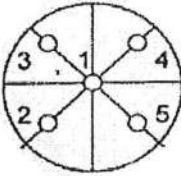
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CALIBRATION DATA

4. Effect of eccentric application of a load on the indication

<div style="display: flex; align-items: center; justify-content: space-around;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 20px;"></div>  <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 20px; display: flex; align-items: center; justify-content: center;">✓</div>  </div>						
Nominal Test Value (g)	Display Value (g)					Maximum Difference of Center Value (g)
	Position 1	Position 2	Position 3	Position 4	Position 5	
1000.00	1000.00	1000.00	1000.00	999.99	999.99	0.01

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 33 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25092300

F3-011-05/12-23

page 4 of 4



@clccalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd, Indphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email: sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : STOP WATCH
MANUFACTURER : CANON
MODEL / TYPE : CT-50
SERIAL NO. : N/A[SPJ-SW-01]
CLID. NO. : 252500490
JOB CONTROL NO. : 250303025750
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : S.P.J.SCIENTIFIC CO., LTD.
80 SOI NAKKEERA LAMTHONG 3, THAP CHANG,
SAPHANSOONG, BANGKOK 10250

DATE OF RECEIVED : 03 March 2025

DATE OF ISSUED : 06 March 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Suwit Phuanbusabong
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory

06 March 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25025750

F3-011-05/12-23

page 1 of 3

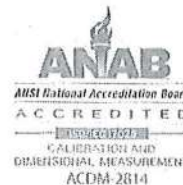


@cl calibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manulal 29 Yaek 4, Prasert Manulal Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION FOR

NOMENCLATURE : STOP WATCH
MANUFACTURER : CANON
MODEL / TYPE : CT-50
SERIAL NO. : N/A[SPJ-SW-01]
DATE OF CALIBRATION : 04 March 2025

ENVIRONMENT CONDITIONS :

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

Relative Humidity : $(55 \pm 15) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure CLC-CPEE-06. The calibration was performed by direct measurement with High Resolution Programmable Timer/Counter which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

High Resolution Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd.

Certificate No. 07-0050/24 , Due Date 13 May 2025 .

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2,00$ which for a normal distribution corresponds to a coverage probability of approximately 95 % .
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25025750

F3-011-05/12-23

page 2 of 3



@clc calibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com Email:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring stop watch.

CALIBRATION DATA

TIME BASE RESULT

Nominal frequency (kHz)	Actual frequency (kHz)	Uncertainty \pm (Hz)
32.768	32.76771	0.05

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 65 of 68

$$\text{Actual time (second)} = \frac{\text{Nominal frequency (kHz)}}{\text{Actual frequency (kHz)}} \times \text{Stop watch Time of reading (second)}$$

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25025750

F3-011-05/12-23

page 3 of 3



eeclcalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGIMATIC CALIPER
MANUFACTURER : MITUTOYO
MODEL / TYPE : CD-6"ASX
SERIAL NO. : B17564652
CLID. NO. : 222509393
JOB CONTROL NO. : 250809092301
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : S.P.J. SCIENTIFIC COMPANY LIMITED
80 SOI NUKKREELALEMTHONG 3, THAPCHANG
SAPHANSOONG, BANGKOK 10250

DATE OF RECEIVED : 09 August 2025

DATE OF ISSUED : 14 August 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Pisit Thangthaiwan
Calibration Engineer

Approved By :

Mongkol Yotsoontorn
Authorized Signatory
14 August 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to
the International System of Units (SI)

Certificate No. Q25092301

F3-011-05/12-23

page 1 of 5



@clc calibration



CALIBRATION LABORATORY CO., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION FOR

NOMENCLATURE	:	DIGIMATIC CALIPER
MANUFACTURER	:	MITUTOYO
MODEL / TYPE	:	CD-6" ASX
SERIAL NO.	:	B17564652
DATE OF CALIBRATION	:	13 August 2025

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 1) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. W1-305-07 based on JIS B 7507 : 2016 as calibration guidelines.

The calibration was performed by using Long Gauge Blocks and Gauge Block which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Long Gauge Blocks, Opus Model N/A S/N. 01761P.
2. Gauge Block, Mitutoyo, Model 516-946-10 S/N. 2002570.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q24137021, Due Date 25 December 2025.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q25070490, Due Date 23 June 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2,00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25092301

F3-011-05/12-23

page 2 of 5



@clccalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digimatic caliper.

1. Flatness and Parallelism

Flatness and Parallelism of measuring faces were tested and found that they comply with JIS B 7507 : 2016.

