ภาคผนวกที่ 4

สำเนาเอกสารขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด



ที่ อก ๐๓๑๐(๑)/ ๗ ๓ ๒๕

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๙ กรกฎาคม ๒๕๖๔

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๓๐ มีนาคม ๒๕๖๔

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๒ แผ่น
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๒ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ขอต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๙๙ สถานที่ตั้งเลขที่ ๒๕/๑๑๔ หมู่ที่ ๖ ซอยชินเขต ๑ ถนนงามวงศ์วาน แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๔๙ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๒๗ รายการ น้ำใต้ดิน จำนวน ๕๘ รายการ อากาศเสีย จำนวน ๒๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๒๐ รายการ และดิน จำนวน ๕๖ รายการ รวมทั้งสิ้นจำนวน ๑๘๗ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๑๘ พฤษภาคม ๒๕๖๗ หากประสงค์จะต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อกรมโรงงานอุตสาหกรรมภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางจินดา เตชะศรินทร์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ
โทร. ๐ ๒๒๐๒ ๔๐๐๒ ๐ ๒๒๐๒ ๔๑๔๖
โทรสาร ๐ ๒๓๕๔ ๓๔๑๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๙๙
ที่ อก ๐๓๑๐(๑)/๗๓๒๕ ลงวันที่ ๒๙ กรกฎาคม ๒๕๖๔

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖ ราย

๑) นางสาวปณิชา พรมชัย	ทะเบียนเลขที่ ว-๐๙๙-ค-๒๔๑๔
๒) นางณัฐรดา เลี้ยงรักษา	ทะเบียนเลขที่ ว-๐๙๙-ค-๓๐๐๒
๓) นายมงคล บูรภักดิ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๕๕๐๐
๔) นางสาวธนิดา บุญรุ่งเรือง	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๐๒๓
๕) นางสาวรมิตา แตงไทย	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๖๖๔
๖) นางสาวไรวินทร์ โพธิ์สิทธิ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๖๖๕
๗) นางสาวณัฐนิชา เสริมมติวงศ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๖๖๖
๘) นายนพสิทธิ์ ทวีพรประดิษฐ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๗๖๖๗
๙) นางสาวธิดารัตน์ ปุกคะ	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๑
๑๐) นายอภิชาติ พูลพล	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๒
๑๑) นายนิทัศน์ ศิริชาติ	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๓
๑๒) นายสุทธิชาญ สังข์ทอง	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๔
๑๓) นางสาวยุวดี ณ ระนอง	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๕
๑๔) นางสาววาสนา ขันเงิน	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๖
๑๕) นางสาวสุภาวรรณ สุวรรณภา	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๗
๑๖) นางสาวนภาจรัส หมื่นวงษ์	ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๘

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอ็นไวรอนเมน์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๙๙
ที่ อก ๐๓๑๐(๑)/ ลงวันที่

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๔๙ ราย

๑) นางสาวเปรมวดี ปุรีไธสง ทะเบียนเลขที่ ว-๐๙๙-จ-๕๔๐๒
๒) นางสาวจิตตวรรณ ลิ้มสมบูรณ์ ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๒๖
๓) นางสาวธนัชพร คนแรง ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๒๙
๔) นางสาวสุดารัตน์ เขจรรักษ์ ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๓๗
๕) นางสาววลิตา โพธิ์เจริญ ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๔๒
๖) นางสาวรัชนีวรรณ ภูประเสริฐ ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๔๔
๗) นายภาณุพล โพธิ์แดง ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๔๕
๘) นายวันชนะ สีหามาตร ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๐
๙) นายโสพล ป้อยแก้ว ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๔
๑๐) นายอภิวัฒน์ ชำนาญเวช ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๖
๑๑) นางสาวอชิรญาณัฐ อ่อนน้อม ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๑
๑๒) นายวัชรางกูร กองแสง ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๒
๑๓) นางสาวสุธาทิพย์ อิ่มน้อย ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๓
๑๔) นายชยณัฐ บุญก้านตง ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๕
๑๕) นางสาวพิชาดา เขียวนรภัย ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๖
๑๖) นางสาวสายใจ ลาดบัวขาว ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๐
๑๗) นางสาวรัตนาภรณ์ วงศ์ประโคน ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๒
๑๘) นางสาวจารุวรรณ แป้นจำนงค์ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๓
๑๙) นางสาวชมพูนุท กสิชีวิน ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๕
๒๐) นางสาวรวีวรรณ สุขารมย์ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๖
๒๑) นางสาวนัฐภรณ์ กันสุข ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๗
๒๒) นางสาวอรอนงค์ นวนนุ่ม ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๘
๒๓) นางสาวสรวรรณ พุฒพันมาต ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๙
๒๔) นางสาวกัญญาลักษณ์ กระทาง ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๑
๒๕) นางสาวปิยธิดา ประแดงโค ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๓
๒๖) นางสาวปวิตรา นาเหล็ก ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๔
๒๗) นางสาวชนิดา นิลผาย ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๕
๒๘) นางสาวพิยะดา จารุไชย ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๖
๒๙) นางสาวทักษพร ไกรสิงห์ ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๗
๓๐) นางสาวฉวีวรรณ บุญจันทึก ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๘
๓๑) นางสาวเบญจวรรณ คำหงษา ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๙
๓๒) นางสาวพัชชา แก้วย้อย ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๐
๓๓) นางสาวณัฐชา สัมฤทธิ์ดี ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๑
๓๔) นางสาวอังคนา อุ่นตา ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๓
๓๕) นางสาวบุศดี มุภาษา ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๔

๓๖) นายรอมซี...

๓๖) นายรอมซี กาเต๊ะ	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๕
๓๗) นายสุริยะ ชูทอง	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๖
๓๘) นายศักรินทร์ นิภานันท์	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๗
๓๙) นายอภิเดช ยาสมดี	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๘
๔๐) นายฉันทวิชญ์ เหลวกูล	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๙
๔๑) นายศิวาวุธ ธรรมนิทา	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๐
๔๒) นายนัฐพล สุทธิมล	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๑
๔๓) นายอาทิตย์ นุชบุษบา	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๒
๔๔) นายอนุวัฒน์ เรืองอ่อน	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๔
๔๕) นายฉัตรชัย โยวะผุย	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๕
๔๖) นายกลยุทธ์ อินทร์คำ	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๗
๔๗) นางสาวนันทชา เนื้อนวล	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๔๘
๔๘) นางสาวพิไลวรรณ แปงทา	ทะเบียนเลขที่ ว-๐๙๙-จ-๙๕๒๑
๔๙) นางสาวจารุวรรณ กระจ่างพันธุ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๙๕๒๒

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอ็นไวรอนเมน์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๙๙
ที่ อก ๐๓๑๐(๑)/ ลงวันที่

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๑๘๗ รายการ

น้ำเสีย จำนวน 27 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[3] 2) Digestion, Inductively Coupled Plasma Method[3]
2	Barium	Digestion, Inductively Coupled Plasma Method[3]
3	Biochemical Oxygen Demand	1) 5-Day BOD Test, Azide Modification Method[3] 2) 5-Day BOD Test, Membrane Electrode Method[3]
4	Cadmium	Digestion, Inductively Coupled Plasma Method[3]
5	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method[3]
6	Chromium	Digestion, Inductively Coupled Plasma Method[3]
7	Color	ADMI Weighted-Ordinate Spectrophotometric Method[3]
8	Copper	Digestion, Inductively Coupled Plasma Method[3]
9	Cyanide	Distillation, Colorimetric method[3]
10	Formaldehyde	Distillation, Colorimetric Method[2]
11	Free Chlorine	1) Iodometric Method[3] 2) DPD Colorimetric Method[3]
12	Hexavalent Chromium	Colorimetric Method[3]
13	Lead	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method[3] 2) Digestion, Inductively Coupled Plasma Method[3]
14	Manganese	Digestion, Inductively Coupled Plasma Method[3]
15	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[3]
16	Nickel	Digestion, Inductively Coupled Plasma Method[3]
17	Oil & Grease	Liquid-Liquid, Partition-Gravimetric Method[3]
18	pH	Electrometric Method[3]
19	Phenols	Distillation, Direct Photometric Method[3]
20	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[3] 2) Digestion, Inductively Coupled Plasma Method[3]
21	Sulfide	Iodometric method[3]

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22 Temperature...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
22	Temperature	Laboratory and Field Methods[3]
23	Total Dissolved Solids	Dried at 180 °C[3]
24	Total Kjeldahl Nitrogen	1) Macro Kjeldahl Method[3] 2) Semi-Micro Kjeldahl Method[3]
25	Total Suspended Solids	Dried at 103-105 °C[3]
26	Trivalent Chromium	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[3]
27	Zinc	Digestion, Inductively Coupled Plasma Method[3]

น้ำใต้ดิน จำนวน 58 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acetone	Purge and Trap 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	Digestion, Inductively Coupled Plasma Method[3]
5	Benzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
6	Beryllium	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	Digestion, Inductively Coupled Plasma Method[3]
10	Carbon Disulfide	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
11	Carbon Tetrachloride	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
12	Chlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
13	Chlorodibromomethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]

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14 Chloroform...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Chloroform	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
15	Chromium	Digestion, Inductively Coupled Plasma Method[3]
16	Chromium (III)	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation[3]
17	Chromium (VI)	Colorimetric Method[3]
18	Cyanide	Colorimetric Method[3]
19	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
20	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[[3]
21	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
22	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
23	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
24	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
25	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
26	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
27	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
28	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
29	1,3-Dichloropropene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
30	Ethylbenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
31	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]

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32 Lead...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
32	Lead	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method[3] 2) Digestion, Inductively Coupled Plasma Method[3]
33	Manganese	Digestion, Inductively Coupled Plasma Method[3]
34	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[3]
35	Methyl Bromide	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
36	Methylene Chloride	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
37	Methyl Tert-Butyl Ether	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
38	Naphthalene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
39	Nickel	Digestion, Inductively Coupled Plasma Method[3]
40	pH	Electrometric method[3]
41	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[3] 2) Digestion, Inductively Coupled Plasma Method[3]
42	Silver	Digestion, Inductively Coupled Plasma Method[3]
43	Styrene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
44	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
45	Tetrachloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
46	Toluene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
47	1,2,4-Trichlorobenzene	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]

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50 Trichloroethylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
50	Trichloroethylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
51	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
52	Vanadium	Digestion, Inductively Coupled Plasma Method[3]
53	Vinyl Chloride	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
54	m-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
55	o-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
56	p-Xylene	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
57	Xylene (Total)	Purge and Trap Gas Chromatographic/ Mass spectrometric Method[3]
58	Zinc	Digestion, Inductively Coupled Plasma Method[3]

<u>อากาศเสีย (ปล่องระบาย) จำนวน 26 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
2	Arsenic	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
3	Beryllium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
4	Cadmium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
5	Carbon Monoxide	Instrumental Analyzer Method[4]
6	Chlorine	1) Absorption Sampling, Ion Chromatographic Method[4] 2) Isokinetic Sampling, Ion Chromatographic Method[4]

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7 Chromium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
7	Chromium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
8	Cobalt	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
9	Copper	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
10	Dioxin/Furans	Isokinetic Sampling[4]
11	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method[4] 2) Isokinetic Sampling, Ion Chromatographic Method[4]
12	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method[4] 2) Isokinetic Sampling, Ion Chromatographic Method[4]
13	Hydrogen Sulfide	Absorption Sampling, Iodometric Method[4]
14	Lead	1) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method[4] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
15	Manganese	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
16	Mercury	Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[4]
17	Nickel	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
18	Opacity	Ringelmann's Method[1]
19	Oxide of Nitrogen	1) Absorption Sampling, Phenoldisulfonic acid Method[4] 2) Instrumental Analyzer Method[4]
20	Selenium	1) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[4] 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]

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21 Sulfur...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
21	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method[4] 2) Isokinetic Sampling, Barium-Thorin Titrimetric Method[4] 3) Instrumental Analyzer Method[4]
22	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method[4]
23	Tin	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
24	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method[4]
25	Vanadium	Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method[4]
26	Xylene	Adsorption Sampling, Gas Chromatographic Method[4]

<u>สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 20 รายการ</u>

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	Digestion, Inductively Coupled Plasma Method[5,8]
2	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5,9] 2) Digestion, Inductively Coupled Plasma Method[5,8]
3	Barium	Digestion, Inductively Coupled Plasma Method[5,8]
4	Beryllium	Digestion, Inductively Coupled Plasma Method[5,8]
5	Cadmium	Digestion, Inductively Coupled Plasma Method[5,8]
6	Chromium	Digestion, Inductively Coupled Plasma Method[5,8]
7	Chromium (III)	Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method[5,6,8,10]
8	Chromium (VI)	Alkaline Digestion, Colorimetric Method[6,10]
9	Cobalt	Digestion, Inductively Coupled Plasma Method[5,8]
10	Copper	Digestion, Inductively Coupled Plasma Method[5,8]
11	Lead	Digestion, Inductively Coupled Plasma Method[5,8]
12	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[11]
13	Molybdenum	Digestion, Inductively Coupled Plasma Method[5,8]
14	Nickel	Digestion, Inductively Coupled Plasma Method[5,8]

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15 pH...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	pH	Electrometric Method[14]
16	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5,12] 2) Digestion, Inductively Coupled Plasma Method[5,8]
17	Silver	Digestion, Inductively Coupled Plasma Method[5,8]
18	Thallium	Digestion, Inductively Coupled Plasma Method[5,8]
19	Vanadium	Digestion, Inductively Coupled Plasma Method[5,8]
20	Zinc	Digestion, Inductively Coupled Plasma Method[5,8]

ดิน จำนวน 56 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
2	Antimony	Digestion, Inductively Coupled Plasma Method[5,8]
3	Arsenic	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5,9] 2) Digestion, Inductively Coupled Plasma Method[5,8]
4	Barium	Digestion, Inductively Coupled Plasma Method[5,8]
5	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
6	Beryllium	Digestion, Inductively Coupled Plasma Method[5,8]
7	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
8	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
9	Cadmium	Digestion, Inductively Coupled Plasma Method[5,8]
10	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
11	Carbon Tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
12	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
13	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]

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14 Chloroform...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
14	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
15	Chromium	Digestion, Inductively Coupled Plasma Method[5,8]
16	Chromium (III)	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation Method[5,7,9,11]
17	Chromium (VI)	Alkaline Digestion, Colorimetric Method[7,11]
18	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
19	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
20	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
21	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
22	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
23	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
24	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
25	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
26	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
27	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
28	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
29	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
30	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
31	Lead	Digestion, Inductively Coupled Plasma Method[5,8]
32	Manganese	Digestion, Inductively Coupled Plasma Method[5,8]
33	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method[11]

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34 Methyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
34	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
35	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
36	Methyl Tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
37	Naphthalene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
38	Nickel	Digestion, Inductively Coupled Plasma Method[5,8]
39	Selenium	1) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method[5,12] 2) Digestion, Inductively Coupled Plasma Method[5,8]
40	Silver	Digestion, Inductively Coupled Plasma Method[5,8]
41	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
42	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
43	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
44	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
45	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
46	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
47	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
48	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
49	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
50	Vanadium	Digestion, Inductively Coupled Plasma Method[5,8]
51	Vinyl Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]

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52 m-Xylene...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
52	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
53	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
54	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
55	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method[7,13]
56	Zinc	Digestion, Inductively Coupled Plasma Method[5,8]

<u>เอกสารอ้างอิง</u>

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ที่ อก ๐๓๑๐(๑)/ ๒๐๓๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๑๐ กุมภาพันธ์ ๒๕๖๕

เรื่อง เปลี่ยนแปลงสารมลพิษที่วิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๒๔ ธันวาคม ๒๕๖๔

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด จำนวน ๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๙๙ สถานที่ตั้งเลขที่ ๒๕/๑๑๔ หมู่ที่ ๖ ซอยชินเขต ๑ ถนนงามวงศ์วาน แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพมหานคร ขอเปลี่ยนแปลงสารมลพิษที่วิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้วให้ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เพิ่มขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในดิน ตามสิ่งที่ส่งมาด้วย

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ที่ อก ๐๓๑๐(๑)/๗๓๒๕ ลงวันที่ ๒๙ กรกฎาคม ๒๕๖๔ คือในวันที่ ๑๘ พฤษภาคม ๒๕๖๗ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางจินดา เตชะศรินทร์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

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

เอกสารแนบท้ายหนังสือเปลี่ยนแปลงสารมลพิษที่วิเคราะห์
บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด เลขทะเบียน ว-๐๙๙
ที่ อก ๐๓๑๐(๑)/ ๒๐๓๙ ลงวันที่ ๑๐ กุมภาพันธ์ ๒๕๖๕

ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓ รายการ

ดิน จำนวน 3 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	TPH (C_5 – C_8)	Purge and Trap, Gas Chromatographic Method[2,3]
2	TPH ($C_{>8}$ – C_{16})	Ultrasonic Extraction, Gas Chromatographic Method[1,3]
3	TPH ($C_{>16}$ – C_{35})	Ultrasonic Extraction, Gas Chromatographic Method[1,3]

เอกสารอ้างอิง

1. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Ultrasonic Extraction. SW-846 Method 3550C**, 2007.

2. United States Environmental Protection Agency. Test Methods for Evaluation Solid Waste Physical/Chemical Methods. **Closed System Purge and Trap and Extraction for Volatile Organics in Soil and Waste Sample. SW-846 Method 5035A**, 2002.

