

ภาคผนวก 9

เอกสารชี้แนะเขียนห้องปฏิบัติการ วิเคราะห์เอกสารชน



ที่ อก ๐๓๑๐(๑)/๒๒๗๑๔

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๔ กันยายน ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๑ พฤษภาคม ๒๕๖๕

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท ศูนย์วิเคราะห์น้ำ จำกัด จำนวน ๑๐ แผ่น

ตามหนังสือที่อ้างถึง บริษัท ศูนย์วิเคราะห์น้ำ จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๑๔๐ สถานที่ตั้งเลขที่ ๑/๔๔ หมู่ที่ ๕ ตำบลคานหาม อำเภออุทัย
จังหวัดพระนครศรีอยุธยา ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท ศูนย์วิเคราะห์น้ำ จำกัด ต่ออายุหนังสือรับขึ้นทะเบียน
ห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์

๑) นางนิรมล ผดุงสงฆ์

ทะเบียนเลขที่ ว-๑๔๐-ค-๐๐๐๑

๒) นางสาวเปรมฤดี ชิวเศรษฐ์

ทะเบียนเลขที่ ว-๑๔๐-ค-๐๐๐๒

๓) นางสาวนิตยา ชันธบุตร

ทะเบียนเลขที่ ว-๑๔๐-ค-๐๐๐๓

๔) นางสาวจุฑารัตน์ ภูผาน

ทะเบียนเลขที่ ว-๑๔๐-ค-๐๐๐๔

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์

๑) นางสาวอนุสรรา แพงดวงแก้ว

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๑

๒) นายรังศศิกร โกสุมภ์

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๒

๓) นางสาวสุวลี บังแสงอ่อน

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๓

๔) นางสาววราพร วันวิเศษ

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๔

๕) นางสุนันทา แจ่มมิน

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๕

๖) นายพุมพิงค์ วรสมันต์

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๖

๗) นางสาวอรรณณ สี่ใต้

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๗

๘) นายวชิราวุฒ อุไรวรรณ

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๘

๙) นางสาวคณิตศรา สร้อยจิตร

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๐๙

๑๐) นางสาวรณกร ผดุงเวียง

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๑๐

๑๑) นายมานพ สลามขอ

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๑๑

๑๒) นายจตุเมธ อินทรโสภาส

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๑๒

๑๓) นางสาวแคทรียา มีแก้ว

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๑๓

๑๔) นางสาวอัญชิสา แผลงศรี

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๑๔

๑๕) นายรัตพล ไบไกร

ทะเบียนเลขที่ ว-๑๔๐-จ-๐๐๑๕

๑๖) นางสาวสมมาต...

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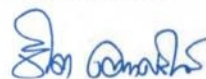
๑๖) นางสาวสมมาต อยู่สา	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๑๖
๑๗) นายภูเบศร์ สารยศ	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๑๗
๑๘) นางสาวกันขญา อจโยธา	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๑๘
๑๙) นายสุทิวส์ ใจธีรภาพกุล	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๑๙
๒๐) นายธนภุต สุจริต	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๒๐
๒๑) นางสาวกนกพร หลวงประมูล	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๒๑
๒๒) นางสาวณิชา แก้วรุ่งฟ้า	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๒๒
๒๓) นางสาวสุธาสินี หอมสวาท	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๒๓
๒๔) นางสาวเครือวัลย์ สมภักษ์	ทะเบียนเลขที่ ๖-๑๙๐-จ-๐๐๒๔

ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนไว้วิเคราะห์ในน้ำเสีย น้ำใต้ดิน สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๖ มิถุนายน ๒๕๖๘ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Codeท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นางจินดา เดชะศรีนทร์)

ผู้อำนวยการกองวิจัยและเฝ้าระวังมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม



กองวิจัยและเฝ้าระวังมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th

ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”



เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

เลขทะเบียน ว-๑๙๐

ที่ อก ๐๓๑๐(๑)๑๒๗๑๔

ลงวันที่ ๘ กันยายน ๒๕๖๕

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๒๙ รายการ

น้ำเสีย จำนวน 44 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
2	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3]
3	Barium	Digestion, Direct Nitrous Oxide Acetylene Flame 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	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
7	δ-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, Electrothermal Atomic Absorption Spectrometric Method ^[3]
10	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method ^[3]
11	Chromium	Digestion, Direct Air-Acetylene Flame Method ^[3]
12	Color	ADMI Weighted-Ordinate Spectrophotometric Method ^[3]
13	Copper	Digestion, Direct Air-Acetylene Flame Method ^[3]
14	Cyanide	Distillation, Colorimetric Method ^[3]
15	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
16	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]

17 4,4'-DDT ...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
18	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
19	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
20	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
21	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
22	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
23	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
24	Formaldehyde	Distillation, Colorimetric Method ^[2]
25	Free Chlorine	DPD Colorimetric Method ^[3]
26	Hexavalent Chromium	Filtration, 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	Lead	1) Digestion, Direct Air-Acetylene Flame Method 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
30	Manganese	Digestion, Direct Air-Acetylene Flame Method ^[3]
31	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[3]
32	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
33	Nickel	Digestion, Direct Air-Acetylene Flame Method ^[3]
34	Oil & Grease	Soxhlet Extraction Method ^[3]
35	pH	Electrometric Method ^[3] 

36 Phenol...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
36	Phenol	Distillation, Direct Photometric Method ^[3]
37	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3]
38	Sulfide	Precipitation, Iodometric Method ^[3]
39	Temperature	Laboratory and Field Methods ^[3]
40	Total Dissolved Solids	Dried at 180 °C ^[3]
41	Total Kjeldahl Nitrogen	Macro Kjeldahl, Titrimetric Method ^[3]
42	Total Suspended Solids	Dried at 103-105 °C ^[3]
43	Trivalent Chromium	Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation ^[3]
44	Zinc	Digestion, Direct Air-Acetylene Flame Method ^[3]