2. Correction of digimatic caliper [Outside]

Nominal Value (mm)	DUC Reading (mm)	Correction (mm)
1.00	0.99	+0.01
1.10	1.09	+0.01
1.20	1.19	+0.01
1.30	1.29	+0.01
1.40	1.39	+0.01
1.50	1.49	+0.01
1.60	1.59	+0.01
1.70	1.69	+0.01
1.80	1.79	+0.01
1.90	1.89	+0.01
2.00	1.99	+0.01
15.00	15.01	-0.01
30.00	30.01	-0.01
45.00	45.01	-0.01
60.00	60.01	-0.01
75.00	75.01	-0.01
90.00	90.01	-0.01
105.00	105.01	-0.01
120.00	120.01	-0.01
135.00	135.01	-0.01
150.00	150.01	-0.01

Uncertainty of measurement ± 0.014 mm

Certificate No. Q25092301

F3-011-05/12-23

page 3 of 5



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

3. Correction of digimatic caliper [Inside]

Nominal Value (mm)	DUC Reading (mm)	Correction (mm)
15.00	15.02	-0.02
30.00	30.02	-0.02
45.00	45.02	-0.02
60.00	60.02	-0.02
75.00	75.02	-0.02
90.00	90.02	-0.02
105.00	105.02	-0.02
120.00	120.02	-0.02
135.00	135.02	-0.02
150.00	150.02	-0.02

Uncertainty of measurement ± 0.014 mm

Certificate No. Q25092301

F3-011-05/12-23

page 4 of 5



@clccalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



4. Correction of digimatic caliper [Depth]

Nominal Value (mm)	DUC Reading (mm)	Correction (mm)
1.00	1.02	-0.02
1.10	1.12	-0.02
1.20	1.22	-0.02
1.30	1.32	-0.02
1.40	1.42	-0.02
1.50	1.52	-0.02
1.60	1.62	-0.02
1.70	1.72	-0.02
1.80	1.82	-0.02
1.90	1.92	-0.02
2.00	2.02	-0.02
15.00	15.02	-0.02
30.00	30.02	-0.02
45.00	45.02	-0.02
60.00	60.02	-0.02
75.00	75.02	-0.02
90.00	90.02	-0.02
105.00	105.02	-0.02
120.00	120.02	-0.02
135.00	135.02	-0.02
150.00	150.02	-0.02

Uncertainty of measurement ± 0.014 mm

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 8 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25092301

F3-011-05/12-23

page 5 of 5



Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E25-020043

Page.: 1 of 6

CERTIFICATE OF CALIBRATION

Customer : S.P.J. Scientific Co., Ltd.

Address : 80 Soi Nakkeera Lamthong 3, Thap Chang, Saphansoong, Bangkok 10250

Description of Equipment : Console meter

Manufacturer : Apex Instrument

Model Number : XC-572-V

Serial Number : A2107534

ID./Control No. : -

Environment Conditions : Temperature (25 ± 2) °C
: Humidity (50 ± 15) % RH

Cal. Date : 07/02/2025

Issue Date : 07/02/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)


This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (IS).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by : 
(Mr. Mana Fuekhud)
Technical Manger



**METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT**

Meter Console Information	
Console Model Number	XC-572-V
Console Serial Number	A2107584
DGM Model Number	SK25EX
DGM Serial Number	00007532

Calibration Conditions			
Date	Time	07/02/2025	12:15 PM
Calibration Reference No.		SER25-020014	
Barometric Pressure		759.66	mmHg
Calibration Meter Gamma		1.001	

Ratios/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Data									
Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice DH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Q)	(P _m)	(V _{mi})	(V _{mf})	(t _{mi})	(t _{mf})	(V _{wi})	(V _{wf})	(t _{wi})	(t _{wf})
min	mm H ₂ O	m ³	m ³	°C	°C	m ³	m ³	°C	°C
12.15	13.0	14.3500	14.4900	27	27	292.02698	292.16578	25	25
12.22	13.0	14.4900	14.6300	26	26	292.16578	292.30476	25	25
8.63	26.0	14.6380	14.7780	27	27	292.31278	292.45172	25	25
8.62	26.0	14.7780	14.9180	27	27	292.45172	292.59038	25	25
13.98	40.0	14.9250	15.2050	28	28	292.59724	292.87418	24	24
13.98	40.0	15.2050	15.4850	28	28	292.87418	293.15076	24	24
10.48	70.0	15.4980	15.7780	29	29	293.16276	293.43798	24	24
10.48	70.0	15.7780	16.0580	30	30	293.43798	293.71216	24	24
9.33	90.0	16.0720	16.3520	30	30	293.72570	293.99902	24	24
9.33	90.0	16.3520	16.6320	30	30	293.99902	294.27118	24	24



**METHOD 5 CONSOLE CALIBRATION
USING REFERENCE WET GAS METER W-NK-2.5-B-Z No.547425
5-POINT METRIC UNIT**

Meter/Console Information	
Console Model Number	XC-572-V
Console Serial Number	A2107584
DGM Model Number	SK25EX
DGM Serial Number	00007532

Calibration Conditions			
Date	Time	07/02/2025	12:15 PM
Calibration Reference No.	SER25-020014		
Barometric Pressure	759.66	mmHg	
Calibration Meter Gamma	1.001		