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



ที่ อก ๐๓๑๐(๑)/ ๑๑๕๖๗

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๔ สิงหาคม ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด

อ้างถึง ๑. คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน ลงวันที่ ๑๑ สิงหาคม ๒๕๖๕
๒. หนังสือบริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ลงวันที่ ๑๑ สิงหาคม ๒๕๖๕

ตามหนังสือที่อ้างถึง ๑ และ ๒ บริษัท เอ็นไวรอนเมนท์ รีเสริช แอนด์ เทคโนโลยี จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๐๙๙ สถานที่ตั้งเลขที่ ๒๕/๑๑๔ หมู่ที่ ๖ ซอยชินเขต ๑ ถนนงามวงศ์วาน แขวงทุ่งสองห้อง เขตหลักสี่ กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๙ ราย

๑) นายโสพล ป้อยแก้ว	ทะเบียนเลขที่ ว-๐๙๙-จ-๗๐๕๔
๒) นางสาวอชิรญาณัฐ อ่อนน้อม	ทะเบียนเลขที่ ว-๐๙๙-จ-๗๖๗๑
๓) นางสาวรัตนาภรณ์ วงศ์ประโคน	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๒
๔) นางสาวสรวรรณ พุฒพันมาต	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๑๙
๕) นางสาวพิยะดา จารุไชย	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๖
๖) นางสาวฉวีวรรณ บุญจันทึก	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๒๘
๗) นายศักรินทร์ นิภานันท์	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๗
๘) นายอภิเดช ยาสมดี	ทะเบียนเลขที่ ว-๐๙๙-จ-๘๘๓๘
๙) นางสาวพิไลวรรณ แปงทา	ทะเบียนเลขที่ ว-๐๙๙-จ-๙๕๒๑

๒. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๕ ราย

๑) ว่าที่ร้อยตรีหญิงภัทรนันท์ วิจิตรศักดิ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๑
๒) นางสาวณัฏฐณิชา ขาวสุทธิ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๒
๓) นางสาวเพชราภรณ์ พงษ์พันธ์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๓
๔) นางสาวพัทธนันท์ คำยา	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๔
๕) นางสาวสุธิดา ทองประภา	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๕
๖) นางสาวรมย์ชลี เดือนแร่รัมย์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๖
๗) นายจิรยุทธ์ สามารถ	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๗
๘) นายอัษฎา ไชยวงค์	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๘
๙) นางสาวณัฐริสา บุญหนัก	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๐๙
๑๐) นางสาวสุพัตรา สุนทร	ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๐

๑๑) นายพงศ์ปวีร์...

๑๑) นายพงศ์ปวีร์ สัตระ ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๑
๑๒) นายนฤดม โชติกาญจน์ ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๒
๑๓) นางสาวพรทิพย์ อัมภรัตน์ ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๓
๑๔) นางสาวจันทนี ปิติพัทธ์พงศ์ ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๔
๑๕) นายอัครวัฒน์ คชบก ทะเบียนเลขที่ ว-๐๙๙-จ-๐๐๑๕

๓. ให้เปลี่ยนชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จากเดิมนางสาววาสนา ขันเงิน ทะเบียนเลขที่ ว-๐๙๙-ค-๘๘๐๖ เป็น นางสาวถิรณัฏฐ์ ขันเงิน

๔. ให้เปลี่ยนชื่อ-สกุลเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จากเดิมนางสาวเปรมวดี ปุริไธสง ทะเบียนเลขที่ ว-๐๙๙-จ-๕๔๐๒ เป็น นางเตชินี สืบเสระ

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ที่ อก ๐๓๑๐(๑)/๗๓๒๕ ลงวันที่ ๒๙ กรกฎาคม ๒๕๖๔ คือในวันที่ ๑๘ พฤษภาคม ๒๕๖๗ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นางจินตา เตชะศรินทร์)
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์

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

ภาคผนวกที่ 5

เอกสารสอบเทียบเครื่องมือตรวจวัด

envi_research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

Environment Research & Technology Company Limited
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210
Tel. 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
www.enviresearch.co.th

Calibration Report

Customer Name : Korachindustry Co., Ltd.
Address : 138 Moo 18, Nong Rawiang, Phimai, Nakhon Ratchasima 30110
Project Name : โรงไฟฟ้าชีวมวลโครงการ 3 (SPP Hybrid Firm)
Sampling Date : มกราคม – มิถุนายน, 2566

Stack

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
1	Console Meter	APEX 1	XC-572V	0306016	September 23, 2022
2	Console Meter	APEX 4	XC-572V	1602011	July 21, 2022
3	Flue Gas Analyzer	Testo SE & Co. KGaA	Testo 350 New	62227989	January 27, 2023
4	Flue Gas Analyzer	Testo SE & Co. KGaA	Testo 350 New	60534802	July 20, 2022
5	Flue Gas Analyzer	Testo SE & Co. KGaA	0632 3511	03599831	August 26, 2022
6	DIGITAL THERMOMETHER	Testo SE & Co. KGaA	305	N0005658	January 9, 2023
7	Electronic Balance	Ohaus	SCOUT PRO SP2001	B224021411	January 13, 2023
8	Electronic Balance	AND	BM-5	TI004302	January 4, 2023

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Tel. 0-2954-7745-6 Fax 0-2954-7747
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Calibration Report

Customer Name : Korachindustry Co., Ltd.
Address : 138 Moo 18, Nong Rawiang, Phimai, Nakhon Ratchasima 30110
Project Name : โรงไฟฟ้าชีวมวลโครงการ 3 (SPP Hybrid Firm)
Sampling Date : มกราคม – มิถุนายน, 2566

Ambient

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
1	TSP High-volume No. A8	Thermo Andersen	HIVOL-BBCBE	3680	February 17, 2023
2	TSP High-volume No. A7	Thermo Andersen	HIVOL-BBCBE	B-NO.A7	February 17, 2023
3	TSP High-volume No. A17	Thermo Andersen	HIVOL-BBCBE	2014-02	February 17, 2023
4	TSP High-volume No. A3	Thermo Andersen	HIVOL-BBCBE	704	February 17, 2023
5	TSP High-volume No. A23	Thermo Scientific	HIVOL-BBCBE	2055	June 7, 2023
6	TSP High-volume No. A8	Thermo Andersen	HIVOL-BBCBE	3680	June 7, 2023
7	TSP High-volume No. A29	Thermo Scientific	HIVOL-BBCBE	2214	June 7, 2023
8	TSP High-volume No. A20	Thermo Scientific	HIVOL-BBCBE	2142	June 7, 2023
9	High-volume PM-10 No. 10	Thermo Andersen	HIVOL-BMBBE	610-047	February 17, 2023
10	High-volume PM-10 No. 2	Thermo Andersen	HIVOL-BMBBE	0604-417	February 17, 2023
11	High volume PM-10 No. 18	Thermo Scientific	HIVOL-BMBBE	2139	February 17, 2023
12	High-volume PM-10 No. 15	Andersen Instrument	HIVOL-BMBBE	2012-04	February 17, 2023
13	High-volume PM-10 No. 5	Thermo Andersen	HIVOL-BMBBE	2015-5	June 7, 2023
14	High-volume PM-10 No. 13	Andersen Instrument	HIVOL-BMBBE	B2012-01	June 7, 2023
15	High-volume PM-10 No. 12	GRASEBY	HIVOL-BMBBE	B2012-10	June 7, 2023
16	Orifice	TISCH Environmental	TE-5025A	3362	January 17, 2023
17	Orifice	TISCH Environmental	TE-5025A	3883	January 17, 2023

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Calibration Report

Customer Name : Korachindustry Co., Ltd.
Address : 138 Moo 18, Nong Rawiang, Phimai, Nakhon Ratchasima 30110
Project Name : โรงไฟฟ้าชีวมวลโครงการ 3 (SPP Hybrid Firm)
Sampling Date : มกราคม – มิถุนายน, 2566

Ambient

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
18	Electronic Balance	Mettler Toledo	AB204-S	1123103723	January 17, 2023
19	NOx Analyzer	HORIBA	APNA-370	KPACV8NA	February 17, 2023
20	NOx Analyzer	HORIBA	APNA-370	J6GUBA4N	February 17, 2023 and June 7, 2023
21	NOx Analyzer	HORIBA	APNA-370	NKDVYFRX	February 17, 2023
22	NOx Analyzer	API	200A	56	February 17, 2023
23	NOx Analyzer	HORIBA	APNA-370	NGABK8F2	June 7, 2023
24	NOx Analyzer	HORIBA	APNA-370	A4LUUFHB	June 7, 2023
25	NOx Analyzer	HORIBA	APNA-370	4VWFEBUK	June 7, 2023
26	SO_2 Analyzer	HORIBA	APSA-370	J000EMWB	February 17, 2023
27	SO_2 Analyzer	Thermo	43C	0335804022	February 17, 2023
28	SO_2 Analyzer	Thermo	43c	73370-373	February 17, 2023
29	SO_2 Analyzer	HORIBA	APSA-370	X7L602W6	February 17, 2023
30	SO_2 Analyzer	HORIBA	APSA-370	JH9GS3FU	June 7, 2023
31	SO_2 Analyzer	Thermo	43C	0335804029	June 7, 2023
32	SO_2 Analyzer	HORIBA	APSA-370	V4HC9062	June 7, 2023
33	SO_2 Analyzer	HORIBA	APSA-370	12E8X34P	June 7, 2023

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Toongsonghong, Laksi, Bangkok 10210
Tel. 0-2954-7745-6 Fax 0-2954-7747
E-mail : envi@enviresearch.co.th
www.enviresearch.co.th

Calibration Report

Customer Name : Korachindustry Co., Ltd.
Address : 138 Moo 18, Nong Rawiang, Phimai, Nakhon Ratchasima 30110
Project Name : โรงไฟฟ้าชีวมวลโครงการ 3 (SPP Hybrid Firm)
Sampling Date : มกราคม – มิถุนายน, 2566

Ambient

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
34	CO Analyzer	Horiba	APMA-370	YKAC090F	February 17, 2023
35	CO Analyzer	Horiba	APMA-370	4N02XP27	February 17, 2023
36	CO Analyzer	Horiba	APMA-370	C06YT0NC	February 17, 2023
37	CO Analyzer	Horiba	APMA-370	JHG8PWA8	February 17, 2023 and June 7, 2023
38	CO Analyzer	Horiba	APMA-370	WNTLD9N8	June 7, 2023
39	CO Analyzer	Horiba	APMA-370	HXA8A4TG	June 7, 2023
40	CO Analyzer	Horiba	APMA-360	577583094	June 7, 2023
41	WS/WD NO.10	Davis Instruments	Wizard III	WE91016A20	February 9, 2022
42	WS/WD NO.14	Davis Instruments	Wizard III	WC90504A18	August 20, 2022
43	Acoustic Calibrator	RION	NC-73	10876348	January 4, 2023
44	Acoustic Calibrator	Quest Technologies	QC-10	QE2080089	July 4, 2022
45	Acoustic Calibrator	LARSON DAVIS	CAL200	2903	February 21, 2023
46	Acoustic Calibrator	Quest Technologies	QC-10	QE8100348	November 14, 2022
47	Sound Level Meter	Scarlet	ST-21D	820453	February 16, 2023
48	Sound Level Meter	Scarlet	ST-21D	820444	February 16, 2023
49	Sound Level Meter	Scarlet	ST-21D	820452	February 16, 2023

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Calibration Report

Customer Name : Korachindustry Co., Ltd.
Address : 138 Moo 18, Nong Rawiang, Phimai, Nakhon Ratchasima 30110
Project Name : โรงไฟฟ้าชีวมวลโครงการ 3 (SPP Hybrid Firm)
Sampling Date : มกราคม – มิถุนายน, 2566

Ambient

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
50	Sound Level Meter	Scarlet	ST-21D	820468	February 16, 2023
51	Sound Level Meter	Scarlet	ST-21D	820462	February 16, 2023
52	Sound Level Meter	Scarlet	ST-21D	820466	February 16, 2023 and June 6, 2023
53	Sound Level Meter	Scarlet	ST-21D	820458	February 16, 2023
54	Sound Level Meter	Scarlet	ST-21D	820447	February 16, 2023
55	Sound Level Meter	Rion	NL-21	00788083	February 16, 2023
56	Sound Level Meter	Scarlet	ST-21D	820470	February 16, 2023 and June 6, 2023
57	Sound Level Meter	Scarlet	ST-21D	820453	February 16, 2023 and June 6, 2023
58	Sound Level Meter	Scarlet	ST-21D	820444	February 16, 2023 and June 6, 2023
59	Sound Level Meter	ACO	6236	222109	February 17, 2023
60	Sound Level Meter	ACO	6236	222121	February 17, 2023
61	Noise Dose Meter	EXTECH	SL400	180200301	February 17, 2023
62	Noise Dose Meter	EXTECH	SL400	180200315	February 17, 2023
63	Sound Level Meter	Scarlet	ST-11D	820869	June 6, 2023
64	Sound Level Meter	Scarlet	ST-21D	820463	June 6, 2023
65	Sound Level Meter	Scarlet	ST-11D	820863	June 6, 2023

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Calibration Report

Customer Name : Korachindustry Co., Ltd.
Address : 138 Moo 18, Nong Rawiang, Phimai, Nakhon Ratchasima 30110
Project Name : โรงไฟฟ้าชีวมวลโครงการ 3 (SPP Hybrid Firm)
Sampling Date : มกราคม – มิถุนายน, 2566

Ambient

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
66	Sound Level Meter	Scarlet	ST-11D	820867	June 6, 2023
67	Sound Level Meter	Scarlet	ST-21D	820469	June 6, 2023
68	Sound Level Meter	Scarlet	ST-21D	820454	June 6, 2023
69	Sound Level Meter	ACO	6226	160111	May 6, 2023
70	Sound Level Meter	ACO	6226	180066	May 6, 2023
71	Noise Dose Meter	EXTECH	SL400	190800236	May 6, 2023
72	Noise Dose Meter	EXTECH	SL400	180200304	May 6, 2023

Workplace

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
1	Heat Stress Monitor	Metrosonics	Hs – 32	MCH110038	August 16, 2022
2	Heat Stress Monitor	Quest	QT - 32	MCD070019	September 15, 2022
3	Heat Stress Monitor	Metrosonics	Hs – 32	MCH110063	July 25, 2022
4	Heat Stress Monitor	Metrosonics	Hs – 32	MCD050029	October 5, 2022
5	Digital Lux Meter	EXTECH	407026	048465	August 29, 2022
6	Digital Lux Meter	EXTECH	407026	048597	August 2, 2022

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Calibration Report

Customer Name : Korachindustry Co., Ltd.
Address : 138 Moo 18, Nong Rawiang, Phimai, Nakhon Ratchasima 30110
Project Name : โรงไฟฟ้าชีวมวลโครงการ 3 (SPP Hybrid Firm)
Sampling Date : มกราคม – มิถุนายน, 2566

Workplace

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
7	Dry Cal	Bios International	DCL-ML	108398	December 15, 2022
8	Electronic Balance	AND	BM-5	TI004302	January 4, 2023
9	Incubator	Memmert	IF 160	D522.0070	January 4, 2023
10	Incubator	Aqualytic	AL 185 KAT	12220 0105	January 4, 2023

Water

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
1	pH Meter	WTW	inoLab pH 730	10510388	January 5, 2023
2	DO Meter	YSI	5000-115	17H104220	October 26, 2022
3	Incubator	Sanyo	MIR-254	1103017	December 12, 2022
4	UV-VIS Spectrophotometer	PerkinElmer	ERTC-L-In-180	365PK22072603	January 4, 2023
4	ICP-OES	Agilent Technologies	G8011A	MY15330001	November 29, 2022
5	Atomic Absorption Spectrometer	PerkinElmer	PinAAcle 900Z	PZAS19031401	June 30, 2023

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Calibration Report

Customer Name : Korachindustry Co., Ltd.
Address : 138 Moo 18, Nong Rawiang, Phimai, Nakhon Ratchasima 30110
Project Name : โรงไฟฟ้าชีวมวลโครงการ 3 (SPP Hybrid Firm)
Sampling Date : มกราคม – มิถุนายน, 2566

Water

Item	Equipment	Manufacturer	Model	Serial Number	Calibration Date
6	Electronic Balance	Mettler Toledo	MS204S	B334691537	January 17, 2023
7	Hot Air Oven	Memmert	UF110	B414.0652	January 4, 2023
8	Hot Air Oven	Binder	FED 115 E2	11-22823	January 4, 2023
9	Conductivity Meter	HM DIGITAL	COM-100	PONPE5860865	December 27, 2022
10	Incubator	Ehret	BK 4106	22162	January 4, 2023
11	Incubator	Memmert	IF 160	D522.0070	January 5, 2023

(Ms.Napajarut Muenwong)
Environmental Scientist

envi research
ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

(Ms.Panicha Promchai)
Laboratory Supervisor

Certificate of Calibration

Method 5 Pre-Test Calibration - Liters (L)

UUT Meter Console Information

Model #:	572
Serial #:	0306016
DGM Model #:	SK25EX
DGM Serial #:	00005305

Calibration Conditions

Bar. Pressure (mm Hg):	758.3
Ambient Temperature (°C):	24.3
Relative Humidity (%):	74.3
Altitude (m):	1.83
Bar. Pressure Corr. (mm Hg):	758.2

Factors/Conversions

Std. Temp. (K):	293.15
Std. Press. (mm Hg):	760
K_1 (K/mm Hg):	0.3857

Reference Equipment

Calibration Meter Model:	DGMR-200H
Cal. Due Date:	03-Jun-23
Serial No.:	0000026
Gamma:	1.0000

UUT Meter (DGM) / **Reference Meter (WTM)**

Run Time (seconds)	Orifice, ΔH (mm H2O)	UUT Meter (DGM) Volume			UUT Meter (DGM) Meter Temperature (°C)		Meter Pressure (in H2O)	Reference Meter (WTM) Volume (L)			Reference Meter (WTM) Outlet Temperature (°C)	
		Initial (L)	Final (L)	Total (L)	Initial	Final		Initial	Final	Total	Initial	0.00
Θ	$P_{m(g)}$	V_{mi}	V_{mf}	V_m	t_{mi}	t_{mf}	P_w	V_{wi}	V_{wf}	V_w	t_{wi}	t_{wf}
840.00	13.00	349453.8	349626.0	172.2	24.0	24.0	0.3	0.00	172.75	172.75	24.0	24.0
630.00	25.00	349626.0	349804.0	178.0	24.0	25.0	0.5	0.00	177.97	177.97	24.0	24.0
450.00	50.00	349804.0	349981.2	177.2	25.0	26.0	0.6	0.00	177.50	177.50	24.0	24.0
360.00	80.00	349981.2	350159.6	178.4	26.0	26.0	2.0	0.00	179.25	179.25	24.0	24.0
300.00	120.00	350159.6	350339.6	180.0	26.0	27.0	2.4	0.00	180.48	180.48	24.0	24.0

Standardized Data

Reference Meter (L)		UUT Meter (L)		Correction Factor		ΔH @ (mm H2O)	
Std. Vol.	Std. Flow	Std. Vol.	Std. Flow	Value	Variation	0.0212 SCMM	Variance
$V_{w(std)}$	$Q_{w(std)}$	$V_{m(std)}$	$V_{w(std)}$	Y	ΔY	ΔH@	ΔΔH@
170.14	12.15	169.68	12.2	1.0027	-0.0014	39.2	-1.513
175.36	16.70	175.31	16.7	1.0003	-0.0038	39.9	-0.780
174.94	23.33	174.36	23.3	1.0034	-0.0007	40.9	0.212
177.28	29.55	175.75	29.5	1.0087	0.0046	41.1	0.428
178.67	35.73	177.71	35.7	1.0054	0.0013	42.4	1.653
				1.0041	**= Y Avg.**	**40.7**	**= ΔH@ Avg.**

Metric

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

Note: For $\Delta H_@$, orifice pressure differential that equates to 0.0212m^3/min at standard temperature and pressure, acceptable tolerance of individual values from the average is +-0.2inches (5.1mm) H_20.

