

ภาคผนวกที่ 4

เอกสารขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ที่ อก-๐๓๑๐(๑)/๗๖๔



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๒๖ มกราคม ๒๕๖๗

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เทสท์ เทคโนโลยี จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๗ ธันวาคม ๒๕๖๖

- สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ แผ่น
๓. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๕ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เทสท์ เทคโนโลยี จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๕๕ สถานที่ตั้งเลขที่ ๓๐.๓๒ ซอยพระรามที่ ๒ ซอย ๖๓ แขวงสามเต้า เขตบางขุนเทียน กรุงเทพมหานครต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เทสท์ เทคโนโลยี จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ ๔๔ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารเคมีที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒๘ มกราคม ๒๕๗๐ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประพนธ์ คำทรงษ์)

ผู้อำนวยการกองวิจัยและพัฒนากิจการโรงงาน
ปฏิบัติการทางเคมีและสิ่งแวดล้อมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนากิจการโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบเคมีและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๑๙

ไปรษณีย์อิเล็กทรอนิกส์ sarabangadlw@mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เอกสารแนบท้ายหนังสือคํออวยุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เทสท์ เทค จำกัด

เลขทะเบียน ๖-๒๔๕

ที่ อก ๐๓๑๐(๑)/ ๗๓๕

ลงวันที่ ๒๖ มกราคม ๒๕๖๗

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย

๑) นางสาวเวรดี ศิริมงคล

ทะเบียนเลขที่ ๖-๒๔๕-ก-๐๐๐๑

๒) นางสาวอรษา อยู่บัว

ทะเบียนเลขที่ ๖-๒๔๕-ก-๐๐๐๒

๓) นางสาวณัฐวิภา อ่อนจัน

ทะเบียนเลขที่ ๖-๒๔๕-ก-๐๐๐๓

๔) นางสาวดวงกมล บุญยิ่ง

ทะเบียนเลขที่ ๖-๒๔๕-ก-๐๐๐๔

๕) นางสาวจิตรา สัมสืบพงษ์

ทะเบียนเลขที่ ๖-๒๔๕-ก-๐๐๐๕

3คน

เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เทลท์ เทค จำกัด

เลขทะเบียน ว-๒๕๕

ที่ ออก ๐๓๑๐(๑) ๗ ๓ ๕

ลงวันที่ ๒๖ มกราคม ๒๕๖๗

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๔๕ ราย

๑) นางสาวปรางค์ทิพย์ รัชชาสุข

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๐๔

๒) นางสาวบุษยา ศรีสว่าง

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๐๕

๓) นางสาวมินตรา ที่ภูษา

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๐๗

๔) นายเฉลิมชัย เจริญยิ่ง

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๐๘

๕) นายอภิสิทธิ์ คุณมาศ

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๐๙

๖) นายชาวุธวิทย์ อุทัยเลื่อง

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๐

๗) นางสาวบุญสิตา พราหมณ์นุช

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๑

๘) นางสาวณัฐนิชา ทองลอย

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๒

๙) นางสาวฐิติพร เชื้อรท

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๓

๑๐) นางสาวกนกพร มั่นนิยม

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๔

๑๑) นางสาวนันนิกา สิมพันธ์

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๕

๑๒) นางสาวเบญจมาศ เชื้อหงษ์

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๖

๑๓) นางสาวสุกิมม คงอินทร์

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๗

๑๔) นางสาวสุนิษา สุนทรภักดี

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๘

๑๕) นางสาวจรินทร์ทิพย์ สุขประทุมเนตร

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๑๙

๑๖) นางสาวพลอยจุ้ สุห์มา

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๐

๑๗) นางสาวอติยา ตีมาภ

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๑

๑๘) นางสาวรัชนิกา ลือเพื่อง

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๒

๑๙) นางสาวศิริندا คำดี

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๓

๒๐) นางสาวถลิตา เสนาบุษ

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๔

๒๑) นางสาวไศภิสรา ใจดีเคย

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๕

๒๒) นายวัฒนา พันธเดช

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๖

๒๓) นางสาวอ้อยใจ สระจันทร์

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๗

๒๔) นางสาวมารีสา วิเศษสังข์

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๘

๒๕) นายณัฐวุฒิ ใจสุภาพ

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๒๙

๒๖) นายกิจติพงษ์ เอ็นงาม

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๐

๒๗) นายไกรทอง สีขอนแก่น

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๑

๒๘) นายสุริยา ชื่นบาน

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๒

๒๙) นางสาวรัตรินทร์ ก้องสุนันท์

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๓

๓๐) นางสาวนุสรุ สุระเวก

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๔

๓๑) นางสาวนริศรา สอนบุญชู

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๕

๓๒) นางสาวผ่องอำไพ ไขงาม

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๖

๓๓) นางสาวนิศาสล อึ้งมั่งคั่ง

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๗

๓๔) นางสาวนริศรา มงทิส

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๘

๓๕) นางสาวศศิญา ท้าวหาญ

ทะเบียนเลขที่ ว-๒๕๕-๖-๐๐๓๙

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- ๓๖) นางสาวกรรณก จันทพิทักษ์
๓๗) นางสาวดวงหทัย เว็วณนิกย์
๓๘) นางสาวรุโรรัตน์ จงประกอบกิจ
๓๙) นายกิตติพิชญ์ ใจใหญ่
๔๐) นางสาวเจนจิรา พลดี
๔๑) นางสาวชลนิกันต์ สิทธิธรรม
๔๒) นางสาวณัฐการณ์ ขวัญศรี
๔๓) นายศิษฏ์วัฒน์ นววิษณุอำรงค์
๔๔) นายธนพล สะเอียดคง

- ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๐
ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๑
ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๒
ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๓
ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๔
ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๕
ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๖
ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๗
ทะเบียนเลขที่ ๖-๒๔๕-จ-๐๐๔๘