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check	PASS	

Calibration Data								
Results								
Standardized Data				Dry Gas Meter				
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate		
(V _{m(std)})	(Q _{m(std)})	(V _{w(std)})	(Q _{w(std)})	Value	Variation	Std & Corr	.0212 m ³ _{std} /min	Variation
m ³	m ³ /min	m ³	m ³ /min	(Y)	(ΔY)	(Q _{m(std)} (corr))	(ΔH _@)	(ΔH _@)
						m ³ /min	mm H ₂ O	
0.138	0.011	0.137	0.011	0.991	0.009	0.011	45.727	-1.309
0.138	0.011	0.137	0.011	0.992	0.011	0.011	46.111	-0.925
0.138	0.016	0.137	0.016	0.991	0.009	0.016	46.198	-0.838
0.138	0.016	0.136	0.016	0.989	0.007	0.016	46.206	-0.830
0.277	0.020	0.273	0.020	0.986	0.004	0.020	46.900	-0.136
0.277	0.020	0.273	0.020	0.985	0.003	0.020	47.022	-0.014
0.278	0.027	0.272	0.026	0.977	-0.005	0.026	46.980	-0.057
0.278	0.027	0.271	0.026	0.974	-0.008	0.026	47.337	0.301
0.279	0.030	0.270	0.029	0.969	-0.013	0.029	48.732	1.696
0.279	0.030	0.269	0.029	0.965	-0.017	0.029	49.148	2.112
				0.982	Y Average		47.036	ΔH _@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is ±0.02.

For ΔH_@, orifice pressure differential that equates to 0.75 cfm (0.0212 m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is ±0.2 inches (5.1mm) H₂O.



Meter/Console Information	
Console Model Number	XC-572-V
Console Serial Number	A2107584
DGM Model Number	SK25EX
DGM Serial Number	00007532

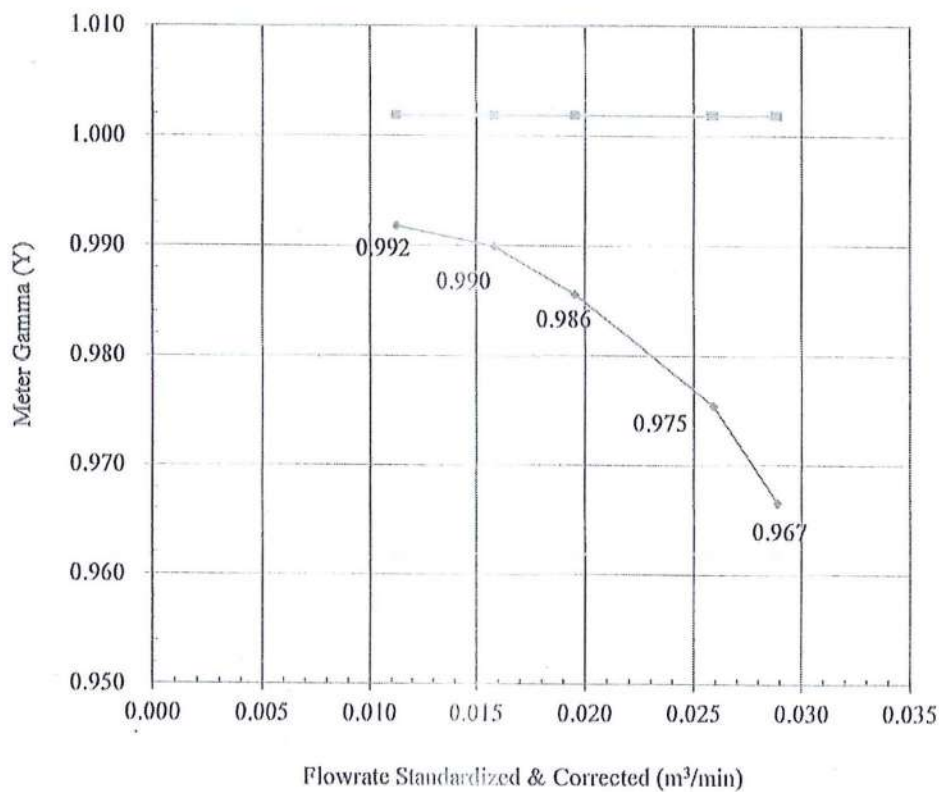
Calibration Conditions			
Date	Time	07/02/2025	12:15 PM
Calibration Reference No.		SER25-020014	
Barometric Pressure		759.66	mmHg
Calibration Meter Gamma		1.001	

Factors/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check		PASS

Calibration Date: 7-2-2025

Calibration Reference No: SER25-020014

Meter Gamma vs Flowrate



Console Serial: A2107584

Console Model: XC-572-V



Meter Console Information	
Console Model Number	XC-572-V
Console Serial Number	A2107584
DGM Model Number	SK25EX
DGM Serial Number	00007532