Pass/Fail Judgment : **Pass**

Calibrate By : Pattamaporn P.

Appproved By:

Date: 23 Sep 22

The instruments listed and described on this certificate have been calibrated against standards traceable to the National Institute of Standards and Technology (N.I.S.T.) and in reference to EPA Method 5, Section 10.3.1.

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Certificate of Calibration - Supplemental

Nomenclature

P_{bar} - Barometric Pressure
DGM - Dry Gas Meter
K_1 - Constant based on standard temp and press
Θ - Run time, in minutes
$P_{m(g)}$ - ΔH (Meter Pressure, gauge)
V_w - Volume collected by test meter, corrected for STP
$Q_{w(std)}$ - Calculated flow rate of test meter
K' - Critical orifice coefficient
P_m - Measured pressure of reference meter
T_m - Temperature measured in reference meter

Equations

$$V_{w(std)} = Y * K_1 \frac{V_w * (P_{bar} + \frac{P_{m(g)}}{13.6})}{T_w}$$

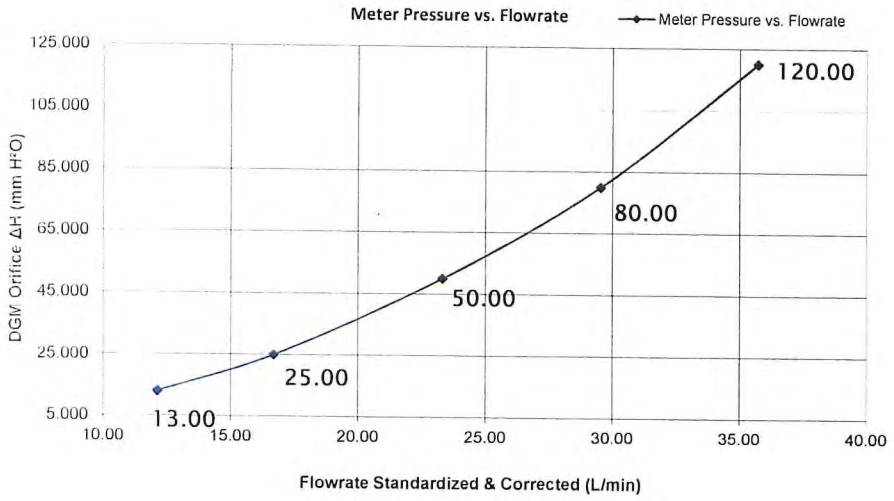
$$V_{m(std)} = \frac{K_1 V_m (P_{bar} + \frac{\Delta H}{13.6})}{T_m}$$

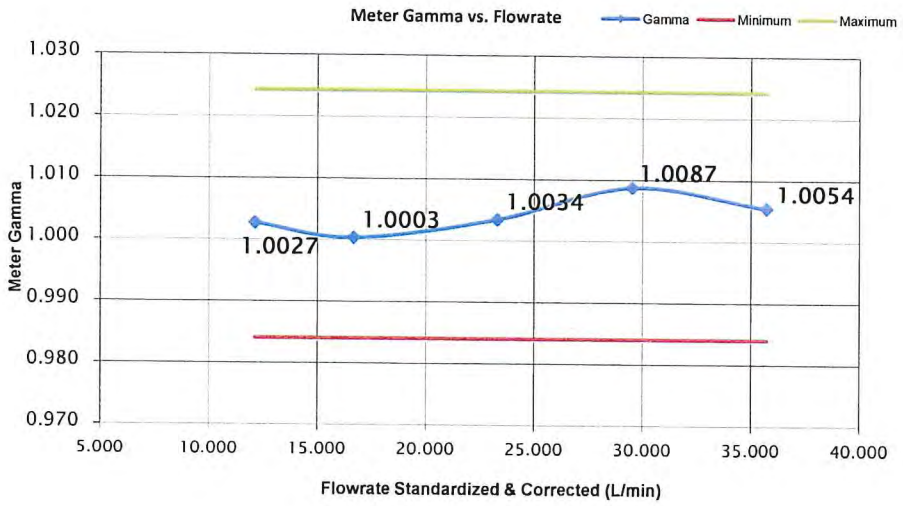
$$K_1 = \frac{T_{std}}{P_{std}} \qquad Y = \frac{V_{cr(std)}}{V_{m(std)}} \qquad Q_{w(std)} = \frac{V_{w(std)}}{\Theta}$$

$$Metric\ \Delta H_@ = \frac{P_{m(g)} * 0.0011696 * (P_{bar} + \frac{P_{m(g)}}{13.6})}{T_m} * \left(\frac{T_w * \Theta}{V_w * P_{bar}}\right)^2$$

Calibration Train







Certificate of Calibration

Method 5 Console Sensor Calibration - Metric Units

Console Information

Model #:	572
Serial #:	0306016
Units:	Metric

Calibration Conditions

Pbar (mm. Hg):	758.3
Tamb (°C):	24.3
Humidity (%):	74.3
Elevation (m):	1.8
Corr. Pbar (mm. Hg):	758.2

Reference Devices

TC Calibrator Model:	CC-VTR-SH
Reference #:	091109269
Barometer Model:	736930
Reference #:	EBARODIALSPE01
Pressure Model:	718 30G
Reference #:	9543013

Temperature Display Calibration Data

Reference Point[1]	Reference Temp.	Test Thermocouple Calibrations					Reference Point Status[2]
		Probe	Stack	Filter	Exit	Aux	
#	°C	°C	°C	°C	°C	°C	*Pass/Fail*
1	-18	-17	-18	-19	-18	-18	PASS
2	38	39	37	37	37	36	PASS
3	93	95	93	94	92	92	PASS
4	149	150	149	150	148	148	PASS
5	260	261	259	261	258	258	PASS
6	371	373	371	372	371	370	PASS
7	482	484	482	483	481	481	PASS
8	593	594	593	595	593	592	PASS
9	816	817	816	817	815	815	PASS
10	1038	1040	1039	1040	1037	1038	PASS
							PASS
							Overall Audit Status

NIST Reference Thermocouple ID:

	Ref Point	Theoretical Temp.	DGM Thermocouple Sensor Reading	ΔT_{abs}[4]
	#	°C	°C	°C
Ice Water	1	0.1	0	0.04%
Ambient[3]	2	24.3	24	0.06%
			Maximum[2]	0.06%
			Status	PASS

Internal temperature thermocouple is not audited to EPA standards, and should not be used as an official reference for ambient temperature.

Calibrate By : Pattanayan P. Appproved By: Date 23 Sep 22

Notes

[1] Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

[2] For valid test results, the maximum difference between temperature and reference readings should be less than ±5.4 °F (±3 °C), for all thermocouples except for the stack thermocouple which should be less than ±1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than ±2 °F (±1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

[3] Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

[4] Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

[5] For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ±0.1 in. Hg (±2.5 mm Hg). (EPA Method 5, Section 6.1.2)

[6] For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.5 in. Hg (±12.5 mm Hg)

[7] For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.05 in. H2O (±1.25 mm H2O), or 5% of full scale

Neediss Supply Instrument Co.,Ltd.

Console Sensor Calibration Data Sheet

Console Information

Model #: 572
Serial #: 0306016
Units: Metric
Type: "English"

Calibration Conditions

Pbar (mm. Hg):	758.3
Tamb (°C):	24.3
Humidity (%):	74.3
Altitude (m)	1.8
Corr. Pbar (mm. Hg):	758.2

Reference Devices

TC Simulator Model:	CC-VTR-SH
Reference #:	091109269
Barometer Model:	736930
Reference #:	EBARODIALSPE01
Digital Pressure Calibrator Model:	718 30G
Reference #:	3891001

Pressure Gauge / Manometer Calibration Data

Console Vacuum Calibration			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status[6]
#	*in. Hg*	*in. Hg*	*Pass/Fail*
1	-5.0	-5.5	PASS
2	-10.0	-10.5	PASS
3	-20.0	-20.5	PASS

Reference Point[1]	ΔH_Manometer Calibration			Reference Point Status[2]
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	*mm H2O*	*mm H2O*	*mm H2O*	*Pass/Fail*
1	-200.000	0.0	-202.0	PASS
2	-150.000	0.0	-150.0	PASS
3	-100.000	0.0	-100.0	PASS
4	-80.000	0.0	-80.0	PASS
5	-50.000	0.0	-50.0	PASS
6	0.000	0.0	0.0	PASS
7	50.000	50.0	0.0	PASS
8	80.000	80.0	0.0	PASS
9	100.000	100.0	0.0	PASS
10	150.000	150.0	0.0	PASS
11	200.000	200.0	0.0	PASS
			ΔH Overall Audit Status	PASS

Reference Point[1]	ΔP_Manometer Calibration			Reference Point Status[2]
	Reference	Positive (+) Pitot	Negative (-) Pitot	
#	*mm H2O*	*mm H2O*	*mm H2O*	*Pass/Fail*
1	-200.000	0.0	-200.2	PASS
2	-150.000	0.0	-150.2	PASS
3	-100.000	0.0	-100.2	PASS
4	-80.000	0.0	-80.2	PASS
5	-50.000	0.0	-50.2	PASS
6	0.000	0.0	0.0	PASS
7	50.000	50.0	0.0	PASS
8	80.000	80.2	0.0	PASS
9	100.000	100.0	0.0	PASS
10	150.000	150.2	0.0	PASS
11	200.000	200.2	0.0	PASS
			ΔP Overall Audit Status	PASS

Calibrate By : Pattanapan P. Appproved By: _____ Date: 23 Sep 22

Notes

[1] Suggested, minimum reference points are 10 (0, 100, 200, 300, 500, 700, 900, 1100, 1500, 1900 °F), can test for more.

[2] For valid test results, the maximum difference between temperature and reference readings should be less than ±5.4 °F (±3 °C), for all thermocouples except for the stack thermocouple which should be less than ±1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than ±2°F (±1 °C) from the reference

[3] Do not change this cell value, it is instead based on input from Cell H8 at the top of this sheet under "Calibration Conditions"

[4] Absolute temperature difference and other formulas are calculated based on unit input from cell C8 at the top of this sheet under "Meter Console Information"

For valid test results, the maximum difference between console and reference barometric pressure readings should be less than ±0.1 in. Hg (±2.5 mm Hg). (EPA Method 5, Section 6.1.2

[6] For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.5 in. Hg (±12.5 mm Hg)

[5] For valid test results, the maximum difference between console and reference vacuum readings should be less than ±0.05 in. H2O (±1.25 mm H2O), or 5% of full scale

I certify that the above Thermocouple Sensors were calibrated in accordance with US EPA Methods 2 and 5, CFR 40 Part 60

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Neediss Supply Instrument Co.,Ltd.

Console Sensor Audit QA Sheet

Meter Console Information (UUT)

Model #:	572
Serial #:	0306016
Units:	Metric

Calibration Conditions

Pbar (mm. Hg):	758.3
Amb. Temp. (°C):	24.3
Humidity (%):	74.3
Altitude (m):	1.8
Corrected Pbar (mm. Hg):	758.2

Reference Devices

TC Simulator Model:	CC-VTR-SH
Reference #:	91109269
Barometer Model:	369307
Reference #:	EBARODIALSPE01
Digital Pressure Calibrator Model:	718 30G
Reference #:	9543013

Audit Data

Reference Point	Reference Temp.	Thermocouple Probe Audit						Reference Point Status[1]
		Aux	Stack	Probe	Oven	Filter	Exit	
	°C	°C	°C	°C	°C	°C	°C	*Pass/Fail*
Room	24.3	25	24	24	24	24	23	PASS
Ice Water	0.2	1	0	0	0	0	0	PASS

Console Vacuum Audit			
Reference Point	Reference Vacuum	Console Vacuum	Reference Point Status[3]
#	*in. Hg*	*in. Hg*	*Pass/Fail*
1	-17.0	-17.5	PASS

Calibrate By: Pattanapan P. Appproved By: _____ Date: 23 Sep 22

Notes

[1]For valid test results, the maximum difference between test and reference readings should be less than 5.4 °F (3 °C), for all thermocouples except for the stack thermocouple which should be less than 1.5% absolute temperature from the reference reading and the exit thermocouple which should be less than 2°F (1 °C) from the reference reading (EPA Method 2, Section 6.3 and EPA Method 5, Sections 6.1.1.7-6.1.1.8)

[2]For valid test results, the maximum difference between console and reference barometric pressure readings should be less than 0.1 in. Hg (2.5 mm Hg), (EPA Method 5, Section 6.1.2)

[3]For valid test results, the maximum difference between console and reference vacuum readings should be less than 0.5 in. Hg (12.5 mm Hg)

I certify that the above Thermocouple, Barometric, and Vacuum Sensors were calibrated and audited in accordance with US EPA Methods, CFR 40 Part 60.

Neediss Supply Instrument Co.,Ltd.

SITHIPORN associates
Environmental / Hygiene Products Division (EPD)
Web site : www.sithiphorn.com # E-mail: service-epd@sithiphorn.com

METHOD 5 PRE-TEST CONSOLE CALIBRATION

USING REFERENCE METER # WET TEST METER W-NK5A No. 540961

5-POINT METRIC UNIT

☑ Preventive Maintenance & Check

Meter Console Information	
Console Model Number	XC-572-V
Console Serial Number	1602011
DGM Model Number	SK25EX
DGM Serial Number	0006265

Calibration Conditions			
Date	Time	21-Jul-22	9:00 AM
Calibration Reference No.		3APE650010	
Barometric Pressure		756	mm Hg
Calibration Meter Gamma		0.9980	unitless

Factors/Conversions		
Std Temp	298	K
Std Press	760	mm Hg
K_1	0.392	

Run Time	Metering Console					Calibration Meter			
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(t_{mi})	(t_{mf})	(Vw_i)	(Vw_f)	(t_{wi})	(t_{wf})
min	mm H_2O	m^3	m^3	°C	°C	m^3	m^3	°C	°C
15.00	13.0	421.0715	421.2445	25	25	298.71711	298.88607	25	25
10.00	25.0	421.2899	421.4557	26	27	298.92765	299.08914	25	25
8.00	50.0	421.5005	421.6953	27	27	299.13177	299.32212	25	25
7.00	80.0	421.7161	421.9296	27	28	299.34277	299.55343	25	25
5.00	120.0	421.9538	422.1391	28	29	299.57750	299.76100	25	25

Results								
Standardized Data				Dry Gas Meter				
				Calibration Factor		Flowrate	ΔH @	
Dry Gas Meter		Calibration Meter		Value	Variation	Std & Corr	0.0212 m^3_{std}/min	Variation
($V_{m(std)}$)	($Q_{m(std)}$)	($Vw_{(std)}$)	($Qw_{(std)}$)	(Y)	(ΔY)	($Q_{m(std)(corr)}$)	(ΔH@)	(ΔΔH@)
m^3	m^3/min	m^3	m^3/min			m^3/min	mm H2O	
0.172	0.011	0.168	0.011	0.973	-0.006	0.011	47.571	4.386
0.164	0.016	0.160	0.016	0.975	-0.005	0.016	44.388	1.203
0.193	0.024	0.189	0.024	0.977	-0.003	0.024	41.025	-2.161
0.212	0.030	0.209	0.030	0.985	0.006	0.030	41.202	-1.983
0.184	0.037	0.182	0.036	0.988	0.009	0.036	41.740	-1.445
				0.980	Y Average		43.185	ΔH@ Average

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

Note: For $\Delta H_@$, orifice pressure differential that equates to 0.75cfm (0.0212m^3/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is +-0.2inches (5.1mm) H_2o.