รวม

เอกสารแนบท้ายหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เทสท์ เทค จำกัด

เลขทะเบียน ๖-๒๕๕

ที่ อก ๐๓๑๐(๑)๙ ๗ ๓ ๕

ลงวันที่ ๒๖ มกราคม ๒๐๑๙

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๓๔ รายการ

น้ำเสีย จำนวน 45 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽³⁾
3	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽³⁾
4	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
5	β-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
6	δ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
7	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
8	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method ⁽³⁾ 2) 5-Day BOD Test, Membrane Electrode Method ⁽³⁾
9	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽³⁾
10	Chemical Oxygen Demand	1) Open Reflux, Titrimetric Method ⁽³⁾ 2) Closed Reflux, Colorimetric Method ⁽³⁾ 3) Closed Reflux, Titrimetric Method ⁽³⁾
11	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽³⁾
12	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽³⁾

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
13	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[3]
14	Copper	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
15	Cyanide	Distillation, Colorimetric Method ^[3]
16	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
17	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
18	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
19	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
20	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
21	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
22	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
23	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
24	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
25	Formaldehyde	Distillation, Colorimetric Method ^[2]
26	Free Chlorine	1) Iodometric Method ^[3] 2) DPD Colorimetric Method ^[3]
27	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
28	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
29	Hexavalent Chromium	Colorimetric Method ^[3]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
30	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
31	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
32	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[3]
33	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
34	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
35	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ^[3] 2) Soxhlet Extraction Method ^[3]
36	pH	Electrometric Method ^[3]
37	Phenols	Distillation, Direct Photometric Method ^[3]
38	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
39	Sulfide	1) Iodometric Method ^[3] 2) Methylene blue Method ^[3]
40	Temperature	Laboratory and Field Methods ^[3]
41	Total Dissolved Solids	Dried at 180 °C ^[3]
42	Total Kjeldahl Nitrogen	Macro-Kjeldahl Method ^[3]
43	Total Suspended Solids	Dried from 103 to 105 °C ^[3]
44	Trivalent Chromium	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^[3] 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[3]
45	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]

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น้ำใต้ดิน จำนวน 56 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
2	Antimony	Digestion, Inductively Coupled Plasma Method ^[3]
3	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
4	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
5	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
6	Beryllium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
7	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
8	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
9	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
10	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
11	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
12	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
13	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
14	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^[3] 2) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[3]
16	Chromium (VI)	Colorimetric Method ^[3]
17	Cyanide	Distillation, Colorimetric Method ^[3]
18	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
19	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
20	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
21	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
22	DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
23	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
24	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
25	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
26	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
27	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
28	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
29	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
30	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
31	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
32	α -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
33	β -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
34	γ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
35	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
36	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
37	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[3]
38	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
39	Methylene chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
40	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
41	pH	Electrometric Method ^[3]
42	Phenol	Distillation, Direct Photometric Method ^[3]
43	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
44	Silver	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Inductively Coupled Plasma Method ^[3]
45	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]
46	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[3]

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
47	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
48	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
49	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
50	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
51	Vanadium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽³⁾
52	Vinyl chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
53	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
54	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
55	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽³⁾
56	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ⁽³⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽³⁾

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 20 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(3,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)

ตรวจ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
2	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(1,4,9) 3) Digestion, Inductively Coupled Plasma Method ^(3,7) 4) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(5,9)
3	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(3,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
4	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(3,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
5	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(3,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
6	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8)

3mg/L

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
7	Chromium (III)	3) Digestion, Inductively Coupled Plasma Method ^[5,7] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[5,8] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,4,7,10] 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,4,8,10] 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[5,6,7,10] 4) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[5,6,8,10]
8	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^[1,10] 2) Alkaline Digestion, Colorimetric Method ^[5,10]
9	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,4,7] 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,4,8] 3) Digestion, Inductively Coupled Plasma Method ^[5,7] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[5,8]
10	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,4,7] 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^[1,4,8] 3) Digestion, Inductively Coupled Plasma Method ^[5,7] 4) Digestion, Flame Atomic Absorption Spectrometric Method ^[5,8]

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(5,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
12	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1,11) 2) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹²⁾
13	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(5,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
14	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(5,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
15	pH	Electrometric Method ^(17,18)
16	Selenium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(1,4,13) 3) Digestion, Inductively Coupled Plasma Method ^(5,7)

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Silver	4) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(5,13) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(5,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
18	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(5,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
19	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(5,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
20	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,7) 2) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,4,8) 3) Digestion, Inductively Coupled Plasma Method ^(5,7) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)

สมร

ลำดับที่	สารพิษ	วิธีวิเคราะห์
12	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(3,7)
13	Nickel	1) Digestion, Inductively Coupled Plasma Method ^(5,7) 2) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
14	Selenium	1) Digestion, Inductively Coupled Plasma Method ^(5,7) 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(5,10)
15	Silver	1) Digestion, Inductively Coupled Plasma Method ^(5,7) 2) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
16	Vanadium	1) Digestion, Inductively Coupled Plasma Method ^(5,7) 2) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)
17	Zinc	1) Digestion, Inductively Coupled Plasma Method ^(5,7) 2) Digestion, Flame Atomic Absorption Spectrometric Method ^(5,8)

เอกสารอ้างอิง

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17. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. pH Electrometric Measurement. SW-846 Method 9040C, 2004.
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**QUALITY CALIBRATION CO., LTD.**

235 Petchkasem 63/2 Road, Latsoeng, Bangkai, Bangkok 10160

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www.qcalibration.com

NSC-TS0-TS17021
CALIBRATION ONLY

CERTIFICATE No : 24T8913

REFERENCE No : 74483-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : WATER BATH

MANUFACTURER : N/A

MODEL : SUP IV

SERIAL No : N/A

ID No : EQL-056

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : PRASERT P.