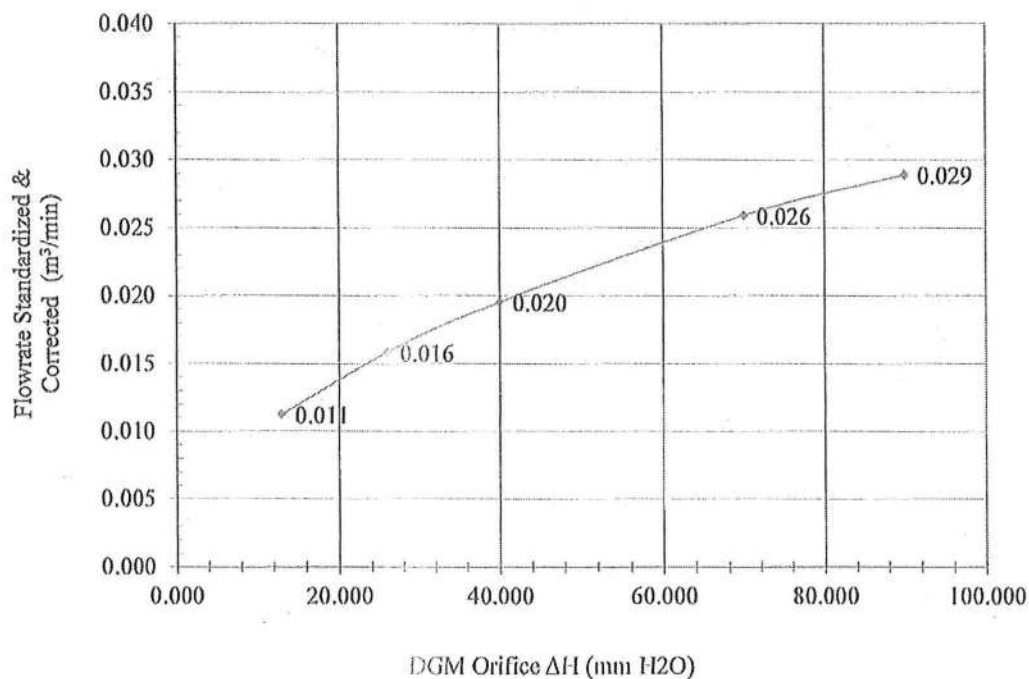
Calibration Conditions			
Date	Time	07/02/2025	12:15 PM
Calibration Reference No.	SER25-020014		
Barometric Pressure	759.66	mmHg	
Calibration Meter Gamma	1.001		

Ratios/Conversions		
Std Temp	293	K
Std Press	760	mm Hg
K ₁	0.386	
Console Leak Check	PASS	

Calibration Date: 7-2-2025

Calibration Reference No: SER25-020014

Meter Pressure vs Flowrate



Console Serial: A2107584

Console Model: XC-572-V



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Console Model Number	XC-572-V
Console Serial Number	A2107584
DGM Model Number	SK25EX
DGM Serial Number	00007532
Meter Box Model Number	765-KF
Meter Box Serial Number	JC 18236

Calibration Conditions			
Date	Time	07/02/2025	02:15 PM
Calibration Reference No.		SER25-020014	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Results											
Console Thermocouple Simulator											
Channel and test point	Meter Box Channel Temperature Reading (°C)										
	-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	816.0	1038.0
Stack	-17.0	25.0	38.0	93.0	149.0	259.0	372.0	482.0	594.0	816.0	1039.0
Aux	-17.0	25.0	38.0	93.0	149.0						
Probe	-17.0	25.0	38.0	93.0	149.0						
Filter	-17.0	25.0	38.0	93.0	149.0						
Oven	-17.0	25.0	38.0	93.0	149.0						
Exit	-17.0	25.0	38.0								

Tolerance Range

Stack ± 1.50% Absolute
 Probe ± 3.0 °C
 Filter ± 3.0 °C

Meter ± 3.0 °C
 Exit ± 2.0 °C



Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. : E25-020045

Page. : 1 of 3

CERTIFICATE OF CALIBRATION

Customer : S.P.J. Scientific Co., Ltd.
Address : 80 Soi Nakkeera Lamthong 3, Thap Chang, Saphansoong, Bangkok 10250
Description of Equipment : Standard Probe Method 5
Manufacturer : Apex Instrument
Model Number : PS-6HV
Serial Number : 1608272
ID./Control No. : -
Environment Conditions : Temperature (25 ± 2) °C
: Humidity (50 ± 15) % RH
Cal. Date : 07/02/2025
Issue Date : 07/02/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (IS).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by :

(Mr. Mana Fuekhud)

Technical Manger



CALIBRATION RESULTS

S-Type Geometric Pitot Tube Calibration

Sampling System Equipment Information

Probe Model	:	PS-8HV
Probe Number	:	1608272
Pitot Number	:	A7104
Pitot Tube Type	:	S-type

Calibration Condition

Date	:	07 February 2025
Barometric Pressure	:	759.66 mm Hg
Digital Caliper	:	CD-6" ASX
Serial number	:	A18008059

Pitot tube/Probe: # PS-8HV			
Parameter	Value	Allowable Range	Check
Assembly level?	Yes	Yes	Pass
Ports Damage?	No	No	Pass
$\alpha 1$	0	$-10^\circ < \alpha 1 < +10^\circ$	Pass
$\alpha 2$	1	$-10^\circ < \alpha 2 < +10^\circ$	Pass
$\beta 1$	0	$-5^\circ < \beta 1 < +5^\circ$	Pass
$\beta 2$	0	$-5^\circ < \beta 2 < +5^\circ$	Pass
γ	0	N/A	-
σ	0	N/A	-
Dt	0.375	.188 " to .375 "	Pass
A	0.9435	$2.1Dt \leq A \leq 3Dt$	Pass
A/2Dt	1.258	$1.05 \leq P_A/Dt \leq 1.5$	Pass
$Z = A \tan \gamma$	0.043	$Z \leq .125"$	Pass
$W = A \tan \sigma$	0.020	$W \leq .031"$	Pass

Remark:

I certified that probe model: **PS-8HV** serial number no. **1608272** and Pitot Tube no. **A7104** meets or exceeds all specifications, criteria and/or applicable design and is hereby assigned a pitot tube certification factor of **0.84**. See 40 CFR Pt. 60, App. A, EPA Method 2.