Signature _____

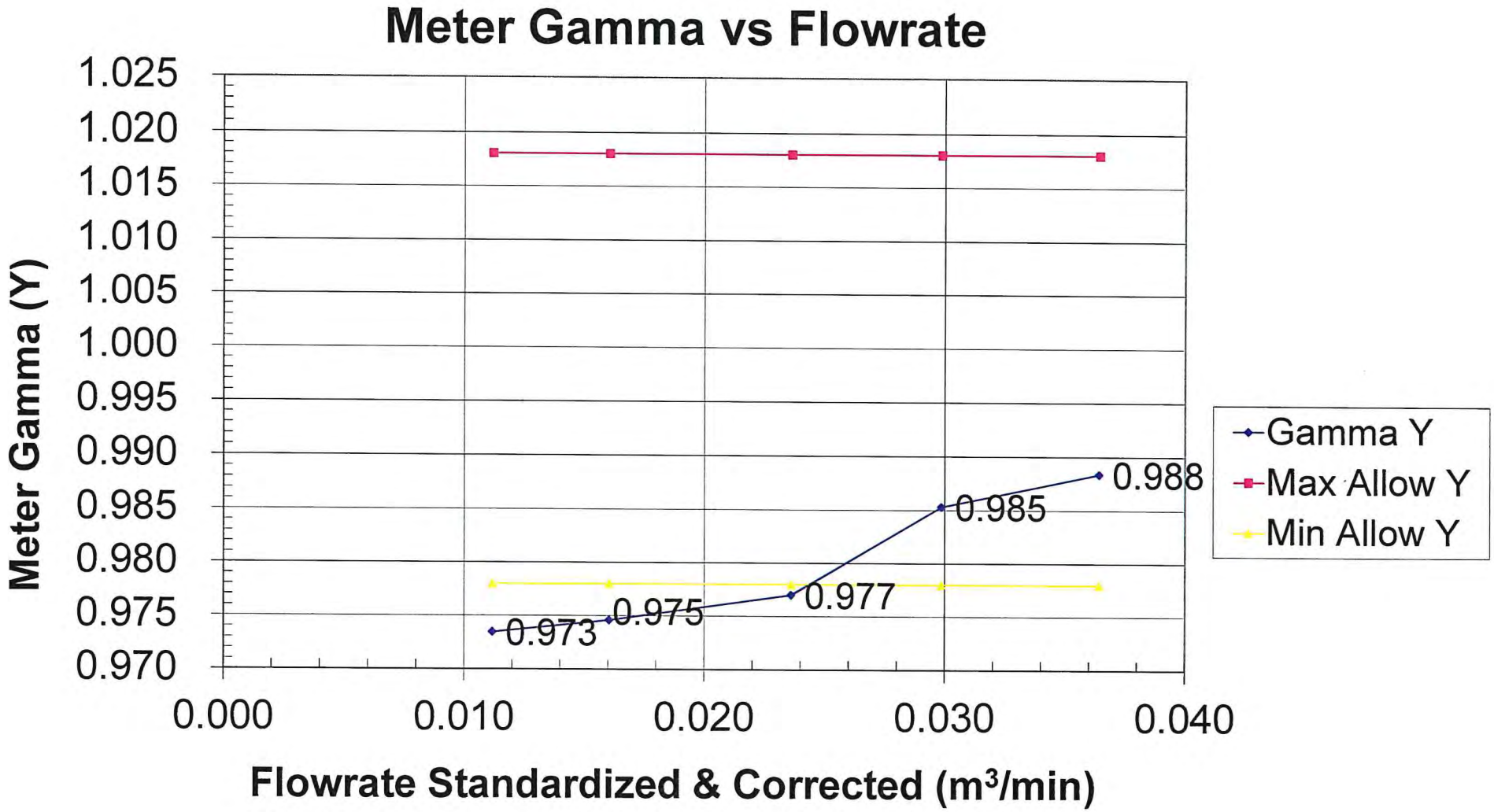
(Surachai Chaisana)
Service Engineer

บริษัท สิทธิพรแอสโซซิเอส จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

Date 21/7/2022

Calibration Date: 7-21-2022

Calibration Reference No: 3APE650010



บริษัท ยิ กริพราแอสโซซิเอส จำกัด
SIP IPORN ASSOCIATES COMPANY LIMITED

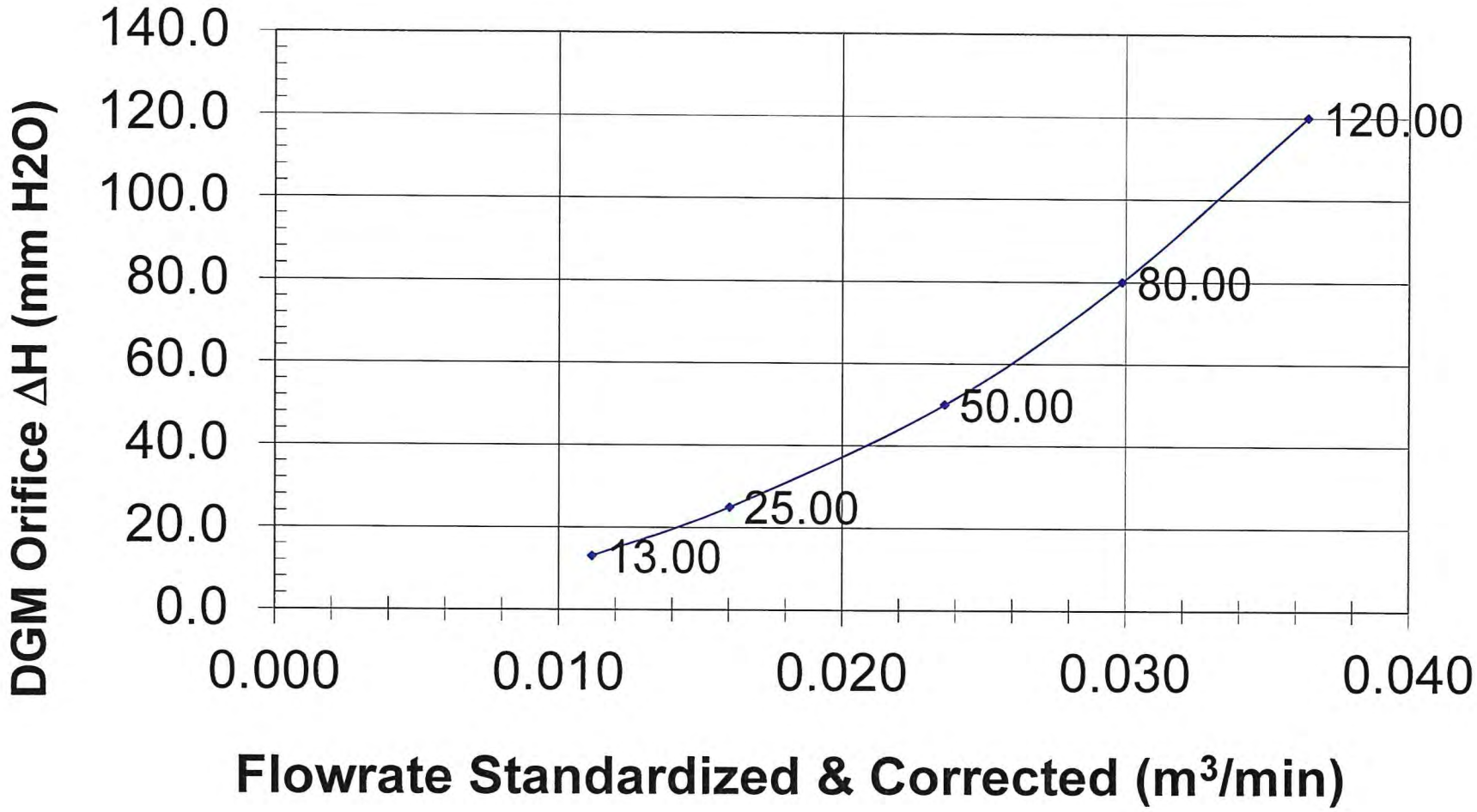
Console Serial: 1602011

Console Model: XC-572-V

Calibration Date: 7-21-2022

Calibration Reference No: 3APE650010

Meter Pressure vs Flowrate



บริษัท สิทธิพรแอสโซซิเอส จำกัด
SIT IPORN ASSOCIATES COMPANY LIMITED

Console Serial: 1602011

Console Model: XC-572-V

SITHIPORN associates

SITHIPORN associates
SA Environmental / Hygiene Products Division (EPD1)
Web site : www.sithiphorn.com # E-mail: service-epd1@sithiphorn.com

THERMOCOUPLES SYSTEM CALIBRATION

Samplig System Equipment Information	
Console Model Number	XC-572-V
Console Serial Number	1602011
DGM Model Number	SK25EX
DGM Serial Number	0006265
Meter Box Model Number	JENCO 765
Meter Box Serial Number	JC15496

Calibration Conditions			
Date	Time	21-Jul-22	11:00 AM
Calibration Reference No.		3APE650010	
Barometric Pressure		756	mm Hg
Reference Thermometer		FLUKE 714	
Serial Number		9038005	

Results

Console Thermocouple Simulator

Channal and test point	Meter Box Channal Temperature Reading (°C)											
	-18.0	25.0	38.0	93.0	149.0	260.0	371.0	482.0	593.0	816.0	1038.0	
Stack	-18	25	37	94	148	259	370	480	592	815	1037	
Filter	-18	25	37	94	148							
Probe	-18	25	37	94	148							
Aux	-18	25	37	94	148							
Exit	-18	25	37									

Tolerance Range

Stack	± 1.50% Absolute		
Probe	± 3.0 °C	Aux	± 3.0 °C
Filter	± 3.0 °C	Exit	± 2.0 °C

Signature _____

(Surachai Chaisana)
Service Engineer

บริษัท สิทธิพร แอสโซซิเอส จำกัด
SITHIPORN ASSOCIATES COMPANY LIMITED

ENTECH
Where Solutions Begin

Calibration Certificate

NSC-TISI-TIS 17025 CALIBRATION 0157

Certificate No: G 660051
Date of issue : 30-Jan-23

Instrument description	:	Flue gas Analyzer
Instrument model	:	Testo 350 New
Instrument serial no.	:	62227989
ID no. or control no.	:	-
Manufacturer	:	Testo SE & Co. KGaA
Probe description	:	-
Probe model	:	-
Probe serial	:	-
Customer name	:	Environment Research & Technology Co., Ltd.
Customer address	:	25/114 Moo 6, Soi Chinnakhet 1, Ngamwongwan Rd., Toongsonghong, Laksi, Bangkok 10210 Thailand
Total pages of certificate	:	2 Pages
Receiving no.	:	L-230212
Receiving date.	:	26-Jan-23
Parameter of calibration	:	Gas Calibration(Oxygen 2.498,10.04,21.02 %vol, Carbon Monoxide 80.14,309.9,1003 ppm, Nitrogen Dioxide 80.96 ppm, Nitric Oxide 150.9 ppm, Sulphur Dioxide 100.8 ppm)
Condition of UUC.	:	Used
Ambient condition	:	All of the Measurment ware caried out the stabilized labotary Temperature : 23 ±5 °C Humidity : 55 ± 15 %RH
Calibration place	:	17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210
Calibration procedure no.	:	WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurent Multiplied by coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

This certificate is applied only to item under test Environmental condition.

This Calibration Certificate may not be reporduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid.

This calibration certificate documents are tracebility to national standards, which realize measurement according to the International System of Units (SI).

Date of calibration : 27-Jan-23

Mr. Sedtawut Nueathong
Calibration Technician

Mrs. Nongluck Wongsettee
Technical Manager

Entech Industrial Solution Co.,Ltd.
17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O2) 2.498 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O2) 10.04 % Vol	CG-0153-21	Nimt	18-Nov-26
Oxygen (O2) 21.02 % Vol	CG-0041-22	Nimt	10-Feb-27
Carbon monoxide (CO) 80.14 ppm	CG-0040-22	Nimt	14-Feb-27
Carbon monoxide (CO) 309.9 ppm	2803/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2583/22	Linde	09-Aug-24
Nitrogen Dioxide (NO2) 80.96 ppm	3240/21	Linde	26-Jun-24
Nitric Oxide (NO) 150.9 ppm	2857/21	Linde	27-Jun-23
Sulphur Dioxide (SO2) 100.8 ppm	3507/22	Linde	9 Nov 24

Measured room conditions

Temperature : 22.1 °C Humidity : 50.5 %RH Pressure : 1012.9 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,100 ml/min Gas pressure : 1019.6 mbar

Calibration Results (without adjustment) (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.498	2.47	-0.028	0.20
O2 (%Vol)	10.04	9.92	-0.12	0.40
O2 (%Vol)	21.02	21.08	0.06	0.80
CO (ppm)	80.14	81	0.86	3.0
CO (ppm)	309.9	310	0.1	6.0
CO (ppm)	1003	1004	1	12
*NO2 (ppm)	80.96	81.5	0.54	8.0
*NO (ppm)	150.9	152	1.1	8.0
*SO2 (ppm)	100.8	100	-0.8	6.0

Remark : 1 cmol/mol = 1 %vol. , 1 µmol/mol = 1 ppm.

* Calibrations marked Not TISI Accredited "in this Certificate have been included for completeness."

End of Report

Entech Industrial Solution Co.,Ltd.
17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

Calibration certificate Kalibrier-Zertifikat

4679269

Object Gegenstand	Control Unit t350	Measuring Box testo 350
Manufacturer Hersteller	TESTO SE & Co. KGaA	TESTO SE & Co. KGaA
Type description Typ	0632 3511	0632 3510
Serial no. Serien Nr.	03599831	63455602
Inventory no. Inventar Nr.	---	---
Test equipment no. Prüfmittel Nr.	---	---
Equipment no. Equipment Nr.	15009011	15008070
Location Standort	---	---

Customer / Auftraggeber: ENVIRONMENT RESEARCH & TECHNOLOGY CO.LTD
25/114 Moo 6 Soi Chinnakhet 1 Ngamwongwa Road,Thung Song Hong Subdistrict,
TH-10210 Lak Si District, Bangkok

Customer ID no. / Kunden Nr.: 1031994

Order no. / Auftrags Nr.: 11282503 / 0520 0055

Date of calibration / Datum der Kalibrierung: 26.08.2022

Date of the recommended re-calibration / Datum der empfohlenen Rekalibrierung: 26.08.2023

Hereby we confirm that the performing calibration laboratory is working with a management system according to ISO 9001:2015 and ISO/IEC 17025:2018. Accreditation certificates can be found under www.testotis.de. The measuring installations used for calibration are regularly calibrated and traceable to the national standards of the German Federal Physical Technical Institute (PTB) or other national standards. Should no national standards exist, the measuring procedure corresponds with the technical regulations and norms valid at the time of the measurement. The documents established for this procedure are available for viewing. All the necessary measured data can be found on this calibration certificate.

Hiermit bestätigen wir, dass das durchführende Kalibrierlabor ein Managementsystem nach ISO 9001:2015, sowie ISO/IEC 17025:2018 eingeführt hat. Die Urkunden finden Sie auf www.testotis.de. Die für die Kalibrierung verwendeten Messeinrichtungen werden regelmäßig kalibriert und sind rückführbar auf die nationalen Normale der Physikalisch Technischen Bundesanstalt (PTB) Deutschlands oder auf andere nationale Normale. Wo keine nationalen Normale existieren, entspricht das Messverfahren den derzeit gültigen technischen Regeln und Normen. Die für diesen Vorgang angefertigte Dokumentation kann eingesehen werden. Alle erforderlichen Messdaten sind in diesem Kalibrier-Zertifikat aufgelistet.

Conformity statement Konformitätsaussage

[X] Measured value(s) within the allowable deviation[1]. Messwert(e) innerhalb der zulässigen Abweichung[1].

[ ] Measured value(s) outside of the allowable deviation[1]. Messwert(e) außerhalb der zulässigen Abweichung[1].

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--- ---

[1]) The expanded measurement uncertainty was calculated according to EA-4/02 M:2022 with a coverage probability of approx. 95% and contains the uncertainty of the reference, the method and the uncertainty of the unit under test. The statement of conformity is based on the decision rule "Vertrauensniveau 50" (confidence level 50).

[1]) Die erweiterte Messunsicherheit wurde nach EA-4/02 M:2022 mit einer Überdeckungswahrscheinlichkeit von etwa 95% berechnet und enthält die Unsicherheit der Referenz, des Verfahrens sowie die Unsicherheit des Prüflings. Die Konformitätsaussage erfolgt nach der Entscheidungsregel "Vertrauensniveau 50".

This calibration certificate may not be reproduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal are not valid.
Dieser Kalibrierschein darf nur vollständig weiterverbreitet werden. Auszüge oder Änderungen bedürfen der Genehmigung des ausstellenden Kalibrierlaboratoriums. Kalibrierscheine ohne Unterschrift und Stempel haben keine Gültigkeit.

Seal Stempel

Supervisor Fachverantwortlicher
Martin Förderer

Technician Bearbeiter
Samuel Garcia Zlodi

Calibration certificate Kalibrier-Zertifikat

4679269

Measuring equipment Messeinrichtungen

Index	Reference Referenz	Traceability Rückführung	Next cal. Rekal.	Certificate-no. Zertifikat-Nr.	Eq.-no. Eq.-Nr.
a	Test gas medium 1 Prüfgas Medium 1	SCS-SCS0026 2022-04	2023-04	4534259	12898976
b	Test gas medium 3 Prüfgas Medium 3	SCS-SCS0026 2022-05	2023-05	4555124	12898982
c	Test gas medium 5 Prüfgas Medium 5	SCS-SCS0026 2022-04	2023-04	4523069	12898984
d	Test gas medium 8 Prüfgas Medium 8	SCS-SCS 2022-07	2023-07	4629530	12898987
e	Test gas medium 7 Prüfgas Medium 7	SCS-SCS0026 2022-04	2023-04	4522462	12898986
f	Test gas medium 11 Prüfgas Medium 11	ISO-ISO 6141 2022-04	2024-04	4522566	14087964

Reference certificates are available at www.primasonline.com Referenzzertifikate sind auf www.primasonline.com abrufbar

Ambient conditions Umgebungsbedingungen

Temperature Temperatur (20...26) °C Humidity Feuchte (20...60) % RH % rF

Measuring procedure Messverfahren

The calibration was carried out by comparison measurement with calibrated test gases, a calibrator of temperature and pressure.
Die Kalibrierung erfolgte durch Vergleichsmessung mit kalibrierten Prüfgasen, einem Temperatur- und Druckkalibrator.