น้ำใต้ดิน จำนวน 31 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3]
2	Antimony	Digestion, Direct Air-Acetylene Flame Method ^[3]
3	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3]
4	Barium	Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[3]
5	Beryllium	Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[3]
6	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
7	Chromium	Digestion, Direct Air-Acetylene Flame Method ^[3]
8	Chromium (III)	Digestion, Direct Air-Acetylene Flame Method; Filtration, Colorimetric Method; Calculation ^[3]
9	Chromium (VI)	Filtration, Colorimetric Method ^[3]
10	Cyanide	Distillation, Colorimetric Method ^[3]
11	DDD	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[3] ว่าง

12 DDE...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
12	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
13	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
14	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
15	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
16	α -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
17	β -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
18	γ -HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
19	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
20	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
21	Lead	1) Digestion, Direct Air-Acetylene Flame Method ^[3] 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^[3]
22	Manganese	Digestion, Direct Air-Acetylene Flame Method ^[3]
23	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[3]
24	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[3]
25	Nickel	Digestion, Direct Air-Acetylene Flame Method ^[3]
26	pH	Electrometric Method ^[3]
27	Phenols	Distillation, Direct Photometric Method ^[3]
28	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[3]
29	Silver	Digestion, Direct Air-Acetylene Flame Method ^[3]

30 Vanadium...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
30	Vanadium	Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[3]
31	Zinc	Digestion, Direct Air-Acetylene Flame Method ^[3]

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 25 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,6,14] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[6,14]
2	Antimony	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^[1,8] 2) Digestion, Direct Air-Acetylene Flame Method ^[4,8]
3	Arsenic	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[1,9] 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4,9]
4	Barium	1) Waste Extraction, Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[1,8] 2) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[4,8]
5	Beryllium	1) Waste Extraction, Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[1,8] 2) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ^[4,8]
6	Cadmium	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^[1,8] 2) Digestion, Direct Air-Acetylene Flame Method ^[4,8]
7	Chromium	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^[1,8] 2) Digestion, Direct Air-Acetylene Flame Method ^[4,8]
8	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^[1,10] 2) Digestion, Colorimetric Method ^[7,10]

9 Copper...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
9	Copper	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^[1,8]
10	DDD	2) Digestion, Direct Air-Acetylene Flame Method ^[4,8] 1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,5,14] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[6,14]
11	DDE	1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,5,14] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[6,14]
12	DDT	1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,5,14] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[6,14]
13	Dieldrin	1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,5,14] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[6,14]
14	Endrin	1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,5,14] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[6,14]
15	Heptachlor	1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,5,14] 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[6,14]
16	Lead	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^[1,8] 2) Digestion, Direct Air-Acetylene Flame Method ^[4,8]

17 Lindane...

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ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
17	Lindane	1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,5,14) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(6,14)
18	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1,11) 2) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(6,12)
19	Methoxychlor	1) Waste Extraction, Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,5,14) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(6,14)
20	Nickel	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^(1,8) 2) Digestion, Direct Air-Acetylene Flame Method ^(4,8)
21	pH	Electrometric Method ⁽¹⁶⁾
22	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(1,13) 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(6,13)
23	Silver	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^(1,8) 2) Digestion, Direct Air-Acetylene Flame Method ^(4,8)
24	Vanadium	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^(1,8) 2) Digestion, Direct Air-Acetylene Flame Method ^(4,8)
25	Zinc	1) Waste Extraction, Digestion, Direct Air-Acetylene Flame Method ^(1,8) 2) Digestion, Direct Air-Acetylene Flame Method ^(4,8)

ดิน...

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ดิน จำนวน 29 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
2	Antimony	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
3	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4,9]
4	Barium	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
5	Beryllium	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
6	Cadmium	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
7	Chromium	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
8	Chromium (III)	Digestion, Direct Air-Acetylene Flame, Colorimetric Method; Calculation ^[4,5,7,10]
9	Chromium (VI)	Digestion, Colorimetric Method ^[7,10]
10	Cyanide	Cyanide Extraction Method ^[15]
11	DDD	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
12	DDE	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
13	DDT	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
14	Dieldrin	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
15	Endrin	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
16	α -HCH	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
17	β -HCH	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
18	γ -HCH	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]

19 Heptachlor...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Heptachlor	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
20	Heptachlor epoxide	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
21	Lead	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
22	Manganese	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
23	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4,12]
24	Methoxychlor	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[6,14]
25	Nickel	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
26	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^[4,13]
27	Silver	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
28	Vanadium	Digestion, Direct Air-Acetylene Flame Method ^[4,8]
29	Zinc	Digestion, Direct Air-Acetylene Flame Method ^[4,8]

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สมชาย



ที่ อก ๐๓๑๐(๑)/ ๗๗๗ ๓

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๘ เมษายน ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท ศูนย์วิเคราะห์น้ำ จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒๙ มีนาคม ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท ศูนย์วิเคราะห์น้ำ จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-๑๙๐ สถานที่ตั้งเลขที่ ๑/๙๔ หมู่ที่ ๕ ตำบลคานหาม อำเภออุทัย จังหวัดพระนครศรีอยุธยา
ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๔ ราย

- | | |
|-----------------------------|----------------------------|
| ๑) นายจตุเมธ อินทรโสภาส | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๑๒ |
| ๒) นางสาวณิชา แก้วรุ่งฟ้า | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๒๒ |
| ๓) นางสาวสุราสินี หอมสวาท | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๒๓ |
| ๔) นางสาวเครือวัลลี สมภักษ์ | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๒๔ |

๒. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย

- | | |
|------------------------------|----------------------------|
| ๑) นางสาวอาภรณ์ แซ่เอื้อ | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๒๕ |
| ๒) นางสาวทิพรรัตน์ ทองเย็น | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๒๖ |
| ๓) นายนิเทศ พูลศรี | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๒๗ |
| ๔) นายจิตติวีร์ วงศ์หมากเห็บ | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๒๘ |
| ๕) นายกฤษณะ ธรรมชัย | ทะเบียนเลขที่ ว-๑๙๐-จ-๐๐๒๙ |

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการ
วิเคราะห์เอกชน คือในวันที่ ๑๖ มิถุนายน ๒๕๖๘ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้
ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายประสม ดำรงพงษ์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”