CALIBRATION DATE : 05-Sep-24

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 09-Sep-24

RECEIVED DATE : 05-Sep-24

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.





QUALITY CALIBRATION CO., LTD.

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CERTIFICATE No : 24T8913

PAGE : 2 OF 2

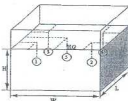
Calibration Report

EQUIPMENT	:	WATER BATH	MODEL	:	SUP IV
MANUFACTURER	:	N/A	SERIAL NUMBER	:	N/A
ID NUMBER	:	EQL-056	CALIBRATION DATE	:	05-Sep-24
RECEIVED DATE	:	05-Sep-24	RELATIVE HUMIDITY	:	50 %RH $\pm$ 10 % RH
AMBIENT TEMPERATURE	:	24 °C $\pm$ 1 °C			

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO ASTM E715-80 (REAPPROVED 2001) BY COMPARISON WITH CALIBRATED RTD. THE PROBES WERE PLACED ON FIVE POINTS AND LOCATED ONE PROBE IN EACH OF THE FOUR CORNERS OF THE BATH AND PLACED THE FIFTH RTD WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE WATER VOLUME (REFERENCE LOCATION) UNDER NO LOAD CONDITION.
 2. REFERENCE STANDARD INSTRUMENTS :-
- | | | | | |
|-------------------------|--------------|------------------|-----------------------|-----------------|
| INSTRUMENT | MODEL | SERIAL No | CERTIFICATE No | DUE DATE |
| 1) DATA LOGGER WITH RTD | 2625A | 6603614 | 24T6473 | 01-Jul-25 |
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
 4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
 5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



PROBE INSTALLATION
POSITION IN THE BATH

GENERAL INFORMATION

Overall Variation of Ambient Temperature around the Bath (°C) : 0.3
Overall Variation of Line Voltage (V) : 3
Instrument Condition : Normal
Bath Inner Size (W*L*H) : 59*35*20 cm

BATH PERFORMANCE

Calibrate Point (°C)	Average All Position (°C)	Temperature Stability (±°C)	Radius Uniformity (°C)	Axial Uniformity (°C)	Overall Variation (°C)
83.0	82.95	0.17	0.06	0.01	0.41

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	
83.0	83.0	82.92	82.96	82.96	82.97	82.93	0.24

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE BATH.

NOTE 2 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

844-20

**QUALITY CALIBRATION CO.,LTD.**

235 Petchkasem 63/2 Road, Laksong, Bangkok, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584



CERTIFICATE No : 25E0617

REFERENCE No : 75885-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : pH METER

MANUFACTURER : TOA DKK

MODEL : HM-25R

SERIAL No : 760205

ID No : EQL-183

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : PRASERT D.

CALIBRATION DATE : 20-Jan-25

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 21-Jan-25

RECEIVED DATE : 20-Jan-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



CERTIFICATE No : 25T6066
REFERENCE No : 77516-6

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : OVEN
MANUFACTURER : MEMMERT
MODEL : UF110
SERIAL No : B414.0764
ID No : EQL-169
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : SUCHART S.

CALIBRATION DATE : 23-Jun-25

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 24-Jun-25

RECEIVED DATE : 23-Jun-25





CERTIFICATE No : 25T6066

PAGE : 2 OF 2

Calibration Report

EQUIPMENT	:	OVEN		
MANUFACTURER	:	MEMMERT		
MODEL	:	UF110		
ID No	:	EQL-169	S/N	: B414.0764
RECEIVED DATE	:	23-Jun-25	CALIBRATION DATE	: 23-Jun-25
AMBIENT TEMPERATURE	:	24 °C ± 1 °C	RELATIVE HUMIDITY	: 51 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD PH00 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE NINTH THERMOMETER PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

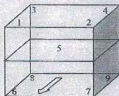
INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	HYDRA 2635A	6633300	24T6468	26-Jun-25

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 2
Overall Line Voltage (V) variation : 5
Instrument Condition : Normal
Chamber Size (W*L*H): 56*40*48 cm



FRONT

CHAMBER PERFORMANCE

Calibration Point (°C)	Average All Position (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
104.0	103.88	104.0	0.18	0.45	0.64
120.0	119.93	120.0	0.28	0.65	0.93
140.0	140.03	140.0	0.19	0.57	0.87
150.0	150.09	150.0	0.23	0.65	0.86
180.0	180.02	180.0	0.16	0.47	0.62

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
#1	#2	#3	#4	Ref 5	#6	#7	#8	#9			
104.0	104.0	103.71	103.85	103.77	103.91	103.80	103.82	104.17	103.85		0.38
120.0	120.0	119.67	119.87	119.79	119.99	120.16	119.83	119.84	120.35	119.85	0.46
140.0	140.0	139.76	140.01	139.94	140.10	140.23	139.91	139.95	140.45	139.93	0.46
150.0	150.0	149.80	150.05	150.00	150.15	150.31	149.97	150.03	150.49	149.95	1.1
180.0	180.0	179.84	180.02	179.95	180.05	180.18	179.92	179.99	180.30	179.98	1.1

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



PN 4-23



CERTIFICATE No : 24T8916
REFERENCE No : 74483-6

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL : UF 110
SERIAL No : B414.0764
ID No : EQL-169
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.
CALIBRATION DATE : 05-Sep-24

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 09-Sep-24

RECEIVED DATE : 05-Sep-24





QUALITY CALIBRATION CO., LTD.