Measuring results Messergebnisse

Channel Kanal ---

Reference value Bezugswert		Indicated measured value probe Angezeigter Messwert Kalibriergegenstand		Deviation Abweichung		Allowed deviation[2] Zulässige Abweichung[2]		Measurement uncertainty (k=2) Messunsicherheit (k=2)		Confirmation Bewertung
ppm	Vol.-%	ppm	Vol.-%	ppm	Vol.-%	ppm	Vol.-%	ppm	Vol.-%	
CO										
100,0[a]	---	99	---	-1,0	---	± 11	---	3,3	---	pass
401,0[b]	---	400	---	-1,0	---	± 21	---	8,4	---	pass
700,0[c]	---	704	---	4,0	---	± 36	---	14,4	---	pass
NO										
150,2[a]	---	148	---	-2,2	---	± 9	---	4,0	---	pass
300[d]	---	302	---	2	---	± 16	---	6,9	---	pass
NO2										
100,0[e]	---	103,7	---	3,7	---	± 5,1	---	3,20	---	pass
SO2										
100,1[f]	---	98	---	-2,1	---	± 11	---	3,5	---	pass
O2										
---	0,0[a]	---	0,18	---	0,2	---	± 0,21	---	0,027	pass
---	2,510[c]	---	2,57	---	0,060	---	± 0,21	---	0,055	pass
---	5,0[b]	---	5,10	---	0,1	---	± 0,21	---	0,102	pass

[2] in accordance with the manufacturer gemäß Hersteller

Special remarks Besondere Bemerkungen

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Where Solutions Begin

Calibration Certificate

NSC-TISI-TIS 17025
CALIBRATION 0157

Certificate No: G 650472
Date of issue : 25-Jul-22

Instrument description	:	Flue gas Analyzer
Instrument model	:	Testo 350 NEW
Instrument serial no.	:	60534802
ID no. or control no.	:	-
Manufacturer	:	Testo SE & Co. KGaA
Probe description	:	-
Probe model	:	-
Probe serial	:	-
Customer name	:	Environment Research & Technology Co., Ltd.
Customer address	:	25/114 Moo 6, Soi Chinnakhet 1, Ngamwongwan Rd.,Toongsonghong, Laksi, Bangkok 10210 Thailand
Total pages of certificate	:	2 Pages
Receiving no.	:	L-222474
Receiving date.	:	18-Jul-22
Parameter of calibration	:	Gas Calibration(Oxygen 2.498,10.00,21.00 %vol, Carbon Monoxide 80.97,309.9,1003 ppm, Nitrogen Dioxide 80.62 ppm, Nitric Oxide 150.9 ppm, Sulphur Dioxide 100.9 ppm)
Condition of UUC.	:	Used
Ambient condition	:	All of the Measurment ware caried out the stabilized labotary Temperature : 23 ±5 °C Humidity : 55 ± 15 %RH
Calibration place	:	17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210
Calibration procedure no.	:	WI-CL-28-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurent Multiplied by coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

This certificate is applied only to item under test Environmental condition.

This Calibration Certificate may not be reporduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid.

This calibration certificate documents are tracebility to national standards, which realize measurement according to the International System of Units (SI).

Date of calibration : 20-Jul-22

Mr. Sedtawut Nueathong
Calibration Technician

Mrs. Nongluck Wongsettee
Technical Manager

Entech Industrial Solution Co.,Ltd.
17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

ENTECH
Where Solutions Begin

Calibration Certificate

NSC-TISI-TIS 17025
CALIBRATION 0157

Certificate No.: G 650472

Standard References (Table 1)

Standard	Certificate No.	Vendor	Due date
Oxygen (O2) 2.498 % Vol	4219/21	Linde	30-Sep-25
Oxygen (O2) 10.00 % Vol	2453/19	Linde	18-Jul-23
Oxygen (O2) 21.00 % Vol	2426/19	Linde	16-Jul-23
Carbon monoxide (CO) 80.97 ppm	2842/21	Linde	24-Jun-23
Carbon monoxide (CO) 309.9 ppm	2803/21	Linde	22-Jun-23
Carbon monoxide (CO) 1003 ppm	2829/21	Linde	23-Apr-23
Nitrogen Dioxide (NO2) 80.62 ppm	3240/21	Linde	25-Jul-23
Nitric Oxide (NO) 150.9 ppm	2857/21	Linde	27-Jun-23
Sulphur Dioxide (SO2) 100.9 ppm	4942/20	Linde	20-Nov-22

Measured room conditions

Temperature : 22.5 °C Humidity : 57.5 %RH Pressure : 1016.6 mbar

Calibration conditions

Gas Temperature : 23 °C Flow rate : 1,200 ml/min Gas pressure : 1024.3 mbar

Calibration Results Before Adjustment (Table 2)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.498	2.51	0.012	0.20
O2 (%Vol)	10.00	9.86	-0.14	0.40
O2 (%Vol)	21.00	21.09	0.09	0.80
CO (ppm)	80.97	79	-1.97	3.0
CO (ppm)	309.9	308	-1.9	6.0
CO (ppm)	1003	1004	1	12
*NO2 (ppm)	80.62	75.6	-5.02	8.0
*NO (ppm)	150.9	151	0.1	8.0
*SO2 (ppm)	100.9	96	-4.9	6.0

Calibration Results After Adjustment (Table 3)

Parameter of Standard	Standard Values	Mean of UUC	Error	Uncertainty (±)
O2 (%Vol)	2.498	2.51	0.012	0.20
O2 (%Vol)	10.00	9.86	-0.14	0.40
O2 (%Vol)	21.00	21.09	0.09	0.80
CO (ppm)	80.97	79	-1.97	3.0
CO (ppm)	309.9	308	-1.9	6.0
CO (ppm)	1003	1004	1	12
*NO2 (ppm)	80.62	81.6	0.98	8.0
*NO (ppm)	150.9	151	0.1	8.0
*SO2 (ppm)	100.9	96	-4.9	6.0

Remark : 1 cmol/mol = 1 %vol. , 1 µmol/mol = 1 ppm.

* Calibrations marked Not TISI Accredited "in this Certificate have been included for completeness."

End of Report

Entech Industrial Solution Co.,Ltd.
17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

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Where Solutions Begin

Calibration Certificate

NSC-TISI-TIS 17025
CALIBRATION 0157

Certificate no: T 660012

Date of issue : 10-Jan-23

Instrument description	:	Digital Thermometer
Instrument model	:	305
Instrument serial no.	:	N0005658
ID no. or control no.	:	STACK 1
Manufacturer	:	Testo SE & Co. KGaA
Probe description	:	Type K Probe, Diameter 7.2 mm., Long 3,600 mm., Material Stainless (Probe 1)
Probe model	:	TM04
Probe serial	:	-
Customer name	:	Environment Research & Technology Co., Ltd.
Customer address	:	25/114 Moo 6, Soi Chinnakhet 1, Ngamwongwan Rd., Toongsonghong, Laksi, Bangkok 10210 Thailand
Total pages of certificate	:	2 Pages
Receiving no.	:	L-230035
Receiving date.	:	03-Jan-23
Parameter of calibration	:	Temperature Calibration
Condition of UUC.	:	Used
Ambient condition	:	All of the Measurement were carried out the stabilized laboratory Temperature : 23 ±5 °C Humidity : 55 ± 15 %RH
Calibration place	:	17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok
Calibration procedure no.	:	WI-CL-14-C

The calibration certificate expanded uncertainty of measurement is stated as the standard uncertainty of measurent Multiplied by coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

This certificate is applied only to item under test Environmental condition.

This Calibration Certificate may not be reporduced other than in full except with the permission of the issuing laboratory. Calibration certificates without signature and seal not valid.

This calibration certificate documents are tracebility to national standards, which realize measurement according to the International System of Units (SI).

Date of calibration : 09-Jan-23

Mr. Peerawat Thongbai
Calibration Engineer

Mrs. Nongluck Wongsettee
Technical Manager

Entech Industrial Solution Co.,Ltd.
17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

ENTECH
Where Solutions Begin

Calibration Certificate

NSC-TISI-TIS 17025
CALIBRATION 0157

Certificate no: T 660012

Standard reference

Standard	Reference No.	Vendor	Due Date
Digital Thermometer with probe	PSL-T 0138/65	TISTR	11-Jan-23
EIUK PTB150	Performance	ENTECH	21-Sep-23
Digital Thermometer with probe	SG-T-00127/65	Success Gateway	07-Feb-23
Dry Block ATC-650B	Performance	ENTECH	21-Sep-23

Measured room conditions

Temperature : 22.7 **°C** **Humidity :** 52.2 **%RH** **Pressure :** 1014.3 **mbar.**

Measured room conditions

Immersion Depth : 140.0 mm.

Calibration results (Without Adjustment)

Parameter of standard	Standard values	Mean of UUC	Error	Uncertainty (±)
Temperature (°C)	30.04	30.1	0.06	0.33
Temperature (°C)	149.95	151.4	1.45	0.75
Temperature (°C)	400.02	403	2.98	1.8

Remark : -

End of Report

Entech Industrial Solution Co.,Ltd.
17/121 Soi Ngamwongwan 47 Yaek 48, Toongsonghong, Laksi, Bangkok 10210 THAILAND Tel. 0-2779-8888 Calibration@entech.co.th
Tax ID : 0105536035591 www.entech.co.th

INTRO TSC Company Limited

Calibration Center Measuring and Testing Instrument

46/155 Nualchan Rd., Nualchan, Bungkum, Bangkok 10230, Thailand

Tel : +66-2363-4417-21 Fax : +66-2363-4427 E-mail : info@intro.co.th

NSC-TISI-TIS 17025
CALIBRATION 0177

Certificate of Calibration

Certificate Number :	**MB2-007-2023**
Equipment :	Electronic Balance
Manufacturer :	Ohaus
Model :	SCOUT PRO SP2001
Serial Number :	B224021411
ID Number :	Stack 2
Max Capacity :	2000 (g)
Resolution :	0.1 (g)

The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.The uncertainty evaluation has been carried out in accordance with UKAS M3003 requirements. This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). This Certificate may not be reproduced other than in full except with the prior written approval of Calibration Center, Intro TSC Co.,Ltd.

Customer Reference :	F411	**Customer :**	Environment Research&Technology Co., Ltd.
CSRS No.:	00670123		25/114 Moo 6 Soi Chinaket 1, Ngamongwan Road,
Date of Receipt :	12-Jan-23		Toongsonghong, Laksi, Bangkok 10210
Date of Calibration :	13-Jan-23	**Location :**	Mass Calibration Laboratory

Condition of this result of calibration

1. Reference Standard instruments :

Instruments	Model	Serial No.	Certificate No.	Due Date
Standard Weight Set (1 g to 5000 g)	N/A	N/A	22M1144	20-Jun-23

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

   - Techonology Promotion Association (Thailand-Japan)

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

Method : Measurement In-house Method Calibration Procedure No. CP-CL-07 base on UKAS Publication Ref : Lab 14 : 2019

Environmental Conditions :

Temperature : (20 ± 2) °C **Humidity :** (50 ± 15) % **Air Pressure :** (1010 ± 10) mbar

Calibrated By : Mr. Pratchaya Sanguankongvilai

Date of Issued : 16-Jan-23

Approved Signatory : .....

Mr. Panuchit Samart

INTRO TSC Company Limited

Calibration Center Measuring and Testing Instrument

46/155 Nualchan Rd., Nualchan, Bungkum, Bangkok 10230, Thailand

Tel : +66-2363-4417-21 Fax : +66-2363-4427 E-mail : info@intro.co.th

Certificate Number : MB2-007-2023

Calibration Result (Weight) : Without Adjustment

1. Repeatability of Reading

Nominal Value (g)	Standard Deviation (g)	Maximum diff. Between succesive (g)
2000	0.00	0.0

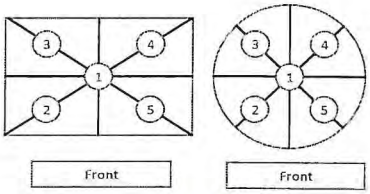
2. Error of indication from norminal value

Nominal Value (g)	Balance Reading (g)	Correction Value (g)	Uncertainty (±) (g)	factor *k*	Balance Reading Before Adjust (g)
Unload	0.0	0.0	0.082	2.00	-
200	199.9	0.1	0.082	2.00	-
400	399.8	0.2	0.082	2.00	-
600	599.8	0.2	0.082	2.00	-
800	800.0	0.0	0.082	2.00	-
1000	1000.0	0.0	0.082	2.00	-
1200	1198.7	1.3	0.095	2.00	-
1400	1399.0	1.0	0.095	2.00	-
1600	1599.2	0.8	0.095	2.00	-
1800	1799.6	0.4	0.095	2.00	-
2000	1999.9	0.1	0.095	2.00	-

3. Eccentric or off-center loading

Nominal Value (g)	Reference Position				
	Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)
1000	1000.0	1000.0	1000.0	1000.0	1000.0

Eccentric Error = 0.0 (g)



End of report

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484

NSC-TISI-TIS17025
CALIBRATION 0008

Certificate of Calibration

Equipment :	Electronic Balance
Manufacturer :	AND
Model :	BM-5
Serial No. :	T1004302
ID No. :	ERTC-L-In.-176
Submitted by :	Environment Research & Technology Company Limited. 25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Road, Toongsonghong, Laksi, Bangkok 10210
Location :	ห้องปฏิบัติการวิเคราะห์ (411)
Received order :	4 January 2023
Calibration Date :	4 January 2023
Ambient Temperature :	15 °C to 40 °C
Relative Humidity :	30 % to 90 %
Calibrated by :	Krisda Malee
Approved by :	Approved Signatory

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

Issue Date : 16 January 2023

The Uncertainties are for a confidence probability of approximately 95%

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

Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2301-0002ON-10

Cert.No.: 23MM1

Procedure used :-

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

Condition of this result of calibration

1. Reference standard instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	-	70RC138	MM-0009-21	03 Feb 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This result of calibration was made on requested at the point specified by customer.
4. This certificate is not certified for any commercial transaction.
5. This certification is traceable to the International System of Unit.

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

Range capacity : 0 g to 5.2 g **Resolution** 0.000001 g

Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
2.5	2.500008	-0.000008	0.026	2.00
5	5.000007	-0.000007	0.027	2.00

After Adjustment :

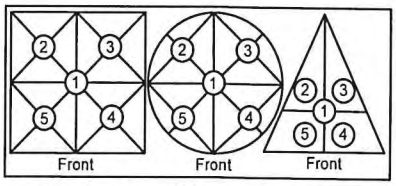
1. **Determination of the standard deviation of weighing machine** (n = 10)

Applied Weight (g)	Standard Deviation of Reading (g)
2.5	0.0000007
5	0.0000007

Malu.

Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2301-0002ON-10

Result of calibration



2. Effect of off center loading

A mass of 2 g was placed to various position on the pan.
The weighing machine reading error obtained is given in the table

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
+0.000002	+0.000005	+0.000004	+0.000002	+0.000003	0.000003

3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (*k*)
Unload	0.000000	0.000000	0.0060	2.11
0.014	0.014002	-0.000002	0.0060	2.00
0.015	0.015001	-0.000001	0.0060	2.00
0.5	0.499995	+0.000005	0.013	2.00
1	1.000001	-0.000001	0.016	2.00
1.5	1.500001	-0.000001	0.020	2.00
2	1.999996	+0.000004	0.020	2.00
2.5	2.500001	-0.000001	0.026	2.00
3	3.000004	-0.000004	0.026	2.00
4	3.999997	+0.000003	0.027	2.00
5	5.000002	-0.000002	0.027	2.00

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

-o0o-

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www.enviresearch.co.th
Head Office/Tax ID 0105 542 064 981

TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

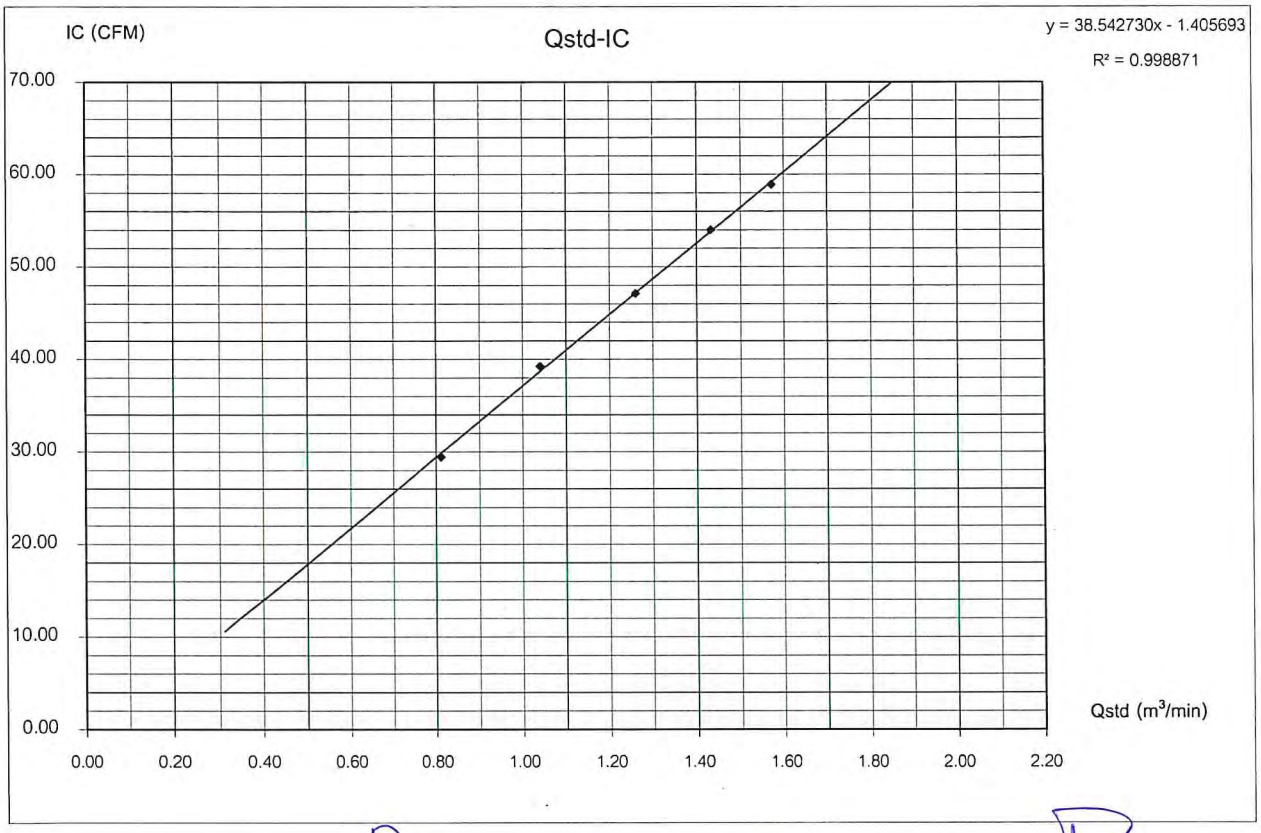
Sampler Location				*Date*	February 16, 2023
โรงเรียนบ้านหนองบัวลอย				*Start Time*	1:09 PM
Sampler Number	TSP No.A8	Transfer Standard Type	Orifice	*Stop Time*	1:19 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Anan Kongngoennok
Motor Serial Number	3680	Calibrator Serial Number	3362		
Recorder Serial Number	3767				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O) Positive	Negative	ΔH_2O	(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) $IC = I[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
5	1.4	1.4	2.8	1.64300	0.81149	30.0	29.46	303.0	745.0		
7	2.3	2.3	4.6	2.11047	1.04038	40.0	39.28	303.0	745.0		
10	3.4	3.4	6.8	2.56043	1.26070	48.0	47.13	303.0	745.0		
13	4.4	4.4	8.8	2.91273	1.43320	55.0	54.00	303.0	745.0		
18	5.3	5.3	10.6	3.19677	1.57227	60.0	58.91	303.0	745.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	745.0		