THERMOCOUPLES SYSTEM CALIBRATION

Sampling System Equipment Information	
Probe Model Number	PS-8HV
Probe Serial Number	1608272
Meter Box Model Number	JENCO 765KF
Meter Box Serial Number	JC 18236

Calibration Conditions			
Date	Time	07/02/2025	03:45 PM
Calibration Reference No.		SER25-020014	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Thermocouple of Standard Probe method 5 = length 8 foot			
Set Point	Reference Thermocouple	Probe Thermocouple	Difference
100	100.0	99.0	0.27
250	250.0	248.0	0.38
300	300.0	298.0	0.35
350	350.0	347.0	0.48



Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No.: E25-020044

Page.: 1 of 2

CERTIFICATE OF CALIBRATION

Customer : S.P.J. Scientific Co., Ltd.

Address : 80 Soi Nakkeera Lamthong 3, Thap Chang, Saphansoong, Bangkok 10250

Description of Equipment : Stainless Steel Nozzle

Manufacturer : Apex Instrument

Model Number : NS SET

Serial Number : -

ID./Control No. : -

Environment Conditions : Temperature (25 ± 2) °C
: Humidity (50 ± 15) % RH

Cal. Date : 07/02/2025

Issue Date : 07/02/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (IS).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by :

(Mr. Mana Fuekhud)

Technical Manger



CALIBRATION RESULTS

Sampling System Equipment Information

Nozzle Model : NS-SET
Nozzle Number : -
Nozzle Type : Stainless Steel

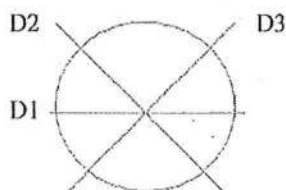
Calibration Condition

Date : 07 February 2025
Barometric Pressure : 759.66 mm Hg
Calibration Device : Vernier, 0-150 mm
Method Reference : US, EPA Method

Nozzle ID	Nozzle Diameter				Different	(D1 + D2 + D3) / 3
Size		D1	D2	D3	ΔD	Davg
	mm	mm	mm	mm	mm	mm
NS-4	3.18	3.21	3.22	3.22	0.010	3.217
NS-6	4.76	4.68	4.69	4.70	0.020	4.690
NS-8	6.35	6.19	6.19	6.19	0.000	6.190
NS-10	7.94	7.78	7.76	7.76	0.020	7.767
NS-12	9.52	9.59	9.59	9.60	0.010	9.593
NS-14	11.11	10.87	10.88	10.88	0.010	10.877
NS-16	12.70	12.65	12.64	12.65	0.010	12.647

Remark:

D1, D2, D3 = There difference nozzle diameters, mm; diameter must be within 0.025 mm
 ΔD = Maximum difference between any two diameters, must be ≤ 0.100 mm
 Davg = $(D_1 + D_2 + D_3) / 3$



Certificate No: G 680016

Date of issue : 14-Jan-25

Instrument description : Flue Gas Analyzer
Instrument model : Testo 350 New
Instrument serial no. : 61946807/0819
Control unit serial no. : 03400290/0819
ID no. or control no. : SPJ-FGA-02
Manufacturer : Testo SE & Co. KGaA
Probe description : -
Probe model : -
Probe serial no. : -
Customer name : S. P. J. SCIENTIFIC CO.,LTD.
Customer address : 80 Soi Nakkilalaemthong 3, Thap Chang, Saphansoong, Bangkok 10250

Total pages of certificate : 2 Pages
Receiving no. : L-250076
Receiving date. : 09-Jan-25
Parameter of calibration : Gas Calibration(Oxygen 2.50,9.984,21.02 %vol, Carbon Monoxide 80.45,302,1007 ppm)
Nitrogen Dioxide 30.68,81.8,201.9 ppm, Nitric Oxide 30.0,151.5,322.5 ppm,
Sulphur Dioxide 50.36,100.7,600.8 ppm)
Condition of UUC. : Used
Ambient condition : All of the Measurment ware caried out the stablilized labotary
Temperature : 23 \pm 5 $^{\circ}$ C
Humidity : 55 \pm 15 %RH
Calibration place : 17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210
Calibration procedure no : This instrument was calibrated by comparison with Standard gas mixture according
to calibration Work Instruction no. WI-CL-28-C


*The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurent
Multiplied by coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.*

This certificate is applied only to item under test Environmental condition.