235 Petchkasom 63/2 Road, Laksong, Bangkok, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 24T8916

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : HOT AIR OVEN
MANUFACTURER : MEMMERT
MODEL : UF 110
ID No : EQL-169
RECEIVED DATE : 05-Sep-24
AMBIENT TEMPERATURE : 24 °C ± 1 °C

S/N : B414.0764
CALIBRATION DATE : 05-Sep-24
RELATIVE HUMIDITY : 50 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

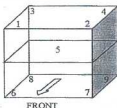
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE NINTH THERMOMETER PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	HYDRA 2635A	7301307	24T6467	26-Jun-25

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 3
Overall Line Voltage (V) variation : 8
Instrument Condition : Normal
Chamber Size (W*L*H): 56*40*48 cm

CHAMBER PERFORMANCE

Calibrate Point (°C)	Average All Position Temp. (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
104.0	104.11	0.06	0.43	0.55
120.0	120.18	0.04	0.58	0.67
140.0	140.24	0.09	0.71	0.91
150.0	150.20	0.10	0.79	0.98

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
104.0	104.0	104.37	104.10	104.39	104.07	104.01	104.25	103.95	103.92	103.97	0.38
120.0	120.0	120.54	120.25	120.45	120.23	120.00	120.33	119.94	119.90	120.00	0.46
140.0	140.0	140.64	140.33	140.53	140.28	139.98	140.48	139.92	139.88	140.09	0.46
150.0	150.0	150.66	150.29	150.55	150.23	149.90	150.47	149.85	149.80	150.06	0.46

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



4-25

F-0010 REV : 03

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www.qcalibration.com



CERTIFICATE No : 24T8915

REFERENCE No : 74483-5

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : HOT AIR OVEN

MANUFACTURER : MEMMERT

MODEL : UFE 500

SERIAL No : G508.0791

ID No : BQL-128

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.CALIBRATION DATE : 05-Sep-24APPROVED BY : 
PONGSAK J.ISSUED DATE : 09-Sep-24RECEIVED DATE : 05-Sep-24



CERTIFICATE No : 24T8915

PAGE : 2 OF 2

Calibration Report

EQUIPMENT	:	HOT AIR OVEN		
MANUFACTURER	:	MEMMERT		
MODEL	:	UFE 500		
ID No	:	EQL-128	S/N	: G508.0791
RECEIVED DATE	:	05-Sep-24	CALIBRATION DATE	: 05-Sep-24
AMBIENT TEMPERATURE	:	24 °C ± 1 °C	RELATIVE HUMIDITY	: 50 %RH ± 10 %RH

CONDITION OF THIS RESULTS OF CALIBRATION

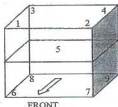
1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TLAS G-20 BY COMPARISON WITH CALIBRATED RTD Pt100 UNDER NO LOAD CONDITION. THE TEMPERATURE PROBES WERE PLACED ON NINE POINTS AND LOCATED ONE THERMOMETER PROBE IN EACH OF THE EIGHT CORNERS OF THE CHAMBER AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE NINTH THERMOMETER PROBE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER WITH RTD	HYDRA 2635A	6635300	24T6468	26-Jun-25

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



GENERAL INFORMATION

Overall Ambient Temperature around the Chamber (°C) variation : 4
Overall Line Voltage (V) variation : 6
Instrument Condition : Normal
Chamber Size (W*L*H): 56*40*48 cm

CHAMBER PERFORMANCE

Calibrate Point (°C)	Average All Position Temp. (°C)	Temperature Stability (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
104.0	104.09	0.24	0.72	1.03
180.0	179.88	0.20	1.00	1.24

TEMPERATURE MEASUREMENT ACCURACY TEST

Controller Temp (°C)	Indicating Temp (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (± °C)
		#1	#2	#3	#4	Ref. 5	#6	#7	#8	#9	
104.0	104.0	104.13	103.69	104.30	103.76	103.78	104.35	104.38	104.13	104.31	0.38
180.0	180.0	180.05	179.34	180.20	179.29	179.51	180.23	180.27	179.92	180.11	1.1

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 5 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k =2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



W 4-27

F-Q010 REV : 03

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235 Petchkasem 63/2 Road, Laksong, Bangkok, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.comMTC 120 7151 2025
CALIBRATION 0049

CERTIFICATE No : 25M6069

REFERENCE No : 77517-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : SARTORIUS

MODEL : BCA224I-1S

SERIAL No : 0043402017

ID No : EQL-268

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD.,
SAMAEDAM, BANGKHUNTHIAN, BANGKOK
10150

CALIBRATED BY : SUCHART S.

CALIBRATION DATE : 23-Jun-25

APPROVED BY : 
PONGRAK J.

ISSUED DATE : 24-Jun-25

RECEIVED DATE : 23-Jun-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
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QUALITY CALIBRATION CO., LTD.

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www.qcalibration.com

CERTIFICATE No : 25M6069

PAGE : 2 OF 2

Calibration Report

EQUIPMENT	:	DIGITAL BALANCE	MODEL	:	BCA2241-1S
MANUFACTURER	:	SARTORIUS	S/N	:	0043402017
ID No	:	EQL-268	RECEIVED DATE	:	23-Jun-25
AIR PRESSURE	:	1007mbar $\pm$ 1mbar	CALIBRATION DATE	:	23-Jun-25
AMBIENT TEMPERATURE	:	27° C $\pm$ 1° C	RELATIVE HUMIDITY	:	64 %RH $\pm$ 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD WEIGHT SET	E2	QK-1-151	C02250116	28-Jun-27
2) STANDARD WEIGHT	E2	15843	C02250117	29-Jun-27

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-

- NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000045 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY ($\pm$ g)
0.0	0.0000	0.0000	0.00010
0.1	0.1000	0.0000	0.00010
0.5	0.5000	0.0000	0.00010
1.0	1.0000	0.0000	0.00010
2.0	2.0000	0.0000	0.00010
20.0	20.0001	-0.0001	0.00011
45.0	45.0001	-0.0001	0.00015
50.0	50.0000	0.0000	0.00012
80.0	80.0001	-0.0001	0.00018
100.0	100.0001	-0.0001	0.00019
120.0	120.0001	-0.0001	0.00022
140.0	140.0001	-0.0001	0.00025
160.0	160.0001	-0.0001	0.00027
180.0	180.0001	-0.0001	0.00030
200.0	200.0001	-0.0001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	99.9999
3	100.0000
4	100.0000
5	100.0001
OFF-CENTER LOADING	0.0001