1	Slope (m)	2.04234	Linear Equation		r^2	0.998871	Pstd(mmHg) 760.0
2	Intercept (b)	-0.01435	Set Point Flow Rate (X) (m^3/min)	1.133	r	0.9994353	T_{NTP} 298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)	0	(Pa/Pstd)*(Tstd/Ta)		0.964087198
Result					C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.981879421

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla)
Technician

Approved By ..... (Mr.Panupon Podang)
Environmental Scientist

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Head Office/Tax ID 0105 542 064 981

PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

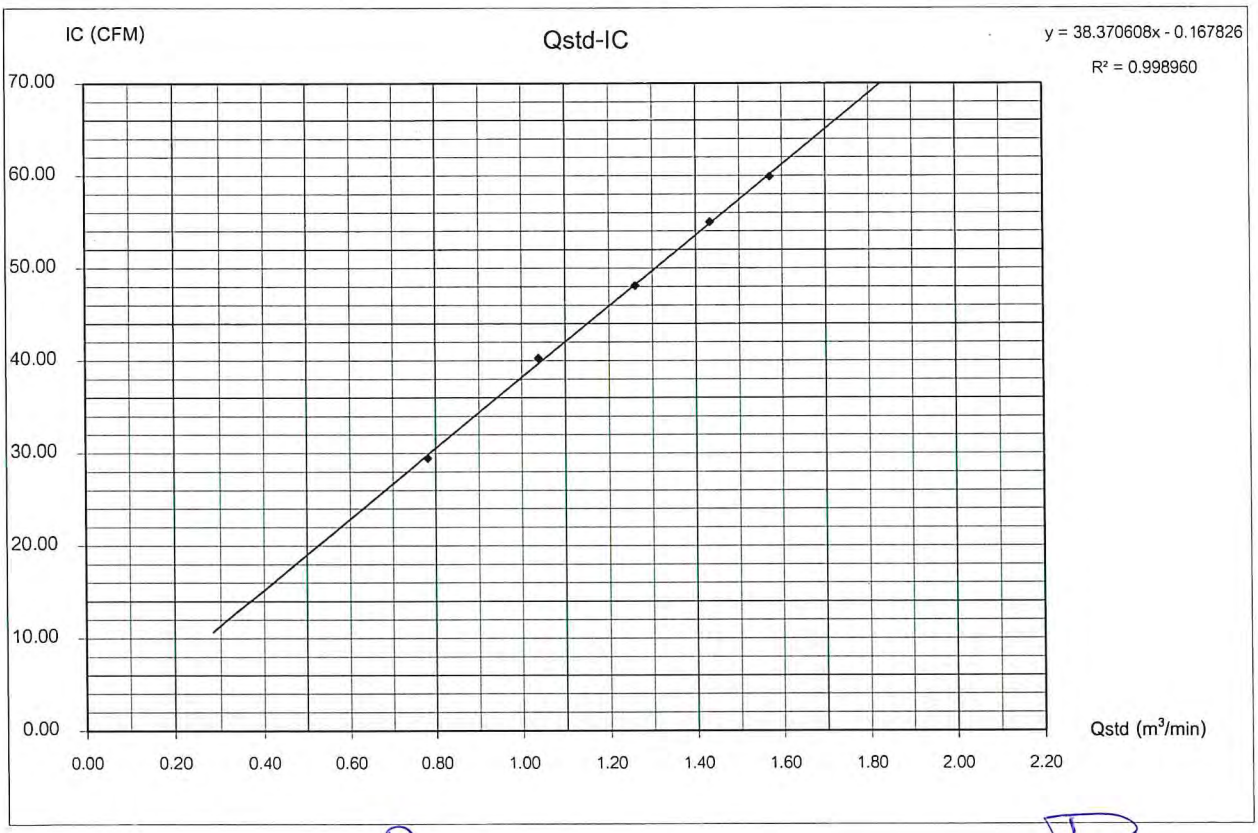
Sampler Location				*Date*	February 16, 2023
โรงเรียนบ้านหนองบัวลอย				*Start Time*	12:59 PM
Sampler Number	PM-10 No.10	Transfer Standard Type	Orifice	*Stop Time*	1:09 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Anan Kongngoennok
Motor Serial Number	610-047	Calibrator Serial Number	3362		
Recorder Serial Number	1313				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)]	(I) ample Flow Rate Indicatio	(Y) IC = I$[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temparature	Barometric Pressure	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O		(m^3/min)	(ft^3/min)		(°K = °C+273)	(mmHg)		
5	1.3	1.3	2.6	1.58323	0.78223	30.0	29.46	303.0	745.0		
7	2.3	2.3	4.6	2.10590	1.03815	41.0	40.26	303.0	745.0		
10	3.4	3.4	6.8	2.56043	1.26070	49.0	48.11	303.0	745.0		
13	4.4	4.4	8.8	2.91273	1.43320	56.0	54.99	303.0	745.0		
18	5.3	5.3	10.6	3.19677	1.57227	61.0	59.89	303.0	745.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	745.0		

1	Slope (m)	2.04234	Linear Equation			r^2	0.99896	Pstd(mmHg)	760.0
2	Intercept (b)	-0.01435	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9994799	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.964087198	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.981879421	

COMMENT

Andersen Instruments, Inc.



Checked By ..... Approved By .....

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Technician

(Mr.Panupon Podang)
Environmental Scientist

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

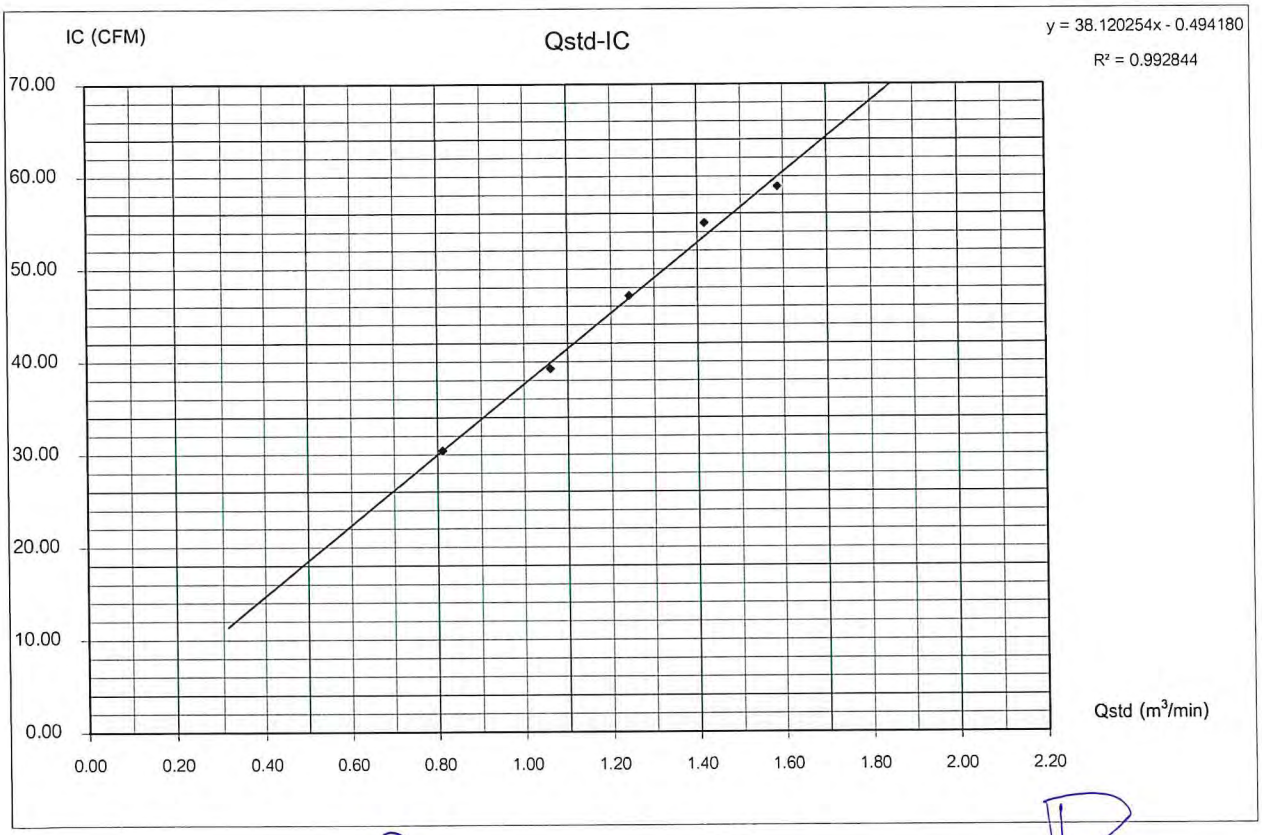
Sampler Location				*Date*	February 17, 2023
โรงเรียนนิคมสร้างตนเองพิมาย 4				*Start Time*	8:09 AM
Sampler Number	TSP No.A7	Transfer Standard Type	Orifice	*Stop Time*	8:19 AM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Anan Kongngoennok
Motor Serial Number	TSP No.A7	Calibrator Serial Number	3362		
Recorder Serial Number	6167				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A)	(X)	(I)	(Y)	Temparature	Barometric Pressure	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O	$[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Qstd = (1/m)[(A-b)] (m^3/min)	ample Flow Rate Indicatio (ft^3/min)	$IC = I[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(°K = °C+273)	(mmHg)		
5	1.4	1.4	2.8	1.64300	0.81149	31.0	30.44	303.0	745.0		
7	2.4	2.4	4.8	2.15119	1.06032	40.0	39.28	303.0	745.0		
10	3.3	3.3	6.6	2.52249	1.24213	48.0	47.13	303.0	745.0		
13	4.3	4.3	8.6	2.87944	1.41690	56.0	54.99	303.0	745.0		
18	5.4	5.4	10.8	3.22679	1.58697	60.0	58.91	303.0	745.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	745.0		

1	Slope (m)	2.04234	Linear Equation			r^2	0.992844	Pstd(mmHg) 760.0
2	Intercept (b)	-0.01435	Set Point Flow Rate (X) (m^3/min)	1.133	r	0.9964156	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)	0	(Pa/Pstd)*(Tstd/Ta)		0.964087198	
Result					C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.981879421	

COMMENT

Andersen Instruments, Inc.



Checked By ..... Approved By .....

(Mr. Prayuh Detkla)
Technician

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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

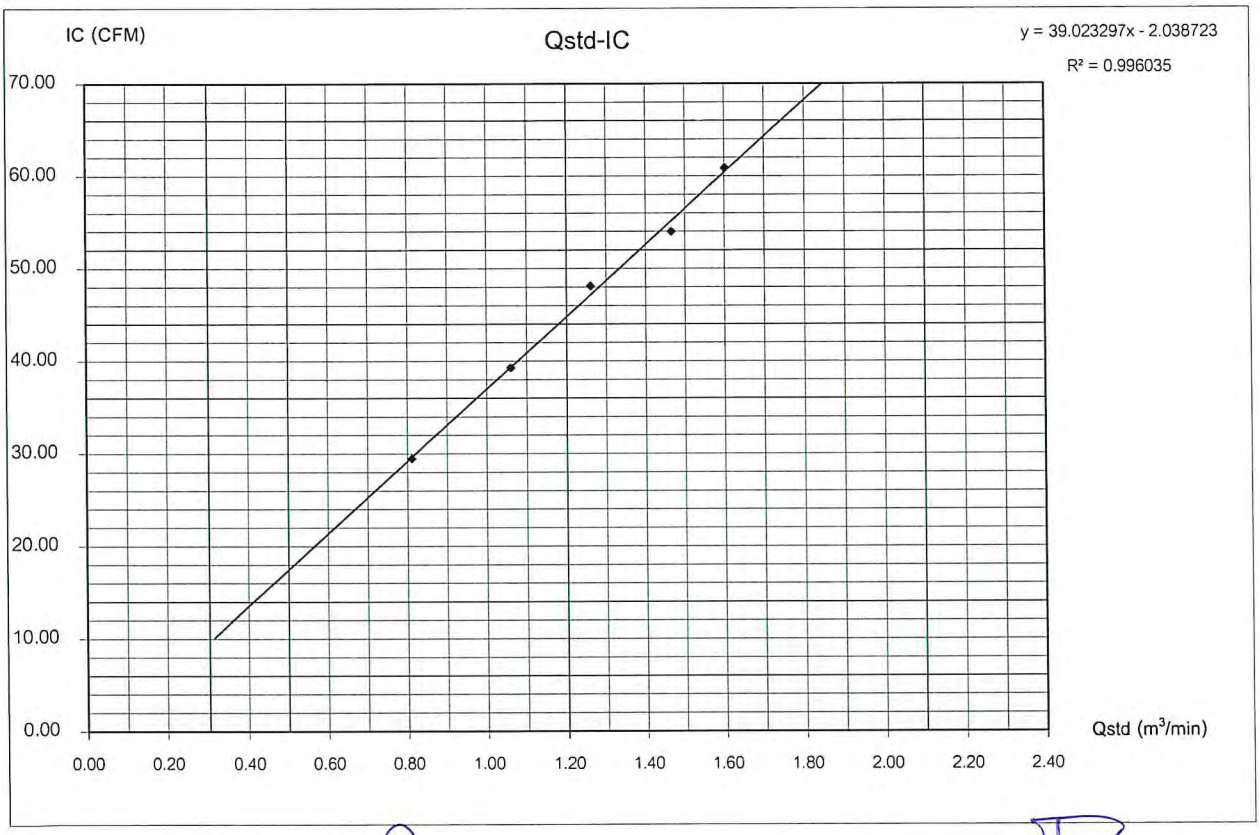
Sampler Location				*Date*	February 17, 2023
โรงเรียนนิคมสร้างตนเองพิมาย 4				*Start Time*	8:19 AM
Sampler Number	PM-10 No.2	Transfer Standard Type	Orifice	*Stop Time*	8:29 AM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Anan Kongngoennok
Motor Serial Number	610-643	Calibrator Serial Number	3362		
Recorder Serial Number	R0411-001				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)]	(I) ample Flow Rate Indicatio	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature	Barometric Pressure	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O		(m^3/min)	(ft^3/min)		(°K = °C+273)	(mmHg)		
5	1.4	1.4	2.8	1.64300	0.81149	30.0	29.46	303.0	745.0		
7	2.4	2.4	4.8	2.15119	1.06032	40.0	39.28	303.0	745.0		
10	3.4	3.4	6.8	2.56043	1.26070	49.0	48.11	303.0	745.0		
13	4.6	4.6	9.2	2.97819	1.46525	55.0	54.00	303.0	745.0		
18	5.5	5.5	11.0	3.25653	1.60153	62.0	60.88	303.0	745.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	745.0		

1	Slope (m)	2.04234	Linear Equation			r^2	0.996035	Pstd(mmHg) 760.0
2	Intercept (b)	-0.01435	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9980155	T_{NTP} 298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.964087198
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.981879421

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla)
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Approved By ..... (Mr.Panupon Podang)
Environmental Scientist