*This Calibration Certificate may not be reporduced other than in full except with the permission of the issuing laboratory.
Calibration certificates without signature and seal not valid and The results relate only to the items tested/calibrated.*

*This calibration certificate documents are tracebility to national standards, which realize measurement according to the
International System of Units (SI).*

Date of calibration : 13-Jan-25



Mr. Kwanchai Khamdoun

Calibration Technician



Mrs. Nongluck Wongsettee

Technical Manager

Certificate No.: G 680016

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O ₂) 2.50 % Vol	2412/23	Linde	27-Aug-27
Oxygen (O ₂) 9.984 % Vol	CG-0113-24	Nimt	01-Aug-29
Oxygen (O ₂) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.45 ppm	CG-0132-24	Nimt	10-Sep-29
Carbon monoxide (CO) 302 ppm	1915/23	Linde	16-Jun-25
Carbon monoxide (CO) 1007 ppm	1870/24	Linde	17-Jun-26
Nitrogen Dioxide (NO ₂) 30.68 ppm	2832/24	Linde	08-Sep-26
Nitrogen Dioxide (NO ₂) 81.8 ppm	2330/24	Linde	01-Aug-26
Nitrogen Dioxide (NO ₂) 201.9 ppm	1975/23	Linde	17-Jul-25
Nitric Oxide (NO) 30.0 ppm	CG-0065-24	Nimt	06-May-26
Nitric Oxide (NO) 151.5 ppm	0161/23	Linde	22-Jan-25
Nitric Oxide (NO) 322.5 ppm	1974/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 50.36 ppm	2004/23	Linde	17-Jul-25
Sulphur Dioxide (SO ₂) 100.7 ppm	2662/24	Linde	25-Aug-26
Sulphur Dioxide (SO ₂) 600.8 ppm	2003/23	Linde	17-Jul-25

Measured room conditions

Temperature : 22.1 °C Humidity : 56.9 %RH Pressure : 1012.7 mbar

Calibration conditions

Gas Temperature : 22 °C Flow rate : 1,300 ml/min Gas pressure : 1015.5 mbar

Calibration Results (Without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O ₂ (%Vol)	2.50	2.46	-0.04	0.15
O ₂ (%Vol)	9.984	9.92	-0.064	0.20
O ₂ (%Vol)	21.02	21.13	0.11	0.30
CO (ppm)	80.45	79	-1.45	3.0
CO (ppm)	302	301	-1	6.0
CO (ppm)	1007	1005	-2	12
NO ₂ (ppm)	30.68	32.7	2.02	8.0
NO ₂ (ppm)	81.8	82.2	0.4	8.0
NO ₂ (ppm)	201.9	204.8	2.9	12
NO (ppm)	30.0	32	2.0	8.0
NO (ppm)	151.5	154	2.5	8.0
NO (ppm)	322.5	325	2.5	12
SO ₂ (ppm)	50.36	51	0.64	6.0
SO ₂ (ppm)	100.7	100	-0.7	6.0
SO ₂ (ppm)	600.8	599	-1.8	13

Remark : 1 cmol/mol = 1 %vol. 1 μmol/mol = 1 ppm.

End of Report

Envi Equipment Service Co., Ltd.

110/254 Moo 3, Tumbon Bang Rak Phatthana, Amphur Bang Bua Thong, Nonthaburi 11110

Tel. 098 362 9152, 089 478 7885

E-mail: sales@envi-ees.com

Certificate No. : E25-080085

Page. : 1 of 2

CERTIFICATE OF CALIBRATION

Customer : S.P.J. Scientific Co., Ltd.

Address : 80 Soi Nakkeera Lamthong 3, Thap Chang, Saphansoong, Bangkok 10250

Description of Equipment : Heated Filter Ovens

Manufacturer : Apex Instrument

Model Number : SB-2M-V

Serial Number : 1905023

ID./Control No. : -

Environment Conditions : Temperature (25 ± 2) °C

: Humidity (50 ± 15) % RH

Cal. Date : 21/08/2025

Issue Date : 21/08/2025

Calibration Method or Calibration Procedure Used

US EPA Method (United State Environmental Protection Agency)

This certificate is traceable to national standard, which realize the units of measurement according to the International System of Units (IS).

Result of Calibration

This certificate may not be reproduced other than in full except with prior Written approval of the Technical Manager, Envi Equipment Service Company Limited.

These reported uncertainties of measurement are expanded by a coverage factor of k=2, providing a 95% confidence level

Calibrated by : Mr. Sanya Sangnil

Approved by :



(Mr. Mana Puekhu)

Technical Manger

CALIBRATION RESULTS

Thermocouples System Calibration

Sampling System Equipment Information	
Console Model Number	XD-502-MV
Console Serial Number	A1908163
Filter Oven Model	SB-2M-V
Filter Oven Serial Number	1905023

Calibration Conditions			
Date	Time	21/08/2025	01:45 PM
Calibration Reference No.		SER25-080034	
Reference Thermometer		DIGICON	
Serial Number		183169105	

Result				
System Heat	Control Acceptance	Reference thermometer temperature	Thermocouple potentiometer temperature	Temperature difference
		°C	°C	°C
Heated Oven	120 °C ± 14 °C	120 °C	118 °C	2 °C





CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : ELECTRONIC BALANCE
MANUFACTURER : AND
MODEL / TYPE : FX-2000i
SERIAL NO. : 15630332
CLID. NO. : 262501264
JOB CONTROL NO. : 250809092300
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : S.P.J. SCIENTIFIC COMPANY LIMITED
80 SOI NUKKREELALEMTHONG 3, THAPCHANG
SAPHANSOONG, BANGKOK 10250

DATE OF RECEIVED : 09 August 2025

DATE OF ISSUED : 15 August 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Nattawadce Baengpech
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
15 August 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25092300

F3-011-05/12-23

page 1 of 4



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

REPORT OF CALIBRATION

FOR

NOMENCLATURE : ELECTRONIC BALANCE
MANUFACTURER : AND
MODEL / TYPE : FX-2000i
SERIAL NO. : 15630332
DATE OF CALIBRATION : 13 August 2025

ENVIRONMENT CONDITIONS :

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

Relative Humidity : $(50 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-175 based on EURAMET cg-18 Version 4.0 (11/2015).