Ref No. : 0303/17008

CERTIFICATE OF TESTING LABORATORY ACCREDITATION

This is to certify that

Laboratory of Water Analysis Center Co., Ltd.
1/94 Moo 5, Tambon Kanharm, Amphoe U-Thai,
Changwat Phra Nakhon Si Ayutthaya 13210

has successfully undergone assessment according to ISO/IEC 17025 : 2017
and under the Bureau of Laboratory Accreditation, Department of Science Service
for the requirements, regulations and criteria for the competence of testing laboratories

LABORATORY ACCREDITATION
Accreditation Number TESTING - 0029
BLA-DSS

The scope of accreditation is as annexed hereto

Issue date : 7th November 2022
Expired date : 6th November 2026
Signature : 
(Mrs. Pochaman Tagheen)
Director of Bureau of Laboratory Accreditation

Bureau of Laboratory Accreditation, Department of Science Service,
Ministry of Higher Education, Science, Research and Innovation

Reference No. : 0303/17008

Scope of Testing Laboratory Accreditation

Laboratory Name : Laboratory of Water Analysis Center Co., Ltd.

Address : 1/94 Moo 5, Tambon Kanharm, Amphoe U-Thai,
Changwat Phra Nakhon Si Ayutthaya 13210

Accreditation Number : Testing - 0029

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
1	Bottled drinking water	- Chloride 6 mg/L to 1 000 mg/L - Total hardness (Calculated as CaCO₃) 5 mg/L to 2 000 mg/L - Total solids dried at 103 °C to 105 °C 25 mg/L to 4 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl⁻ B Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2340 C Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 B

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Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
1 (cont.)	Bottled drinking water	- Manganese 0.05 mg/L to 5 mg/L - Iron 0.10 mg/L to 5 mg/L - Cadmium 1 µg/L to 5 µg/L - Lead 10 µg/L to 50 µg/L - pH 6.0 to 8.0	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 3111 B, 3030 E Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 3113 B, 3030 E In - house method : TM 001 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500-H ⁺ B

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Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
2	Water	- pH 6.0 to 10.0 - Total suspended solids dried at 103 °C to 105 °C 10 mg/L to 1 000 mg/L - Total dissolved solids dried at 180 °C 25 mg/L to 4 000 mg/L	In - house method : TM 001 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-H⁺ B Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C

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Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
2 (cont.)	Water	- Cadmium 0.02 mg/L to 0.9 mg/L - Copper 0.05 mg/L to 5 mg/L - Zinc 0.05 mg/L to 5 mg/L - Chromium 0.05 mg/L to 5 mg/L - Nickel 0.10 mg/L to 4 mg/L - Manganese 0.05 mg/L to 5 mg/L - Lead 0.10 mg/L to 2 mg/L - Iron 0.10 mg/L to 5 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 3111 B, 3030 E

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Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
2 (cont.)	Water	- Water soluble silica (Calculated as SiO₂) 1.1 mg/L to 26 mg/L - Chloride 6 mg/L to 1 000 mg/L - Total hardness (Calculated as CaCO₃) 5 mg/L to 2 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-SiO₂ C Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-Cl B Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2340 C

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Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
2 (cont.)	Water	- BOD 2 mg/L to 500 mg/L - BOD 2 mg/L to 500 mg/L - COD 40 mg/L to 200 mg/L	In - house method : TM 041 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5210 B In - house method : TM 013 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5210 B, part 4500-O C Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5220 C

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Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
2 (cont.)	Water	- Total Kjeldahl Nitrogen 5 mg/L to 200 mg/L - Oil and grease 2 mg/L to 100 mg/L - Total solids dried at 103 °C to 105 °C 25 mg/L to 4 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500-NH ₃ C, part 4500-N _{org} B Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5520 D Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2540 B

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Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
2 (cont.)	Water	- Selenium 5 µg/L to 50 µg/L - Arsenic 5 µg/L to 50 µg/L - Barium 0.5 mg/L to 5 mg/L - Cadmium 1 µg/L to 5 µg/L - Lead 10 µg/L to 50 µg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3114 C Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3111 D, 3030 E Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 3113 B, 3030 E

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Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
3	Wastewater	- pH 4.0 to 10.0 - Total suspended solids dried at 103 °C to 105 °C 10 mg/L to 1 000 mg/L - Total dissolved solids dried at 180 °C 50 mg/L to 4 000 mg/L	In - house method : TM 001 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H⁺ B Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 D Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 2540 C

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 Accreditation Number : Testing - 0029
 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
3 (cont.)	Wastewater	- Cadmium 0.02 mg/L to 0.9 mg/L - Copper 0.05 mg/L to 5 mg/L - Zinc 0.05 mg/L to 5 mg/L - Chromium 0.05 mg/L to 5 mg/L - Nickel 0.10 mg/L to 4 mg/L - Manganese 0.05 mg/L to 5 mg/L - Lead 0.10 mg/L to 2 mg/L - Iron 0.10 mg/L to 5 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 3111 B, 3030 E

Initial Issue Date 23rd September 2008

Issue Number 13

Bureau of Laboratory Accreditation, Department of Science Service, Ministry of Higher Education, Science, Research and Innovation

LA-F-31-9/11-19

page 10/14

Reference No. : 0303/17008

Scope of Testing Laboratory Accreditation

Laboratory Name : Laboratory of Water Analysis Center Co., Ltd.

Address : 1/94 Moo 5, Tambon Kanharm, Amphoe U-Thai,
Changwat Phra Nakhon Si Ayutthaya 13210

Accreditation Number : Testing - 0029

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
3 (cont.)	Wastewater	- Total hardness (Calculated as CaCO_3) 5 mg/L to 2 000 mg/L - BOD 4 mg/L to 7 000 mg/L - BOD 4 mg/L to 7 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2340 C In - house method : TM 041 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5210 B In - house method : TM 013 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5210 B, part 4500-O C

Initial Issue Date 23rd September 2008 Issue Number 13

Bureau of Laboratory Accreditation, Department of Science Service, Ministry of Higher Education, Science, Research and Innovation

LA-F-31-9/11-19 page 11/14

Reference No. : 0303/17008

Scope of Testing Laboratory Accreditation

Laboratory Name : Laboratory of Water Analysis Center Co., Ltd.