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA. THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



N 4-29

F-0010 REV 03



Harikul Science Co., Ltd.
694 Soi Ratchadaniwet 24, Pracharabamphen,
Samsaenrok, Huaikhwang, Bangkok 10310
Tel: 0-2274-2456 Fax: 0-2274-2443
Email: info@harikul.com www.harikul.com

CERT.No.: HS-V046G

Certificate of Calibration

Calibration Date : 17 Jul 24
Submitted by : TEST TECH CO.,LTD.
30,32 Ramall Soi 63, Ramall Road, Samaedam,
Bangkhunthian, Bangkok 10150

Model : YSI 5000
S/N : 12E102403
Probe : YSI 5010
S/N : 23E100133
ID NO. : EGL-154
Air Temp ref : S/N. F8065C26
Barometric ref : S/N. F8065C26
Water Temp ref : -
ID NO. : HS001
Technician : Kittipong M.

Avg Room Temp : 20 °C
Avg Water Temp : 20 °C
Air Pressure : 760.00 mmHg
Salinity : 0 ppt

Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.09	(PASS)	-
Measurement 2 (mg/l)	9.09	(PASS)	-
Measurement 3 (mg/l)	9.09	(PASS)	-
Measurement 4 (mg/l)	9.08	(PASS)	-
Measurement 5 (mg/l)	9.07	(PASS)	-
Measurement 6 (mg/l)	9.08	(PASS)	-
Measurement 7 (mg/l)	9.07	(PASS)	-
Measurement 8 (mg/l)	9.09	(PASS)	-
Measurement 9 (mg/l)	9.08	(PASS)	-
Measurement 10 (mg/l)	9.08	(PASS)	-
Mean Measurement	9.08	mg/l	-
Inaccuracy	0.01	mg/l	-

Overall Status (PASS)

Manufacturer Specification

Accuracy = +/- 0.02 mg/l

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.


Technician Signature
(Kittipong Maekwong)

91 4-30


Laboratory Manager
(Natanapha Pisakunchon)

**QUALITY CALIBRATION CO., LTD.**

235 Petchkasem 63/2 Road, Laksong, Bangkoe, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com



CERTIFICATE No : 25T0975

REFERENCE No : 76012-7

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA
MODEL : HVE-50
SERIAL No : 30612085166
No : EQL-155
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : TEST TECH CO.,LTD.
30,32 RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.

CALIBRATION DATE : 04-Feb-25

APPROVED BY : 
PONGSAK J.

ISSUED DATE : 12-Feb-25

RECEIVED DATE : 04-Feb-25

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



23 4-31

F-G010 REV : 03



QUALITY CALIBRATION CO., LTD.

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www.qcalibration.com

CERTIFICATE No : 25T0975

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : AUTOCLAVE
MANUFACTURER : HIRAYAMA MODEL : HVE-50
ID NUMBER : EQL-155 SERIAL NUMBER : 30612085166
RECEIVED DATE : 04-Feb-25 CALIBRATION DATE : 04-Feb-25
AMBIENT TEMPERATURE : 29°C ± 1°C RELATIVE HUMIDITY : 53 %RH ± 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

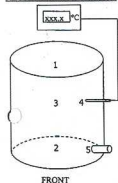
1. THIS INSTRUMENT WAS CALIBRATED BASED ON BS 2646-1:2021 BY COMPARISON WITH CALIBRATED RTD DATA LOGGERS UNDER NO LOAD CONDITION. THE SENSORS WERE PLACED ON FIVE LOCATIONS AS SHOWN IN THE PICTURE. THE SENSOR ON LOCATION 1 AND 2 WERE PLACED IN THE UPPER HALF AND LOWER HALF OF CHAMBER FREE SPACE RESPECTIVELY. THE THIRD SENSOR WAS PLACED WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE INSTRUMENT CHAMBER. SENSOR NUMBER 4 WAS ATTACHED TO THE LOAD TEMPERATURE PROBE, IF FITTED, WITHIN 15 mm OF ITS TIP. SENSOR NUMBER 5 WAS PLACED IN THE CHAMBER DRAIN OR VENT WITHIN 100 mm OF ITS CONNECTION TO THE CHAMBER.

REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) DATA LOGGER	VALPROBE	S350,S367,DV35,DN94	25T0777	24-Jan-26

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT



GENERAL INFORMATION

Overall Ambient Temperature around the Chamber variation : 1.2 °C

Autoclave Condition : Normal

Chamber Size (Diameter*H): 30 * 71 cm

CHAMBER PERFORMANCE

Controller Temperature (°C)	Average All Position (°C)	Temperature Stability (°C)	Temperature Uniformity (°C)	Overall Variation (°C)	Pressure (MPa)	Holding time (min)	Operating Cycle time (min)
115	115.71	0.10	0.20	0.20	0.090	15	60
121	121.65	0.10	0.20	0.20	0.125	15	60

TEMPERATURE MEASUREMENT ACCURACY TEST (°C)

Calibration Point	Controller Temp.	Indicating Temp.	Measured Temperature (°C) at Spread Locations					Uncertainty (± °C)
			#1	#2	#3	#4	#5	
115	115	115	115.66	115.65	115.76	115.76	115.70	0.63
121	121	121	121.59	121.60	121.71	121.71	121.66	0.64

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT OF TEMPERATURE MEASUREMENT ACCURACY TEST EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : THE STABILITY TERM IN THE UNCERTAINTY BUDGET WAS REPLACED BY THE STANDARD REPEATABILITY.

NOTE 3 : LOCATION 3 WAS REFERENCE LOCATION.