The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Weight Set, Mettler Toledo Class F1 S/N. 158910.
2. Weight Set, N/A Class F2 S/N. MNOPL103037, MNOPL103040, MNOPL103041.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).

Certificate No. MM-0224-24, Due Date 17 December 2025.

2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q24015300, Q24015301. Due Date 15 February 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25092300

F3-011-05/12-23

page 2 of 4



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : () without adjustment (X) adjustment

CALIBRATION DATA

1. Error of indications [Before Adjustment]

Nominal Test Value (g)	Conventional mass (g)	Display Value (g)	Error of Balance (g)	Uncertainty \pm (g)	Coverage factor <i>k</i>
200.00	200.00	200.12	+0.12	-	-
500.00	500.00	500.22	+0.22	-	-
1000.00	1000.00	1000.31	+0.31	-	-
2000.00	2000.00	2000.43	+0.43	-	-
2200.00	2200.00	OVER LOAD	-	-	-

2. Error of indications [After Adjustment]

Nominal Test Value (g)	Conventional mass (g)	Display Value (g)	Error of Balance (g)	Uncertainty \pm (g)	Coverage factor <i>k</i>
Unload	0.00	0.00	0.00	0.006	2,00
200.00	200.00	200.00	0.00	0.010	2,00
400.00	400.00	400.00	0.00	0.010	2,00
600.00	600.00	600.00	0.00	0.010	2,00
800.00	800.00	800.00	0.00	0.010	2,00
1000.00	1000.00	1000.00	0.00	0.011	2,00
1200.00	1200.00	1200.00	0.00	0.011	2,00
1400.00	1400.00	1400.00	0.00	0.011	2,00
1600.00	1600.00	1600.00	0.00	0.011	2,00
1800.00	1800.00	1800.00	0.00	0.012	2,00
2000.00	2000.00	2000.00	0.00	0.019	2,00
2200.00	2200.00	2200.00	0.00	0.019	2,00

3. Repeatability of indications

Nominal Test Value (g)	Standard Deviation of Reading (g)
2000.00	0.003

Certificate No. Q25092300

F3-011-05/12-23

page 3 of 4



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

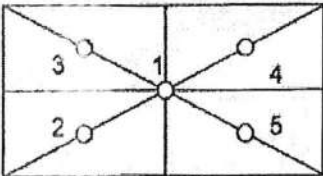
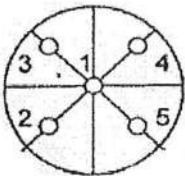
2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CALIBRATION DATA

4. Effect of eccentric application of a load on the indication

<div style="display: flex; align-items: center; justify-content: space-around;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-right: 20px;"></div> <div style="text-align: center;">  </div> <div style="text-align: center;"> <div style="border: 1px solid black; width: 30px; height: 30px; margin-bottom: 5px;"></div> <div style="text-align: center;">✓</div> </div> <div style="text-align: center;">  </div> </div>						
Nominal Test Value (g)	Display Value (g)					Maximum Difference of Center Value (g)
	Position 1	Position 2	Position 3	Position 4	Position 5	
1000.00	1000.00	1000.00	1000.00	999.99	999.99	0.01

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 33 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25092300

F3-011-05/12-23

page 4 of 4

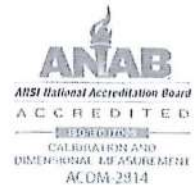


@clccalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaok 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : STOP WATCH
MANUFACTURER : CANON
MODEL / TYPE : CT-50
SERIAL NO. : N/A[SPJ-SW-01]
CLID. NO. : 252500490
JOB CONTROL NO. : 250303025750
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : S.P.J.SCIENTIFIC CO., LTD.
80 SOI NAKKEERA LAMTHONG 3, THAP CHANG,
SAPHANSOONG, BANGKOK 10250

DATE OF RECEIVED : 03 March 2025

DATE OF ISSUED : 06 March 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Suwit Phuanbusabong
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory

06 March 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement
according to the International System of Units (SI)

Certificate No. Q25025750

F3-011-05/12-23

page 1 of 3



@clcalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



REPORT OF CALIBRATION

FOR

NOMENCLATURE : STOP WATCH
MANUFACTURER : CANON
MODEL / TYPE : CT-50
SERIAL NO. : N/A[SPJ-SW-01]
DATE OF CALIBRATION : 04 March 2025

ENVIRONMENT CONDITIONS :

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

Relative Humidity : $(55 \pm 15) \% \text{ RH}$

PROCEDURE USED :

This instrument was calibrated under procedure CLC-CPEE-06. The calibration was performed by direct measurement with High Resolution Programmable Timer/Counter which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

High Resolution Programmable Timer/Counter, Philips Model PM6680B S/N. SM607101.

TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Aeronautical Radio of Thailand Ltd.

Certificate No. 07-0050/24 , Due Date 13 May 2025 .

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2,00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25025750

F3-011-05/12-23

page 2 of 3



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring stop watch.