Address : 1/94 Moo 5, Tambon Kanharm, Amphoe U-Thai,
Changwat Phra Nakhon Si Ayutthaya 13210

Accreditation Number : Testing - 0029

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
3 (cont.)	Wastewater	- COD 40 mg/L to 3 000 mg/L - Total Kjeldahl Nitrogen 5 mg/L to 200 mg/L - Oil and grease 2 mg/L to 1 000 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5220 C Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500-NH ₃ C, 4500-N _{org} B Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5520 D

Initial Issue Date 23rd September 2008

Issue Number 13

Bureau of Laboratory Accreditation, Department of Science Service, Ministry of Higher Education, Science, Research and Innovation

LA-F-319/11-19

page 12/14

Reference No. : 0303/17008

Scope of Testing Laboratory Accreditation

Laboratory Name : Laboratory of Water Analysis Center Co., Ltd.

Address : 1/94 Moo 5, Tambon Kanharm, Amphoe U-Thai,
Changwat Phra Nakhon Si Ayutthaya 13210

Accreditation Number : Testing - 0029

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
3 (cont.)	Wastewater	- Total solids dried at 103 °C to 105 °C 25 mg/L to 4 000 mg/L - Selenium 5 µg/L to 50 µg/L - Arsenic 5 µg/L to 50 µg/L - Barium 0.5 mg/L to 5 mg/L	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2540 B Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 3114 C Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 3111 D, 3030 E

Initial Issue Date 23rd September 2008

Issue Number 13

Bureau of Laboratory Accreditation, Department of Science Service, Ministry of Higher Education, Science, Research and Innovation

LA-F-31-9/11-19

page 13/14

Reference No. : 0303/17008

Scope of Testing Laboratory Accreditation

Laboratory Name : Laboratory of Water Analysis Center Co., Ltd.

Address : 1/94 Moo 5, Tambon Kanharm, Amphoe U-Thai,

Changwat Phra Nakhon Si Ayutthaya 13210

Accreditation Number : Testing - 0029

Laboratory Status : ☐ Permanent ☒ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test Item / Range of Testing	Test Method / Technique Used
4	Environmental noise	- Sound level Equivalent sound level $L_{eq,T}$ 30 dB (A) to 120 dB (A) Maximum sound level L_{max} 30 dB (A) to 120 dB (A)	In - house method : TM 201 based on ISO 1996-2 : 2017

Issue Date : 7th November 2022

Signature :



(Mrs. Pochaman Tagheen)

Director of Bureau of Laboratory Accreditation

Initial Issue Date 23rd September 2008

Issue Number 13

Bureau of Laboratory Accreditation, Department of Science Service, Ministry of Higher Education, Science, Research and Innovation



THC
Calibration Services

THAI HEART CALIBRATION CO., LTD.
112/1 Moo 5, Prachin-Sa-Muang, Samut Prakan 10280
Tel: 0-2394-2162, 0-2357-8158, 0-2757-8196 Fax: 0-2757-8507



ilac-MRA
ANAB
ACCREDITED
ISO/IEC 17025
CALIBRATION LABORATORY
AC-2695

CERTIFICATE OF CALIBRATION

Certificate No.: C0-1808005/23

Page 1 **of total** 4 **pages**

Customer WATER ANALYSIS CENTER CO., LTD.
1/94 Moo 5, T.Kanham,
A.U-thai, Ayutthaya 13210

Equipment pH Meter

Manufacturer METTLER TOLEDO

Serial No. B327527211

Description Range : 0 - 14 pH, Resolution : 0.01 pH

Model SevenCompact S220

ID No. WWL 0068

Environmental Conditions

Ambient Temperature: (20 ± 2) °C

Relative Humidity: (50 ± 10) %

Atmospheric Pressure: -

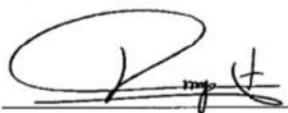
Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 18 August 2023

Calibration Date 18 August 2023

Date of Issue 21 August 2023

Condition of Artifacts Used conditions but can be calibrated



Checked by

Act as Technical Manager



Approved by

Representative of Managing Director

() (Krisyosl K.)

() (Patiphan K.)

() (Pongsak H.)

() (Kanung C.)

() (Pramong P.)

() (Sakda Y.)

(✓) (Onnapa P.)

() (Nitiphong K.)

() (Nonthachai K.)

() (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.

FE-169

REV.02 02/24/21



THAI HEART CALIBRATION CO., LTD.
112/1 Moo 5, Phase 5, Muang, Samut Prakan 10280
Tel. 0-28912162, 0-27578155, 0-27578196 Fax. 0-27578107



Certificate No.: C0-1808005/23

Page 2 of total 4 pages

Reference Method:

- The calibration method used was CP-178 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:

Type	pH Value	Lot No.	Due Date	Traceability
pH Standard Solution	4.01	030822	Feb. 9, 2024	NIMT
	7.01	300522	Feb. 9, 2024	
	10.01	230822	Feb. 7, 2024	

Type	Model	Serial No.	Certificate No.	Due Date	Traceability
Documenting Process Calibrator	754	2630521	I0-2412001/22	Dec. 23, 2023	THC
Digital Thermometer with Sensor	1523 / 5622	1709138 / 4605984-005	I0-0806001/23	Jun. 8, 2024	

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

- NIMT, National Institute of Metrology (Thailand).
- THC, Thai Heart Calibration Co., Ltd.