NOTE 4 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k=2, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

W 4-32



F-Q10 REV 03

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Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 24T8053

REFERENCE No : 74209-2

PAGE : 1 OF 3

Certificate of Calibration

EQUIPMENT : BOD INCUBATOR

MANUFACTURER : N/A

MODEL : N/A

SERIAL No : N/A

ID No : EQL-166

CONDITION AS RECEIVED : USED ITEM

SUBMITTED BY : TEST TECH CO., LTD.
30,32 RAMA II SOI 63, RAMA II RD., SAMAEDAM,
BANGKHUNTHIAN, BANGKOK 10150

CALIBRATED BY : CHAICHARN CH.CALIBRATION DATE : 13-Aug-24APPROVED BY : 
PONGSAK J.ISSUED DATE : 19-Aug-24RECEIVED DATE : 13-Aug-24

**QUALITY CALIBRATION CO., LTD.**

235 Peichakarn 63/2 Road, Lakson, Bangkok, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 24T8053

PAGE : 2 OF 3

Calibration Report

EQUIPMENT	:	BOD INCUBATOR	MODEL	:	N/A
MANUFACTURER	:	N/A	SERIAL NUMBER	:	N/A
ID NUMBER	:	EQL-166	CALIBRATION DATE	:	13-Aug-24
RECEIVED DATE	:	13-Aug-24	RELATIVE HUMIDITY	:	54 %RH $\pm$ 10 % RH
AMBIENT TEMPERATURE	:	25° C $\pm$ 1° C			

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED ACCORDING TO TIAS G-20 BY COMPARISON WITH CALIBRATED THERMOCOUPLE TYPE K UNDER NO LOAD CONDITION. THE THERMOCOUPLES WERE PLACED ON 19 POINTS AND LOCATED AS THE PICTURE BELOW AND WAS AWAY FROM THE EACH WALL OF 5 cm TO 10 cm. AND PLACED THE TENTH THERMOCOUPLE WITHIN 2.5 cm. OF THE GEOMETRIC CENTER OF THE CHAMBER. THE UNIFORMITY WAS MEASURED BETWEEN REFERENCE PROBE AND OTHER PROBES AT THE SAME TIME.
2. REFERENCE STANDARD INSTRUMENTS :-

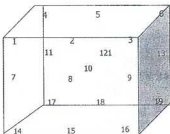
- | INSTRUMENT | MODEL | SERIAL No | CERTIFICATE No | DUE DATE |
|-------------------------------|-------------|-----------|----------------|-----------|
| 1) DATA LOGGER WITH TC TYPE K | HYDRA 2635A | 7286308 | 24T6471 | 24-Jan-25 |
3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH QUALITY CALIBRATION CO., LTD.

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT**GENERAL INFORMATION**

Overall Ambient Temperature around the Chamber (°C) variation : 0
Overall Line Voltage (V) variation : 11
Instrument Condition : Normal
Chamber Size (W*L*H): 190*70*174 cm

CHAMBER PERFORMANCE

Calibrate Point (°C)	Average all Located Temp. (°C)	Temperature Stability ($\pm$ °C)	Temperature Uniformity (°C)	Overall Variation (°C)
20.0	20.09	0.41	0.47	1.0



FRONT

END OF CALIBRATION REPORT PAGE 2 OF 3

W 4 - 34

**QUALITY CALIBRATION CO., LTD.**

235 Potchakarn 63/2 Road, Laksoong, Bangkok, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

CERTIFICATE No : 24T8053

PAGE : 3 OF 3

Calibration Report**RESULT OF CALIBRATION (CONTINUE):-****TEMPERATURE MEASUREMENT ACCURACY TEST**

Controller temperature (°C)		20.0
Indicating Temperature		20.0
Measured Temperature (°C) at Spread Locations	1	20.00
	2	20.15
	3	20.16
	4	20.17
	5	20.18
	6	20.12
	7	20.21
	8	20.10
	9	20.09
	10 Ref.	19.92
	11	19.97
	12	20.22
	13	20.16
	14	20.11
	15	20.16
	16	20.06
	17	20.01
	18	19.94
	19	20.04
Uncertainty of Measurement ($\pm$ °C)		0.62

NOTE 1 : THE UNCERTAINTY OF MEASUREMENT EXCLUDED TEMPERATURE UNIFORMITY OF THE CHAMBER.

NOTE 2 : LOCATION 10 WAS REFERENCE LOCATION.

NOTE 3 : THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA.

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT

W 4-35

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaphrasathan 3 Rd., Bangpoo, Pakkred, Nonthaburi 11120

Tel.(02) 964-9211 Fax.(02) 964-9155, e-mail: cal@caltech.co.th, cal@caltech.co.th, cal@caltech.co.th



Certificate of Calibration

Certificate No. : 67-300495-1

Page : 1 of 2

Submitted by : Test Tech Co.,Ltd. (Head Office)

30, 32 Rama II Soi 63, Rama II Rd., Samaeedam, Bangkokhachin, Bangkok 10150

Equipment : Auto Burette

Manufacturer : EM

Class : A

Capacity : 25 ml

Graduation : 0.05 ml

ID No. : 6310BU25-01

Environment : Ambient Temperature : 20 ± 3 °C

Relative Humidity : (50 ± 10) %

Air Pressure : 1003.0 mbar.

Date of Received : 28 August 2024

Date of Calibration : 30 August 2024

Date of Issue : 30 August 2024

Calibrated by : Areerat Sombun

Calibration Method : In-house method CAL-M2001 based on ASTM E 542-22

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

Electronic Balance

ID No.	Cert. No.	Due Date	Traceability
241005	67-200210-4	02 Dec 2024	National Institute of Metrology (Thailand) (NIMT)

Approved by :

(Wipit Tovallee)

Supervisor

4-36

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, Sukhaphrachuan 3 Rd., Bangpoo, Pkdech, Northburi 11120

Tel. (02) 964-6211 Fax. (02) 964-3155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 67-300495-1

Page : 2 of 2

Result of Calibration : This result of true Volume is referred to standard temperature at 20 °C

UUC Condition As-Received : Good

Delivery Time : 34.20 sec.