CALIBRATION DATA

TIME BASE RESULT

Nominal frequency (kHz)	Actual frequency (kHz)	Uncertainty \pm (Hz)
32.768	32.76771	0.05

Note, The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 015 Page 65 of 68

$$\text{Actual time (second)} = \frac{\text{Nominal frequency (kHz)}}{\text{Actual frequency (kHz)}} \times \text{Stop watch Time of reading (second)}$$

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25025750

F3-011-05/12-23

page 3 of 3



@clccalibration



CLC
Accredited
ISO/IEC 17025

CALIBRATION LABORATORY CO., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



NSC-TISI-TIS 17025
CALIBRATION 0059
CLC

CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGIMATIC CALIPER
MANUFACTURER : MITUTOYO
MODEL / TYPE : CD-6"ASX
SERIAL NO. : B17564652
CLID. NO. : 222509393
JOB CONTROL NO. : 250809092301
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : S.P.J. SCIENTIFIC COMPANY LIMITED
80 SOI NUKKREELALEMTHONG 3, THAPCHANG
SAPHANSOONG, BANGKOK 10250

DATE OF RECEIVED : 09 August 2025

DATE OF ISSUED : 14 August 2025

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By : Pisit Thangthaiwan
Calibration Engineer

Approved By : Mongkol Yotsoontorn
Authorized Signatory
14 August 2025



This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q25092301

F3-011-05/12-23

page 1 of 5



@clccalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



REPORT OF CALIBRATION FOR

NOMENCLATURE	:	DIGIMATIC CALIPER
MANUFACTURER	:	MITUTOYO
MODEL / TYPE	:	CD-6" ASX
SERIAL NO.	:	B17564652
DATE OF CALIBRATION	:	13 August 2025

ENVIRONMENT CONDITIONS :

Temperature : $(20 \pm 1) ^\circ\text{C}$

Relative Humidity : $(55 \pm 10) \% \text{RH}$

PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-07 based on JIS B 7507 : 2016 as calibration guidelines.

The calibration was performed by using Long Gauge Blocks and Gauge Block which maintained by the Calibration Laboratory Co., Ltd.

REFERENCE STANDARD USED :

1. Long Gauge Blocks, Opus Model N/A S/N. 01761P.
2. Gauge Block, Mitutoyo, Model 516-946-10 S/N. 2002570.

TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q24137021, Due Date 25 December 2025.
2. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q25070490, Due Date 23 June 2026.

UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2.00$ which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q25092301

PD-011-05/12-23

page 2 of 5



@clccalibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment () adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digimatic caliper.

1. Flatness and Parallelism

Flatness and Parallelism of measuring faces were tested and found that they comply with JIS B 7507 : 2016.

2. Correction of digimatic caliper [Outside]

Nominal Value (mm)	DUC Reading (mm)	Correction (mm)
1.00	0.99	+0.01
1.10	1.09	+0.01
1.20	1.19	+0.01
1.30	1.29	+0.01
1.40	1.39	+0.01
1.50	1.49	+0.01
1.60	1.59	+0.01
1.70	1.69	+0.01
1.80	1.79	+0.01
1.90	1.89	+0.01
2.00	1.99	+0.01
15.00	15.01	-0.01
30.00	30.01	-0.01
45.00	45.01	-0.01
60.00	60.01	-0.01
75.00	75.01	-0.01
90.00	90.01	-0.01
105.00	105.01	-0.01
120.00	120.01	-0.01
135.00	135.01	-0.01
150.00	150.01	-0.01

Uncertainty of measurement ± 0.014 mm

Certificate No. Q25092301

F3-011-05/12-23

page 3 of 5



@clc calibration



CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230

Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



3. Correction of digimatic caliper [Inside]

Nominal Value (mm)	DUC Reading (mm)	Correction (mm)
15.00	15.02	-0.02
30.00	30.02	-0.02
45.00	45.02	-0.02
60.00	60.02	-0.02
75.00	75.02	-0.02
90.00	90.02	-0.02
105.00	105.02	-0.02
120.00	120.02	-0.02
135.00	135.02	-0.02
150.00	150.02	-0.02

Uncertainty of measurement ± 0.014 mm

Certificate No. Q25092301

F3-011-05/12-23

page 4 of 5



@clc calibration

4. Correction of digimatic caliper [Depth]

Nominal Value (mm)	DUC Reading (mm)	Correction (mm)
1.00	1.02	-0.02
1.10	1.12	-0.02
1.20	1.22	-0.02
1.30	1.32	-0.02
1.40	1.42	-0.02
1.50	1.52	-0.02
1.60	1.62	-0.02
1.70	1.72	-0.02
1.80	1.82	-0.02
1.90	1.92	-0.02
2.00	2.02	-0.02
15.00	15.02	-0.02
30.00	30.02	-0.02
45.00	45.02	-0.02
60.00	60.02	-0.02
75.00	75.02	-0.02
90.00	90.02	-0.02
105.00	105.02	-0.02
120.00	120.02	-0.02
135.00	135.02	-0.02
150.00	150.02	-0.02

Uncertainty of measurement ± 0.014 mm

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 8 of 138

This report is valid for the above stated instrument/s only.

End of Certificate

Certificate No. Q25092301

F3-011-05/12-23

page 5 of 5



clc calibration