Measurement Results:

1. Function Simulated pH Meter

Standard Applied (mV)	Nominal Value (pH)	UUC Reading		Uncertainty (± mV)
		pH	mV	
177.48	4.00	4.01	177.4	0.060
0.00	7.00	7.00	0.0	0.060
-177.48	10.00	10.01	-177.4	0.060

UUC : Unit Under Calibration

Note : Adjust Curve to simulate pH (4,7,10)

FE-169

Calibrated by Kittipong
REV.02 02/24/21



Page 3 of total 4 pages

2. Calibration of pH Electrode (Serial No.: 3222623)

Temperature stability of micro bath : $25 \pm 0.2^\circ\text{C}$

FE-169

Calibrated by Kittipong
REV.02 02/24/21



THC
Calibration Services

THAI HEART CALIBRATION CO., LTD
112/1 Moo 5, Phrae Sa Muang, Samu Prakan 10380
Tel. 0-2394-2162, 0-2757-8453, 0-2757-8496 Fax. 0-2757-8507




Certificate No.: C0-1808005/23

Page 4 of total 4 pages

Reference Method:

- The calibration method used was CP-096 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	Model	Serial No.	Cert. No.	Due Date	Traceability
Thermometer Readout	1529-R	B7C853	I0-0911001/22	Nov. 9, 2023	THC
Platinum Resistance Thermometer	5626	4854	C0A30047	Oct. 22, 2023	FLUKE
Liquid Bath	XORTS-40A	XO111019	I0-2405001/23	May 25, 2025	THC

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

- THC, Thai Heart Calibration Co., Ltd.
- FLUKE, Fluke Comporation, U.S.A.

Measurement Results: (X) Without Adjustment

Dimension of probe : Diameter 4 mm. Sensor Type : RTD (PT100)

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
120	22.00	22.2	-0.20	0.065
120	25.00	25.2	-0.20	0.065
120	28.00	28.2	-0.20	0.065

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 -

FE-169



Calibrated by Pongsak
REV.02 02/24/21



Master Calibration Co., Ltd.

547 Soi Ratchadaniwat, Kwaeng Samsennok, Khet Huaykwang, Bangkok 10310

Tel. : (02) 274 2978-9, (02) 2742987-8 Fax : (02) 274 2518, (02) 274 2989

Website : www.mastercalibration.com E-mail : calibrate@mastercalibration.com

Certificate of Calibration

TEMPERATURE CONTROLLER ENCLOSURES



Certificate No.: MC 2307702

Page 1 of 3



Customer : Water Analysis Center Co., Ltd.
1/94 Moo 5, T.Kantham, A.U-Thai, Ayutthaya 13210.

Reference Job No. : 23-1577 Received Date : 11 July 2023

Description : Refrigerator

Manufacturer : SANDEN INTERCOOL Model : SEC-1500SBD

Serial No. : SEC1500201A-0708-00304 ID. No. : WWL0038

Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number (MC 2307702) has been attached to the case.

Method : In-House calibration procedure MWI-T-033 this method is reference to TLAS G-20 "Temperature Controlled Enclosures".

Location of Calibration : Water Analysis Center Co., Ltd. ; Laboratory.

Environmental Conditions : Ambient Temperature : (25.3 to 25.9) °C
Relative Humidity : (65.2 to 67.9) %

Date of Calibration : 11 July 2023 Date of Issue : 12 July 2023

Checked by : Thanagorn
Thanagorn Limchaicharoen
(Calibration Supervisor)

Approved by : Aittipong
Aittipong Kanjanawasit
(Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the conditions of accreditation granted by the National Standardization Council of Thailand-Office of the National Standardization Council that has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of Master Calibration Co., Ltd.

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]



547 Soi Ratchadaniwat, Kwaeng Samsenok, Khet Huaykwang, Bangkok 10310
Tel. : (02) 274 2978-9, (02) 2742987-8 Fax : (02) 274 2518, (02) 274 2989
Website : www.mastercalibration.com E-mail : calibrate@mastercalibration.com

Certificate No.: MC 2307702

Page 2 of 3

The Reference Standard Instrument :

Description	Certificate No.	Serial No.	Due date	Traceable thru
Data Acquisition/Switch Unit With Thermocouple Type "T" ID. No.17/1 to 17/9	MC 2303173	MY41010916	9 Mar 2024	MCAL

Traceability :

The measurement standard traceable to the international system of units (SI) through certificate as mentioned above

1. Calibration Procedure:

This Instrument was calibration according to TLAS G-20 by comparison with calibrated thermocouple type T under no load condition. The Thermocouples were placed on nine points and located one thermocouple 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 thermocouple within 2.5 cm of the geometric center of the chamber.

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. The reference sensor should preferably be located at the geometric center of the chamber.

Temperature Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

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

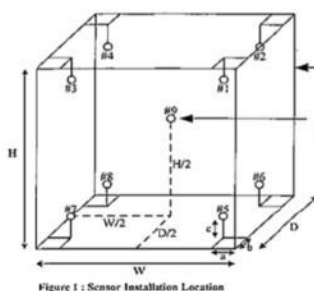


Figure 1 : Sensor Installation Location

Overall Ambient Temperature around the Chamber variation : 3.2 °C

Overall Line Voltage variation : 0.1 V

Chamber Size (W*H*D) : 171 cm x 157 cm x 60 cm

Checked by : *Thanagim*

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]



547 Soi Ratchadaniwat, Kwaeng Samsenok, Khet Huaykwang, Bangkok 10310
Tel. : (02) 274 2978-9, (02) 2742987-8 Fax : (02) 274 2518, (02) 274 2989
Website : www.mastercalibration.com E-mail : calibrate@mastercalibration.com

Certificate No.: MC 2307702

Page 3 of 3

2. Result of calibration :

Temperature Measurement Accuracy Test

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. #9	
2.5	4.4	4.2	4.2	4.2	4.0	3.9	4.1	4.0	3.8	0.86

Chamber Characterization Result

Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
2.0	2.5	1.50	1.01	3.3

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 %.

This certificate will certify of the calibrated equipment only.

End of Certificate

Checked by : *Thanagorn*

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]



THAI HEART CALIBRATION CO., LTD.

112/1 Moo 5, Phase 3, Wang Saeng Samut Prakan 10230

Tel. 0-2394-2162, 0-2757-3466, 0-2757-3467 Fax. 0-2757-3517



CERTIFICATE OF CALIBRATION

Certificate No.: C0-1907007/23

Page 1 of total 2 pages

Customer WATER ANALYSIS CENTER CO., LTD.