Nominal Volume (ml)	Measuring Volume (ml)
5	4.9776
15	14.9768
25	24.9767

Uncertainty of measurement with in $\pm$ 0.0066 ml

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%

- o O o -

04 A-37





บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.

การดูแลบำรุงรักษาเชิงป้องกัน

Preventive Maintenance

Customer Name : บริษัท เฮอร์เทค จำกัด
Product : Distillation Unit
Brand : GERHARDT
Model : Vapodest 30
Serial number : GER003718

 **Gerhardt**
Analytical Systems



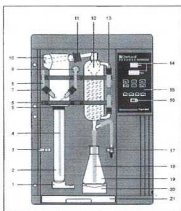
บริษัท ซีจี ไซแอนติฟิค จำกัด
CG SCIENTIFIC CO., LTD.

- Part 1: สัญญาการให้บริการ (Service Contact)
- Part 2: ข้อมูลพื้นฐานของเครื่องมือ (Details of Instrument)
- Part 3: ตรวจเช็คสภาพเครื่อง
- Part 4: รายละเอียดและรายงานผลการให้บริการ Preventive Maintenance
 - 4.1 ขั้นตอนการบริการ
 - 4.2 รายงานผลการให้บริการ
- Part 5: ข้อมูลสนับสนุนด้านเทคนิค (General Technical Support)
 - 5.1 Care and Maintenance
 - 5.1.1 การบำรุงรักษาทั่วไป (Basic maintenance)
 - 5.1.2 General error message

Part 3: Operational Qualification (OQ)

3.1 ตรวจสอบสภาพเครื่อง

FRONT

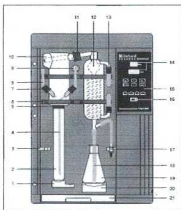


No	Description	PASS	FAIL	N/A
1.	Quick clamping device with wedge	☒	☐	☐
2.	Kjeldatherm digestion tube	☒	☐	☐
3.	Holder for steam inlet tubing	☒	☐	☐
4.	PTFE-Inlet tubing, steam	☒	☐	☐
5.	Viton-cone	☒	☐	☐
6.	Clamping for glassware	☒	☐	☐
7.	Screw cap GL18 with silicone seal	☒	☐	☐
8.	PTFE-Inlet tubing, NaOH	☒	☐	☐
9.	PP-Distributor with PP-threaded joint	☒	☐	☐
10.	Distribution head, PP	☒	☐	☐
11.	Screw cap GL32 with silicone seal	☒	☐	☐
12.	Distillation condenser	☒	☐	☐
13.	Screw cap GL14 with plastic screw connection	☒	☐	☐
14.	Display	☒	☐	☐
15.	Keyboard, chemical-resistant	☒	☐	☐
16.	Main switch, green	☒	☐	☐
17.	Ventilation valve	☒	☐	☐
18.	Distillate outlet tubing	☒	☐	☐
19.	Erlenmeyer flask	☒	☐	☐
20.	Platform	☒	☐	☐
21.	Drip tray	☒	☐	☐

Part 3: Operational Qualification (OQ)

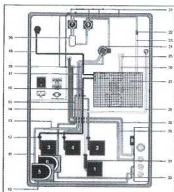
3.1 ตรวจสอบสภาพเครื่อง

FRONT



No	Description	PASS	FAIL	N/A
1.	Quick clamping device with wedge	☒	☐	☐
2.	Kjeldatherm digestion tube	☒	☐	☐
3.	Holder for steam inlet tubing	☒	☐	☐
4.	PTFP-Inlet tubing, steam	☒	☐	☐
5.	Viton-cone	☒	☐	☐
6.	Clamping for glassware	☒	☐	☐
7.	Screw cap GL18 with silicone seal	☒	☐	☐
8.	PTFP-Inlet tubing, NaOH	☒	☐	☐
9.	PP-Distributor with PP-threaded joint	☒	☐	☐
10.	Distribution head, PP	☒	☐	☐
11.	Screw cap GL32 with silicone seal	☒	☐	☐
12.	Distillation condenser	☒	☐	☐
13.	Screw cap GL14 with plastic screw connection	☒	☐	☐
14.	Display	☒	☐	☐
15.	Keyboard, chemical-resistant	☒	☐	☐
16.	Main switch, green	☒	☐	☐
17.	Ventilation valve	☒	☐	☐
18.	Distillate outlet tubing	☒	☐	☐
19.	Erlenmeyer flask	☒	☐	☐
20.	Platform	☒	☐	☐
21.	Drip tray	☒	☐	☐