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

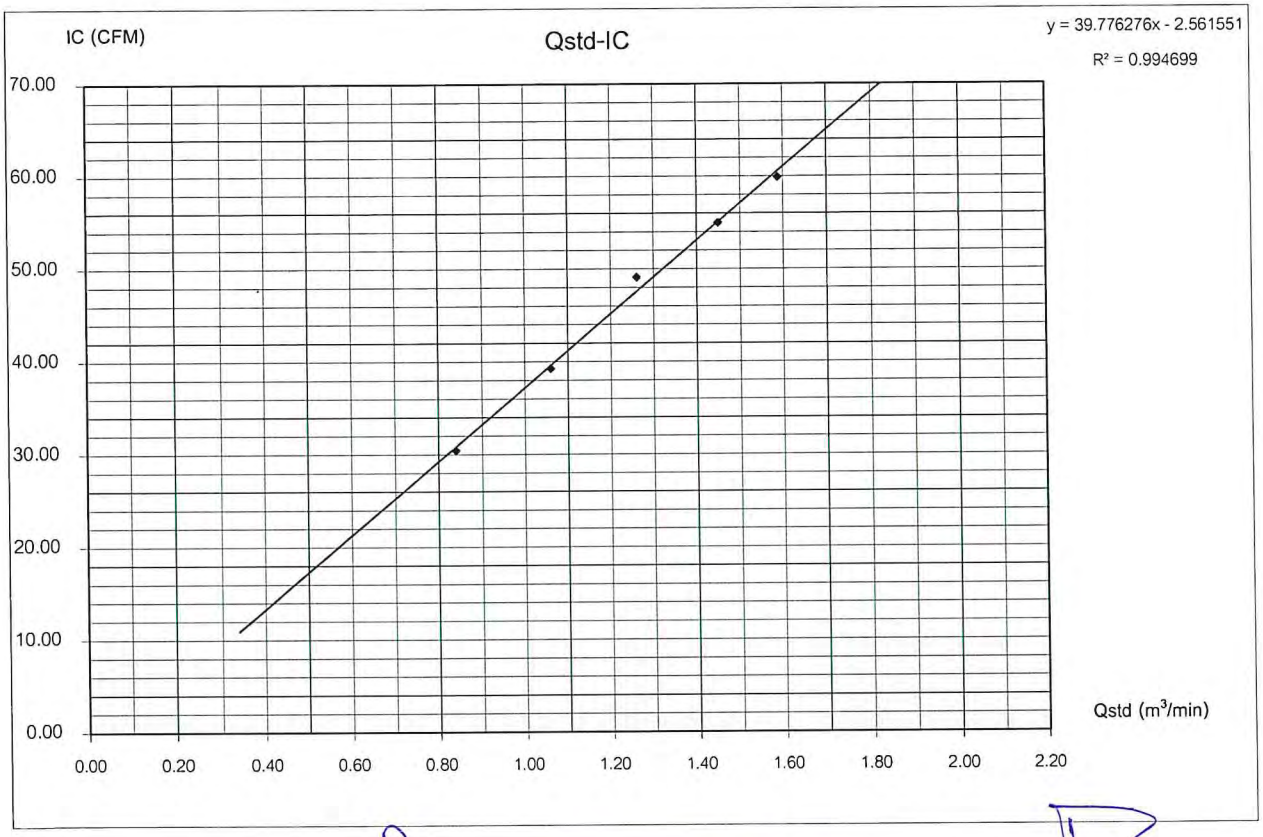
Sampler Location				*Date*	February 17, 2023
วัดบ้านเพชร				*Start Time*	10:32 AM
Sampler Number	TSP No.A17	Transfer Standard Type	Orifice	*Stop Time*	10:42 AM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Anan Kongngoennok
Motor Serial Number	6000-02	Calibrator Serial Number	3362		
Recorder Serial Number	7366				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I$[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.5	1.5	3.0	1.70067	0.83973	31.0	30.44	303.0	745.0		
7	2.4	2.4	4.8	2.15119	1.06032	40.0	39.28	303.0	745.0		
10	3.4	3.4	6.8	2.56043	1.26070	50.0	49.09	303.0	745.0		
13	4.5	4.5	9.0	2.94564	1.44931	56.0	54.99	303.0	745.0		
18	5.4	5.4	10.8	3.22679	1.58697	61.0	59.89	303.0	745.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	745.0		

1	Slope (m)	2.04234	Linear Equation		r^2	0.994699	Pstd(mmHg)	760.0
2	Intercept (b)	-0.01435	Set Point Flow Rate (X) (m^3/min)	1.133	r	0.997346	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)	0	(Pa/Pstd)*(Tstd/Ta)		0.964087198	
Result					C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.981879421	

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla)
Technician

Approved By .....
(Mr.Panupon Podang)
Environmental Scientist

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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

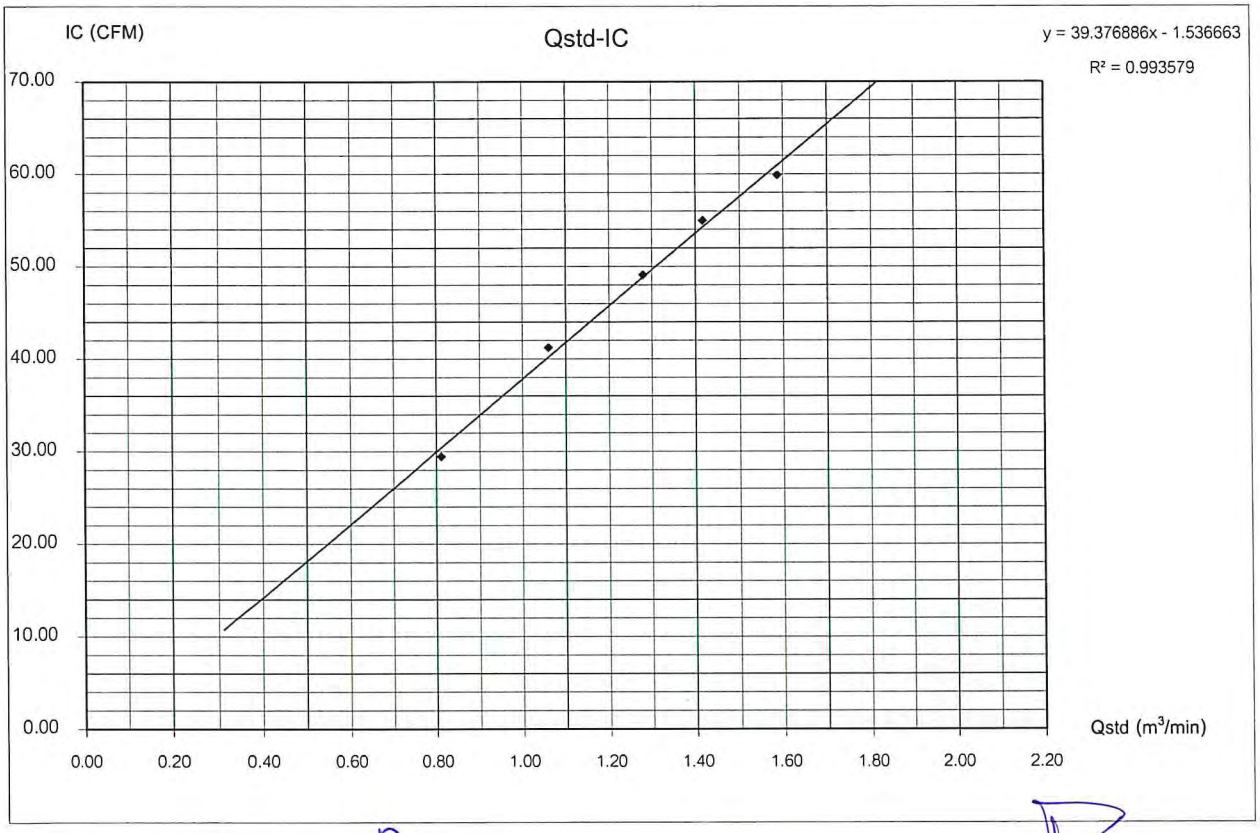
Sampler Location				*Date*	February 17, 2023
วัดบ้านเพชร				*Start Time*	10:42 AM
Sampler Number	PM-10 No.18	Transfer Standard Type	Orifice	*Stop Time*	10:52 AM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Anan Kongngoennok
Motor Serial Number	2139	Calibrator Serial Number	3362		
Recorder Serial Number	2390				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)]	(I) ample Flow Rate Indicatio	(Y) $IC = I[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temparature	Barometric Pressure	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O		(m^3/min)	(ft^3/min)		(°K = °C+273)	(mmHg)		
5	1.4	1.4	2.8	1.64300	0.81149	30.0	29.46	303.0	745.0		
7	2.4	2.4	4.8	2.15119	1.06032	42.0	41.24	303.0	745.0		
10	3.5	3.5	7.0	2.59781	1.27900	50.0	49.09	303.0	745.0		
13	4.3	4.3	8.6	2.87944	1.41690	56.0	54.99	303.0	745.0		
18	5.4	5.4	10.8	3.22679	1.58697	61.0	59.89	303.0	745.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	745.0		

1	Slope (m)	2.04234	Linear Equation			r^2	0.993579	Pstd(mmHg)	760.0
2	Intercept (b)	-0.01435	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9967843	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.964087198	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.981879421	

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla) Technician

Approved By ..... (Mr.Panupon Podang) Environmental Scientist

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

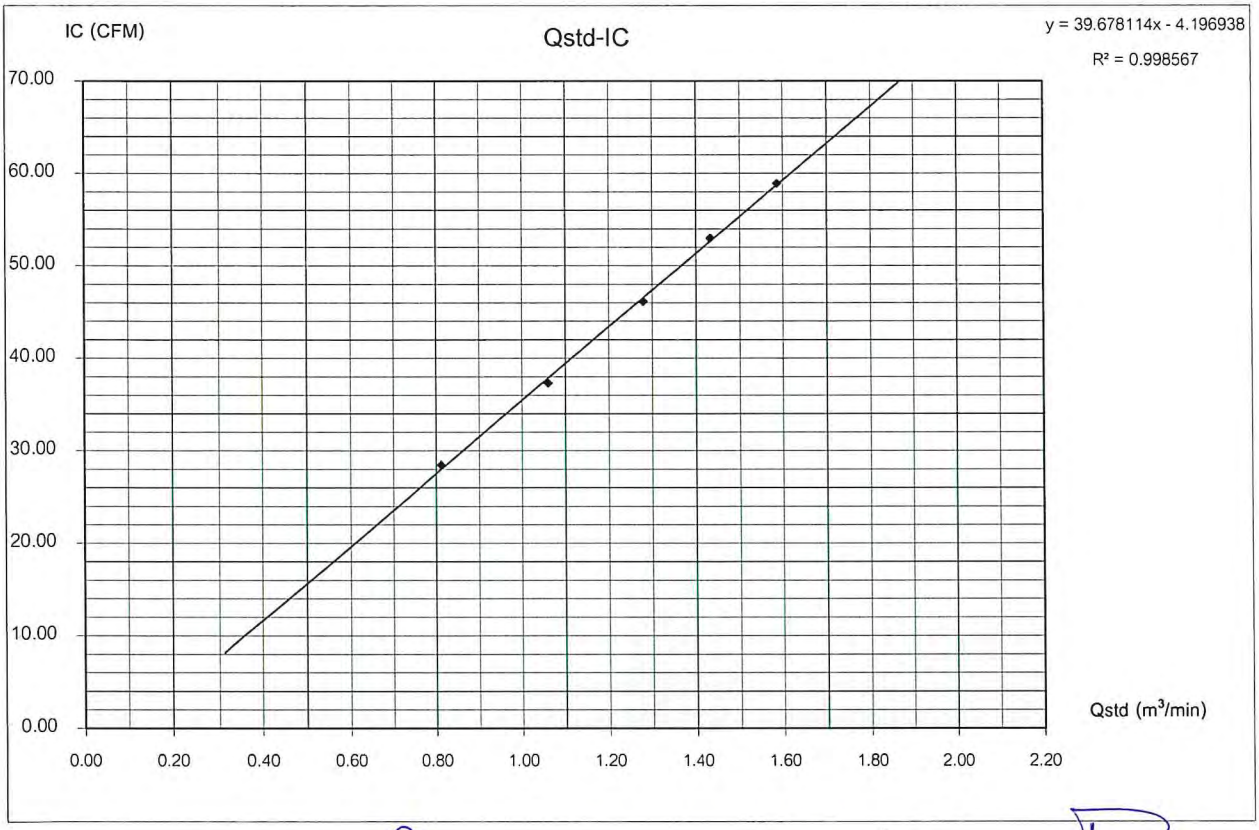
Sampler Location				*Date*	February 16, 2023
โรงเรียนบ้านหนองโสน				*Start Time*	2:07 PM
Sampler Number	TSP No.A3	Transfer Standard Type	Orifice	*Stop Time*	2:17 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Anan Kongngoennok
Motor Serial Number	704	Calibrator Serial Number	3362		
Recorder Serial Number	4651				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I$[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.4	1.4	2.8	1.64300	0.81149	29.0	28.47	303.0	745.0		
7	2.4	2.4	4.8	2.15119	1.06032	38.0	37.31	303.0	745.0		
10	3.5	3.5	7.0	2.59781	1.27900	47.0	46.15	303.0	745.0		
13	4.4	4.4	8.8	2.91273	1.43320	54.0	53.02	303.0	745.0		
18	5.4	5.4	10.8	3.22679	1.58697	60.0	58.91	303.0	745.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	745.0		

1	Slope (m)	2.04234	Linear Equation			r^2	0.998567	Pstd(mmHg)	760.0
2	Intercept (b)	-0.01435	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9992832	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.964087198	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.981879421	

COMMENT

Andersen Instruments, Inc.



Checked By ..... Approved By .....

(Mr. Prayun Detkla)
Technician

(Mr.Panupon Podang)
Environmental Scientist

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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

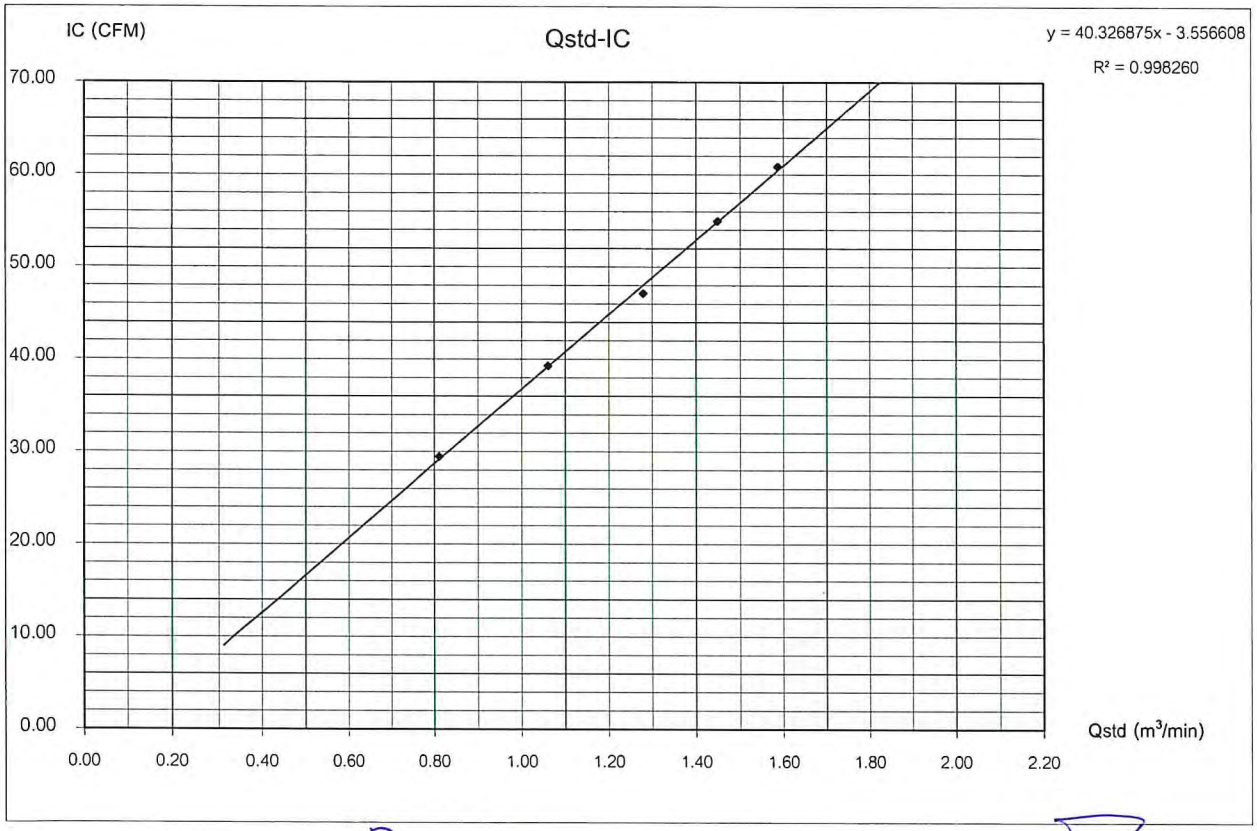
Sampler Location				*Date*	February 16, 2023
โรงเรียนบ้านหนองโสน				*Start Time*	1:57 PM
Sampler Number	PM-10 No.15	Transfer Standard Type	Orifice	*Stop Time*	2:07 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Anan Kongngoennok
Motor Serial Number	B2012-10	Calibrator Serial Number	3362		
Recorder Serial Number	4649				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.4	1.4	2.8	1.64300	0.81149	30.0	29.46	303.0	745.0		
7	2.4	2.4	4.8	2.15119	1.06032	40.0	39.28	303.0	745.0		
10	3.5	3.5	7.0	2.59781	1.27900	48.0	47.13	303.0	745.0		
13	4.5	4.5	9.0	2.94564	1.44931	56.0	54.99	303.0	745.0		
18	5.4	5.4	10.8	3.22679	1.58697	62.0	60.88	303.0	745.0		
Linear Regresstion Y ON X : Y= mX + b							Average	303.0	745.0		

1	Slope (m)	2.04234	Linear Equation			r^2	0.99826	Pstd(mmHg)	760.0
2	Intercept (b)	-0.01435	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9991296	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99993	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.964087198	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.981879421	