1/94 Moo 5, T.Kanham,

A.U-thai, Ayutthaya 13210

Equipment Conductivity Meter

Manufacturer EUTECH

Model CON 2700

Serial No. 2657889

ID No. WWL 0136

Description -

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$

Relative Humidity: $(50 \pm 10) \%$

Atmospheric Pressure: -

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 19 July 2023

Calibration Date 19 July 2023

Date of Issue 20 July 2023

Condition of Artifacts Used conditions but can be calibrated

Checked by

Act as Technical Manager

Approved by

Representative of Managing Director

() (Krisyosl K.)

() (Sakda Y.)

(Dr. Ekachai Puttitwong)

() (Patiphan K.)

(✓) (Onnapa P.)

() (Pongsak H.)

() (Nitiphong K.)

() (Kanung C.)

() (Nonthachai K.)

() (Pramong P.)

() (Noppol P.)

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FE-169

REV.02 02/24/21



THC
Calibration Services

THAI HEART CALIBRATION CO., LTD.
112/1 Moo 5, Phad Sai Muang, Samut Prakan 10230
Tel. 0 2304 2132, 0 2757 3435, 0 2757 3494, 0 2757 3507




Certificate No.: C0-1907007/23 **Page 2 of total 2 pages**

Reference Method:

- The calibration method used was CP-177 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 :

Material	Batch Value	Lot Number	Due Date	Traceability
Conductivity Standard Solution	147.8 $\mu\text{S/cm}$	S220611005	Dec. 6, 2023	SCP Science
	1.425 mS/cm	S220812006	May 31, 2024	

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

- SCP Science.

Measurement Results: (Probe Serial No. : 93X219065)

Conductivity Standard Solution	Measured Value	Correction	Uncertainty ($\pm$)
147.8 $\mu\text{S/cm}$	147.5 $\mu\text{S/cm}$	0.3 $\mu\text{S/cm}$	2.5 $\mu\text{S/cm}$
1.425 mS/cm	1.427 mS/cm	-0.002 mS/cm	0.0051 mS/cm

Note : Adjustment points: 147.8 $\mu\text{S/cm}$ 1.425mS/cm

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 -

FE-169

Calibrated by Onnapa

REV.02 02/24/21



Automation

AUTOMATION SERVICE CO.,LTD.
CALIBRATION LABORATORY

SV 201005/2024

Cert. No. WAC-065

Page 1 of 2

CERTIFICATE OF CALIBRATION

Instrument : DO Meter Machine : -
Model : DO-31P Location : -
Serial No. : 780065
Manufacturer : TOA-DKK
Measuring Range : 0.00 ~ 20.00 mg/l

Customer : Water Analysis Center Co.,Ltd.
1/94 Moo.5 T.Kanham, A.U-Thai
Ayutthaya 13210 Thailand

Date Of Received : 11 / 01 / 2024
Date Of Calibration : 11 / 01 / 2024

Ambient Condition : Temperature 26 °C
Humidity 58 % RH

Calibrated By :

P. Yooyen
(Ms. Phanee Yooyen)
Technician

Approved By :

N. Phung
(Mr. Nipon Phungsomsak)
Technical Manager

Date Of Issue : 15 / 01 / 2024

This Certificate may not be reproduced other than in full, except with
the prior written approval of the head of the industrial instruments
calibration center.



Automation

AUTOMATION SERVICE CO.,LTD.

CALIBRATION LABORATORY

Instrument : DO Meter

Model : DO-31P

Serial No. : 780065

Cert. No. WAC-065

Page 2 of 2

Calibrate Procedure

- ☐ This instrument was calibrated by comparison with standard solution (PH/ORP)
- ☐ This instrument was calibrated by comparison with scattering plate value (Turbidity)
- ☐ This instrument was calibrated by comparison with conductivity (Conductivity)
- ☒ This instrument was calibrated by comparison with Sodium sulfite anhydrous (DO)

Condition of this result of calibration

1). Reference Standard Solution

Standard	Lot No	Batch.	Cert. No.	Due Date
Sodium Sulfite Power	408K1405	-	-	-

2). Traceability This certification is traceable to

- ☒ Kanto Chemical Co.,INC.
- ☐ DKK Corporation

Result Of Calibration

Standard Solution (mg/l) at 25.7°C		Before Adjust		After Adjust	
		Indicator	Error	Indicator	Error
Zero	0.00	0.10	+ 0.10	0.00	-
Span	8.02	6.45	- 1.57	8.02	-

DO Electrode No. OE270AA(5) S/N 111F0029

Calibrated By P. Yooyen
(Ms. Phanee Yooyen)
Technician



Inctech Metrological Center Co.Ltd.

39/1 Soi 82, Sukhapiban 5 Rd., O ngoen,

Saimai, Bangkok 10220, Thailand

Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com



Calibration Cert. # 3884.01
ISO/IEC 17025

Certificate of Calibration

Certificate No. : MT24-3208

Page : 1 of 2

Customer : Water Analysis Center Co.,Ltd.

Address : 1/94 M.5, Rojana Industrial Park, T.Kanham, A.U-Thai, Ayutthaya 13210

Description : Hot Air Oven

Manufacturer : Memmert

Model : UF 260

Serial No. : B620.0814

Identification No. : WWL 0212

Calibration Place : Customer Laboratory

Order No. : 1152/24

Received date : Mar 22, 2024

Calibration date : Mar 22, 2024

Environment Condition :

Temperature : (25+/-10) °C

Humidity : (50+/-30) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure CP-MT-006 According to comparison with LXI Data Acquisition Switch Unit with sensor. The calibration methods based on Euramet Calibration Guide No.20 - guidelines on the Calibration of Temperature and/or Humidity Controlled Enclosures.

Reference Standard Instruments :

<u>Instrument</u>	<u>Model</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
LXI Data Acquisition Switch Unit with Sensor	34972A	MY49020096	MT23-7163	Nov 30, 2024

The effect that the result relate only to the items calibrated. It was found accurate as shown on date and place of calibration only.