REAR



No	Description	PASS	FAIL	N/A
1.	Diaphragm pump NaOH	☒	☐	☐
2.	Diaphragm pump H ₂ BO ₃	☒	☐	☒ *Vap10
3.	Diaphragm pump H ₂ O for steam generator	☒	☐	☐
4.	Diaphragm pump H ₂ O for sample	☒	☐	☐ *Vap30,40
5.	Peristaltic pump for suction sample	☒	☐	☐ *Vap30, 40
6.	Peristaltic pump for suction receiver	☒	☐	☒ Option
7.	Pinch-solenoid valve, steam	☒	☐	☐
8.	Magnetic valve with pressure control	☒	☐	☐
9.	Pinch-solenoid valve, shut-off	☒	☐	☐
10.	Verprene-tubing 4x8 mm.	☒	☐	☐
11.	Verprene-tubing 4x8 mm.	☒	☐	☐ *Vap30,40
12.	Non-return valve for diaphragm pumps	☒	☐	☐
13.	Tubing reduction PP 51x10x5 mm.	☒	☐	☐ *Vap30,40
14.	Silicone tubing 4x7 mm.	☒	☐	☒ *Vap40
15.	Silicone tubing 4x7 mm.	☐	☐	☒ Option
16.	Silicone -tubing 4x7 mm.	☒	☐	☐
17.	Verprene-tubing 8x12 mm.	☒	☐	☐ *Vap30,40
18.	Verprene tubing 4x7 mm.	☒	☐	☐ *Vap30,40
19.	Silicone tubing 4x7 mm.	☒	☐	☐
20.	Ventilation glass	☒	☐	☐
21.	Novoprene-tubing 4.8x8 mm.	☒	☐	☐
22.	Tubing reduction	☒	☐	☐
23.	Silicone tubing 6x10 mm.	☒	☐	☐
24.	PP-distributor with PP-thread	☒	☐	☐
25.	SKT-valve (built in with brass fitting)	☒	☐	☐
26.	Silicone tubing 8x16x80 mm.	☒	☐	☐
27.	Steam generator	☒	☐	☐
28.	PTFE-inlet tubing NaOH	☒	☐	☐
29.	Silicone tubing 8x16 for cooling water inlet	☒	☐	☐
30.	Silicone tubing 8x16 for cooling water outlet	☒	☐	☐
31.	Viton-tubing 6x12"50 mm.	☒	☐	☐
32.	Silicone tubing 4x7 mm.	☐	☐	☒ Option



Part 4: รายละเอียดการตรวจสอบ

4.1 ขั้นตอนการบริการ

ตรวจสอบระบบไฟฟ้า (Electrical Test)

- ความต้านทานวงจรไฟฟ้าของเครื่อง/กับกราวด์
- กระแสไฟฟ้าใช้งาน

PASS	FAIL	Remark
☒	☐	
☒	☐	

ตรวจสอบสภาพเครื่อง (Optical Test)

- Main cable
- Electric wiring
- Pumps
- Distribution Head
- Condensor
- Steam generator
- Tubing
- Viton cone

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	

ตรวจสอบ Function การทำงาน (The Function Test)

- ระบบสร้างและควบคุมความดันของ Steam
- ระบบการดึงน้ำเข้า Sample Tube
- ระบบการดึง NaOH
- ระบบการ Suction ที่ Sample Tube use Receiver

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	
☒	☐	

4.2 รายงานผลการให้บริการ

1. TECHNICAL DATA

Main Supply 220 volt + 10% 50 Hz
Nominal current

PASS	FAIL	Remark
☒	☐	
☒	☐	

1.1 COOLING WATER BATH

Temperature 15-20 °C
Cooling Water Outlet
Control Temperature

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	

1.2 OPTICAL TEST VAP 30

Screw cap GL14
Screw cap GL18
Screw cap GL32
Distillation Head
Condensor
Viton Cone
Ventilation Valve
Micro Switch Sample

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	
☒	☐	

2. SYSTEM COOLING WATER INLET

Cooling Water Inlet
Cooling Water Outlet
Flow control valve

PASS	FAIL	Remark
☒	☐	
☒	☐	
☒	☐	



3. SYSTEM CONTROL

	PASS	FAIL	Remark
Key Board	☒	☐	
Display *	☒	☐	
Program[]	☒	☐	
Adding H ₂ O	☒	☐	*Vap33,40
Adding NaOH	☒	☐	
Adding H ₃ BO ₃	☐	☐	*Vap40
Suction Sample	☒	☐	*Vap30,40

4. SYSTEM DISTILLATION

	PASS	FAIL	Remark
Boiler	☒	☐	
Level Sensor	☒	☐	
Neoprene-Tubing	☒	☐	
Solenoid Valve Shut-Off	☒	☐	
Solenoid Valve Steam	☒	☐	
Excess Pressure Detector	☒	☐	
Ventilation Valve	☒	☐	
Heater	☒	☐	

5. PUMPS

	PASS	FAIL	Remark
Pump H ₂ O Steam			
- Non-Return Valve	☒	☐	
Pump H ₂ O Sample			
- Non-Return Valve	☒	☐	
Pump NaOH			
- Non-Return Valve	☒	☐	
Pump H ₃ BO ₃			
- Non-Return Valve	☐	☐	N/A
Pump suction	☒	☐	

6. THE FOLLOWING PROGRAM RUN

	PASS	FAIL	Remark
Addition H ₂ O 0-99 sec.	☒	☐	
Addition NaOH 0-99 sec.	☒	☐	
Addition H ₃ BO ₃ 0-99 sec.	☐	☐	N/A
Reaction Time 0-99 min	☒	☐	
Distillation Time 0-99 min	☒	☐	
Steam Capacity 30%-100%	☒	☐	
Suction Time 0-99 sec.	☒	☐	
The Instrument is in perfect technical shape	☒	☐	

Remark :

4.2 Error Code

The micro-processor continually surveys all the functions of the distillation system. As soon as an error arises it is shown on the display and accompanied by an acoustic signal.

Error message	Measures
No tap water	Check cooling water inlet for blockages. Ensure the tap is turned on → Enter
No sample tube	Insert tube → Enter
Check chemicals	Check set of tanks → Enter
Low water Press Enter	Check the water inlet distilled H ₂ O → Enter
↓ Filling Steam generator	This message disappears as soon as steam generator is filled
After the above mentioned errors are corrected, the following message is displayed.	
Error message	Measures
Stop Prog. No. x Continue=Enter	Enter = continue of interrupted program Reset = Standby-mode

Other error messages	
Error message	Measures
Wait for steam	Message disappears as soon as stand-by is reached
Add sol. > 1min Continue=Enter	Check programming Enter=continue of interrupted program Reset=Standby-mode
Program undefined	Check programming → Reset
Excess steam pressure	Switch the system off and call service
Sensor error	Switch the system off and call service