Traceability : This measurement are traceable to the International System of Unit (SI), through National Institute of Metrology Thailand (NIMT)

The reported expanded uncertainty of measurement was based on standard uncertainty multiplied by coverage factor 2, providing a level of confidence of not less than 95%



Calibrated by : Mr.Yuttakorn Jamneansri

Approved by :

(Mr.Panuwat Phuklan)

Issue date : Apr 10, 2024

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Rev.03 / Feb 2024

FM-MT-013



Inctech Metrological Center Co.Ltd.

39/1 Soi 82, Sukhapiban 5 Rd., O ngoen,

Saimai, Bangkok 10220, Thailand

Tel. (662) 909-8820 (Auto 10 lines) www.imcinstrument.com



Calibration Cert. # 3884.01
ISO/IEC 17025

Certificate No. : MT24-3208

Page : 2 of 2

Function : Temperature measurement

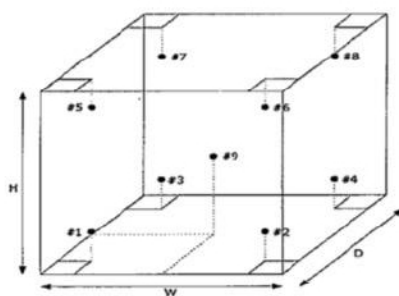
Result : Without adjustment

Calibration point : 104, 180 °C

Resolution : 0.1 °C

Calibration point (°C)	Temperature of UUC* at each position (°C)									Uncertainty of measurement (+/- °C)
	Ch.1	Ch.2	Ch.3	Ch.4	Ch.5	Ch.6	Ch.7	Ch.8	Ch.9	
104	103.494	103.933	103.871	103.988	103.990	104.081	103.843	104.217	104.022	0.45
180	179.985	179.953	180.047	179.985	179.908	180.088	180.065	180.273	180.105	0.54

Setting temperature (°C)	Indicating Temperature (°C)	Measured stability (+/- °C)	Measured uniformity (°C)	Overall variation (°C)
104.0	104.0	0.34	0.66	1.3
180.0	180.0	0.41	0.86	1.2



- #1 Lower Left Front
- #2 Lower Right Front
- #3 Lower Left Rear
- #4 Lower Right Rear
- #5 Upper Left Front
- #6 Upper Right Front
- #7 Upper Left Rear
- #8 Upper Right Rear
- #9 Geometric Center

Front view

UUC* = Unit under calibration

Uniformity = Maximum and Minimum difference of measured temperature at any probes and the measured temperature at the reference and same time.

Overall Variation = Difference of temperature value between the maximum and minimum any time.

Stability = One half of the maximum difference of measured temperatures at any one probe.

-oOo-

Rev.03 / Feb 2024

FM-MT-013



Certificate of Calibration

Equipment:	Balance	Certificate No.:	C01241754
Model:	BL 210S	Issued Date:	05 June 2024
Serial No. (or ID.):	15808131 (WWL 0022)	Job No.:	WO-00030302
Manufacturer:	Sartorius	Page:	1 of 2
Condition:	In condition		

Customer: Water Analysis Center Co., Ltd.
1/94 Moo 5, Rojana Industrial Park, Rojana Road,
Tambol Kanham, Amphur U-Thai, Ayutthaya 13210 Thailand

Environment Condition: Temperature 26 °C ± 0.2 °C
Humidity 50 %RH ± 2.6 %RH

Calibration Place: Water Analysis Center Co., Ltd. (ห้างเคซีอิงซิ่ง)
1/94 Moo 5, Rojana Industrial Park, Rojana Road,
Tambol Kanham, Amphur U-Thai, Ayutthaya 13210 Thailand

Calibration By: Mr. Polawad Ruamirup

Calibration Date: 05 June 2024

The Method used: In-house method, CAL-WI-47, based on UKAS Lab 14

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02240400

(Mr. Polawad Ruamirup)

Person in charge

(Mr. Rungrod Jenkitrakulchai)

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 DKSH Technology Limited.

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Certificate No.: C01241754

Page: 2 of 2

Calibration Results:

Without 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	
-	0.0000	0.0001	0.0000	-0.0002	

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

Nominal test value (g)	Standard Deviation
20	0.00004
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
1	1.00001	1.0000	0.0000	0.00011	2.04
2	2.00002	2.0000	0.0000	0.00011	2.04
5	5.00002	5.0000	0.0000	0.00011	2.04
10	10.00001	10.0000	0.0000	0.00011	2.04
20	20.00001	20.0000	0.0000	0.00012	2.03
50	50.00003	50.0000	0.0000	0.00013	2.02
70	70.00004	70.0000	0.0000	0.00016	2.01
100	99.99996	100.0001	0.0001	0.00017	2.01
120	119.99997	120.0002	0.0002	0.00021	2.00
150	149.99999	150.0002	0.0002	0.00024	2.00
200	199.99996	200.0004	0.0004	0.00030	2.00

The End of Certificate

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Certificate of Calibration

LIQUID BATH



Certificate No.: MC 2314268

Page 1 of 3



Customer : Water Analysis Center Co., Ltd.
1/94 Moo 5, T.Kantham, A.U-Thai, Ayutthaya 13210.

Reference Job No. : 23-2833 Received Date : 15 December 2023

Description : Water Bath

Manufacturer : ESSTELL Model : EWB-122D

Serial No. : 20180508122 ID. No. : WWL 0214

Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number (MC 2314268) has been attached to the case.

Method : In-House calibration procedure MWI-T-029 this method is reference to ASTM E715 "Liquid Bath".

Location of Calibration : Water Analysis Center Co., Ltd. ; Laboratory.

Environmental Condition : Ambient Temperature : (29.4 to 29.8) °C
Relative Humidity : (49.0 to 52.0) %

Date of Calibration : 15 December 2023 Date of Issue : 19 December 2023

Checked by : Chalermkit
Chalermkit Rakphada
(Calibration Engineer)

Approved by : Aittipong
Aittipong Karjjanasit
(Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the conditions of accreditation granted by the National Standardization Council of Thailand-Office of the National Standardization Council that has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of Master Calibration Co.,Ltd.

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]



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Certificate No.: MC 2314268

Page 2 of 3

Reference Standard Instrument :

Description	Certificate No.	Serial No.	Due date	Traceable thru
Data Acquisition/Switch Unit With Thermocouple Type " T " ID. No.27/1 to 27/5	MC 2301270	MY44020009	9 Mar 2024	MCAL

Traceability :

The measurement standard traceable to the international system of units (SI) through certificate as mentioned above

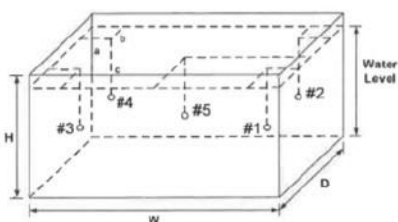
1. Calibration Procedure:

This Instrument was calibration according to ASTM E715 - 2007 by comparison with calibrated sensor under no load condition. The sensor were placed on five points and located one sensor in each of the eigh corners of the chamber and was away from the each wall of 5 cm to 10 cm. And placed the five sensor within 2.5 cm of the geometric center of the chamber.

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. The reference sensor should preferably be located at the geometric center of the chamber.

Temperature Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

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



- Overall Ambient Temperature around the Chamber variation : 1.3 °C
- Overall Line Voltage variation : 0.0 V
- Chamber Size (W*H*D) : 50 cm x 12 cm x 30 cm
- Water Level : 7 cm

Checked by : Chalemkai

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]



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Website : www.mastercalibration.com E-mail : calibrate@mastercalibration.com

Certificate No.: MC 2314268

Page 3 of 3

2. Result of calibration :

Temperature Measurement Accuracy Test

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations					Uncertainty (±°C)
	#1	#2	#3	#4	Ref. #5	
45.0	44.5	44.4	44.5	44.5	44.6	0.45

Chamber Characterization Result

Desired Temperature (°C)	Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
44.5	45.0	45.0	0.62	0.88	1.5

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2.0$, providing a level of confidence of approximately 95 %.

This certificate will certify of the calibrated equipment only.

End of Certificate

Checked by : *Chalermsak*

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]



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Certificate of Calibration

TEMPERATURE CONTROLLER ENCLOSURES



Certificate No.: MC 2314270

Page 1 of 3



Customer : Water Analysis Center Co., Ltd.
1/94 Moo 5, T.Kantham, A.U-Thai, Ayutthaya 13210.

Reference Job No. : 23-2833 Received Date : 15 December 2023

Description : Incubator

Manufacturer : Memmert Model : IN260

Serial No. : D619.0170 ID. No. : WWL 0192

Marking : Additionally for the purpose of identification by this laboratory a label marked with this certificate number (MC 2314270) has been attached to the case.

Method : In-House calibration procedure MWI-T-033 this method is reference to TLAS G-20 "Temperature Controlled Enclosures".

Location of Calibration : Water Analysis Center Co., Ltd. ; Laboratory.

Environmental Conditions : Ambient Temperature : (25.2 to 25.6) °C
Relative Humidity : (65.4 to 66.2) %

Date of Calibration : 15 December 2023 Date of Issue : 19 December 2023

Checked by : Chalermkit
Chalermkit Rakphada
(Calibration Engineer)

Approved by : Aittipong
Aittipong Kahjansawat
(Technical Manager)

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the conditions of accreditation granted by the National Standardization Council of Thailand-Office of the National Standardization Council that has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of Master Calibration Co.,Ltd.

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Certificate No.: MC 2314270

Page 2 of 3

Reference Standard Instrument :

Description	Certificate No.	Serial No.	Due date	Traceable thru
Data Acquisition/Switch Unit With Thermocouple Type " T " ID. No.31/1 to 31/9	MC 2214032	MY41029992	26 Dec 2023	MCAL

Traceability :

The measurement standard traceable to the international system of units (SI) through certificate as mentioned above

1. Calibration Procedure:

This Instrument was calibration according to TLAS G-20 by comparison with calibrated thermocouple type T under no load condition. The Thermocouples were placed on nine points and located one thermocouple in each of the eigh corners of the chamber and was away from the each wall of 5 cm to 10 cm. And placed the ninth thermocouple within 2.5 cm of the geometric center of the chamber.

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. The reference sensor should preferably be located at the geometric center of the chamber.

Temperature Stability - one-half of the greatest maximum difference of measured temperatures at any one sensor.

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

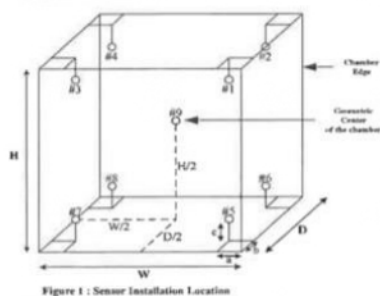


Figure 1 : Sensor Installation Location

Overall Ambient Temperature around the Chamber variation : 0.4 °C

Overall Line Voltage variation : 0.0 V

Chamber Size (W*H*D) : 65 cm x 80 cm x 50 cm

Checked by : Chalermkit

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]



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Website : www.mastercalibration.com E-mail : calibrate@mastercalibration.com

Certificate No.: MC 2314270

Page 3 of 3

2. Result of calibration :

Temperature Measurement Accuracy Test

Indicating Temperature (°C)	Measured Temperature (°C) at Spread Locations									Uncertainty (±°C)
	#1	#2	#3	#4	#5	#6	#7	#8	Ref. #9	
35.0	35.2	35.2	35.2	35.2	35.1	35.1	35.0	35.1	35.1	0.44

Chamber Characterization Result

Desired Temperature (°C)	Controller Temperature (°C)	Indicating Temperature (°C)	Temperature Stability (±°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	35.0	35.0	0.13	0.21	0.4

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 %.

This certificate will certify of the calibrated equipment only.

End of Certificate

Checked by : *Chalemkrit*

[MCF-Q-077 ; Rev.6 ; Date : 22/04/2021]