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla)
Technician

Approved By ..... (Mr.Panupon Podang)
Environmental Scientist

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

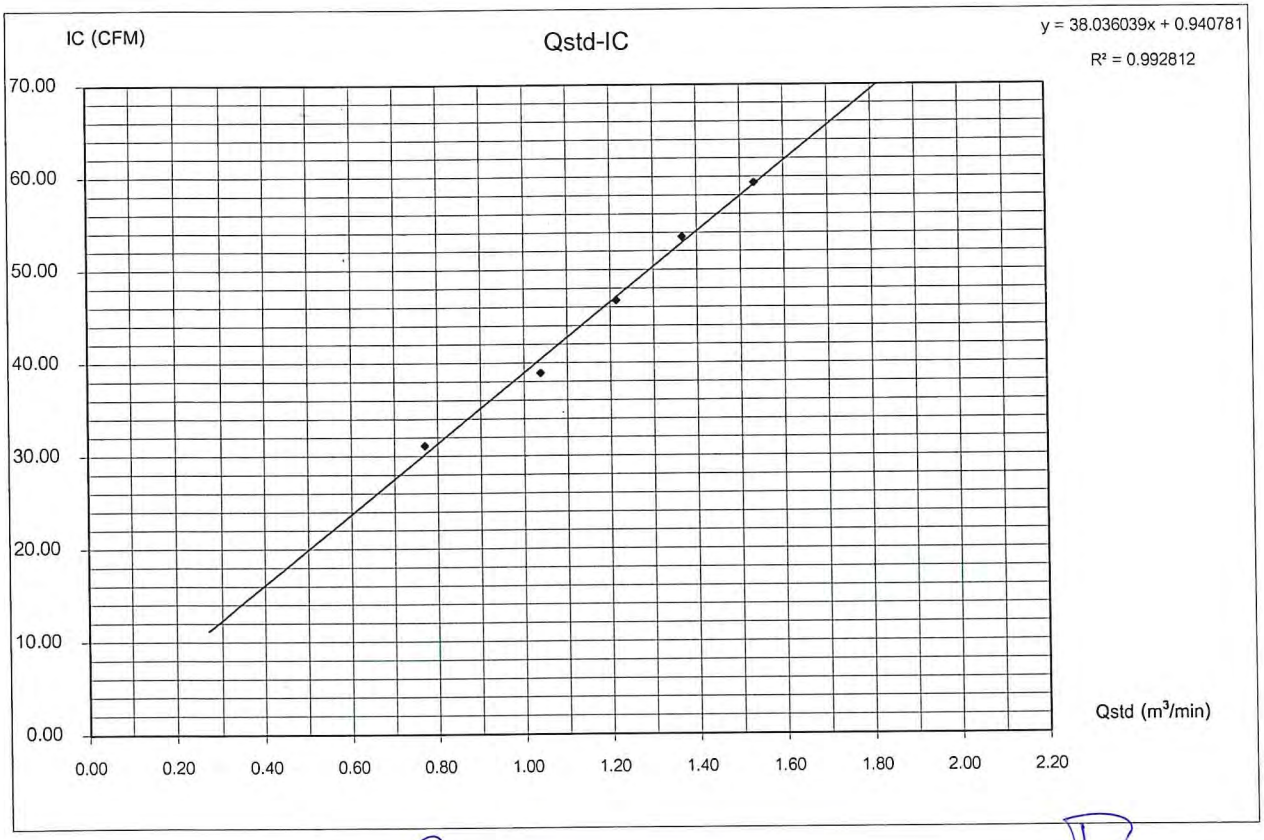
Sampler Location				*Date*	June 6, 2023
โรงเรียนหนองบัวลอย (2022-01772)				*Start Time*	12:27 PM
Sampler Number	TSP No.A23	Transfer Standard Type	Orifice	*Stop Time*	12:37 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Thnisorn Pariman
Motor Serial Number	2055	Calibrator Serial Number	3883		
Recorder Serial Number	2186				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) $IC = I[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.3	1.3	2.6	1.57060	0.76977	32.0	31.17	305.0	738.0		
7	2.4	2.4	4.8	2.13403	1.03813	40.0	38.96	305.0	738.0		
10	3.3	3.3	6.6	2.50237	1.21357	48.0	46.75	305.0	738.0		
13	4.2	4.2	8.4	2.82305	1.36631	55.0	53.57	305.0	738.0		
18	5.3	5.3	10.6	3.17126	1.53216	61.0	59.42	305.0	738.0		
Linear Regresstion Y ON X : Y= mX + b							Average	305.0	738.0		

1	Slope (m)	2.09951	Linear Equation			r^2	0.996912	Pstd(mmHg) 760.0
2	Intercept (b)	-0.04553	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9984548	T_{NTP} 298.0
3	Correlation Coefficient (r)	0.99992	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.948766178
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.974046291

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla)
Technician

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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

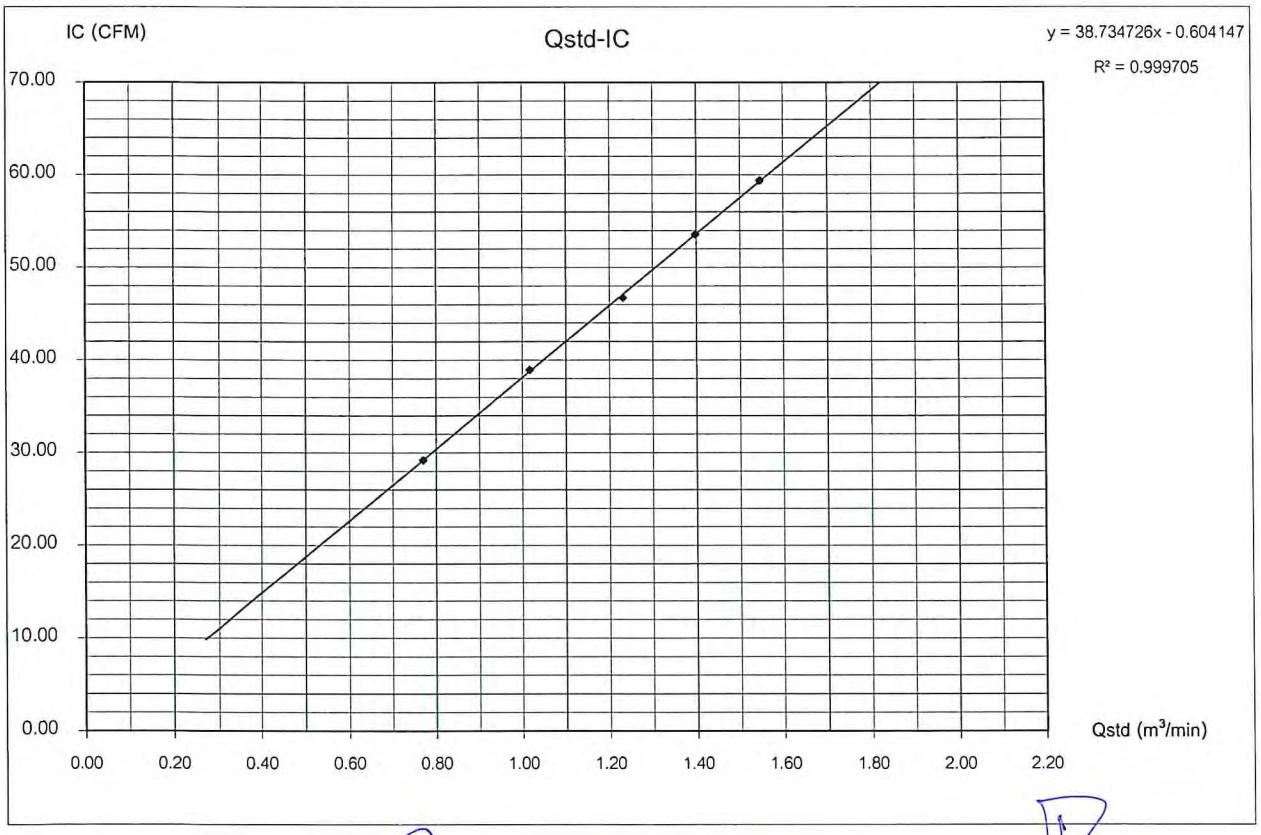
Sampler Location				*Date*	June 6, 2023
โรงเรียนหนองบัวลอย (2022-01772)				*Start Time*	12:17 PM
Sampler Number	PM-10 No.5	Transfer Standard Type	Orifice	*Stop Time*	12:27 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Thnisorn Pariman
Motor Serial Number	2015-5	Calibrator Serial Number	3883		
Recorder Serial Number	R-C21				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature ($^\circ K = ^\circ C+273$)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.3	1.3	2.6	1.57060	0.76977	30.0	29.22	305.0	738.0		
7	2.3	2.3	4.6	2.08910	1.01673	40.0	38.96	305.0	738.0		
10	3.4	3.4	6.8	2.54000	1.23149	48.0	46.75	305.0	738.0		
13	4.4	4.4	8.8	2.88949	1.39795	55.0	53.57	305.0	738.0		
18	5.4	5.4	10.8	3.20104	1.54635	61.0	59.42	305.0	738.0		
Linear Regresstion Y ON X : Y= mX + b							Average	305.0	738.0		

1	Slope (m)	2.09951	Linear Equation			r^2	0.999705	Pstd(mmHg) 760.0
2	Intercept (b)	-0.04553	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9998525	T_{NTP} 298.0
3	Correlation Coefficient (r)	0.99992	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.948766178
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.974046291

COMMENT

Andersen Instruments, Inc.



Checked By .....
(Mr. Prayun Detkla)
Technician

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(Mr.Panupon Podang)
Environmental Scientist

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

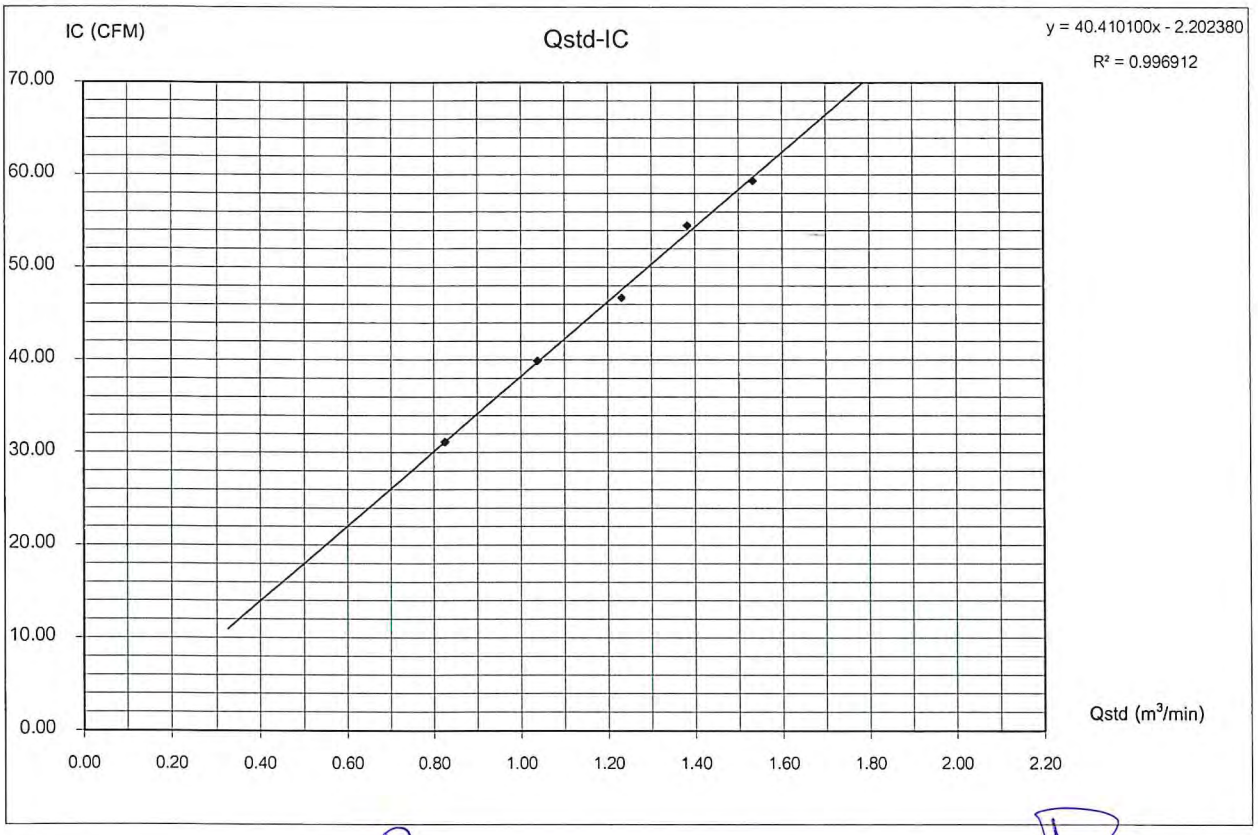
Sampler Location				*Date*	June 6, 2023
โรงเรียนนิคมสร้างตนเองพิมาย 4 (2022-01772)				*Start Time*	11:53 AM
Sampler Number	TSP No.A8	Transfer Standard Type	Orifice	*Stop Time*	12:03 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A		
Motor Serial Number	3680	Calibrator Serial Number	3883	*Calibrated By*	Mr.Thnisorn Pariman
Recorder Serial Number	3767				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I$[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temparature ($°K = °C+273$)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.5	1.5	3.0	1.68710	0.82525	32.0	31.17	305.0	738.0		
7	2.4	2.4	4.8	2.13403	1.03813	41.0	39.94	305.0	738.0		
10	3.4	3.4	6.8	2.54000	1.23149	48.0	46.75	305.0	738.0		
13	4.3	4.3	8.6	2.85646	1.38222	56.0	54.55	305.0	738.0		
18	5.3	5.3	10.6	3.17126	1.53216	61.0	59.42	305.0	738.0		
Linear Regresstion Y ON X : Y= mX + b							Average	305.0	738.0		

1	Slope (m)	2.09951	Linear Equation			r^2	0.996912	Pstd(mmHg)	760.0
2	Intercept (b)	-0.04553	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9984548	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99992	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.948766178	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.974046291	

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla)
Technician

Approved By ..... (Mr.Panupon Podang)
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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

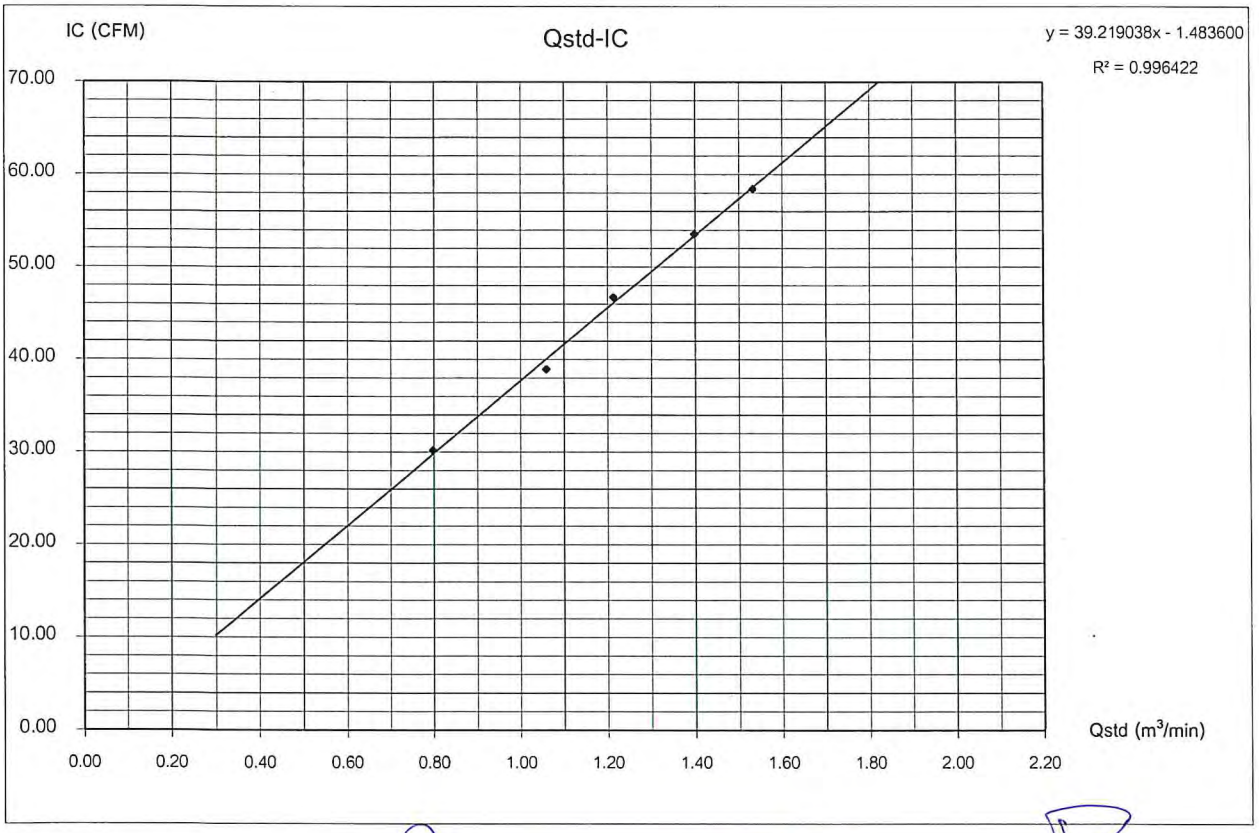
Sampler Location				*Date*	June 6, 2023
โรงเรียนนิคมสร้างตนเองพิมาย 4 (2022-01772)				*Start Time*	11:43 AM
Sampler Number	PM-10 No.13	Transfer Standard Type	Orifice	*Stop Time*	11:53 AM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Thnisorn Pariman
Motor Serial Number	B-TSP-A9	Calibrator Serial Number	3883		
Recorder Serial Number	4654				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature	Barometric Pressure	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O					(°K = °C+273)	(mmHg)		
5	1.4	1.4	2.8	1.62989	0.79801	31.0	30.20	305.0	738.0		
7	2.5	2.5	5.0	2.17803	1.05909	40.0	38.96	305.0	738.0		
10	3.3	3.3	6.6	2.50237	1.21357	48.0	46.75	305.0	738.0		
13	4.4	4.4	8.8	2.88949	1.39795	55.0	53.57	305.0	738.0		
18	5.3	5.3	10.6	3.17126	1.53216	60.0	58.44	305.0	738.0		
Linear Regresstion Y ON X : Y= mX + b							Average	305.0	738.0		

1	Slope (m)	2.09951	Linear Equation			r^2	0.996422	Pstd(mmHg)	760.0
2	Intercept (b)	-0.04553	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9982094	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99992	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.948766178	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.974046291	

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla)
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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

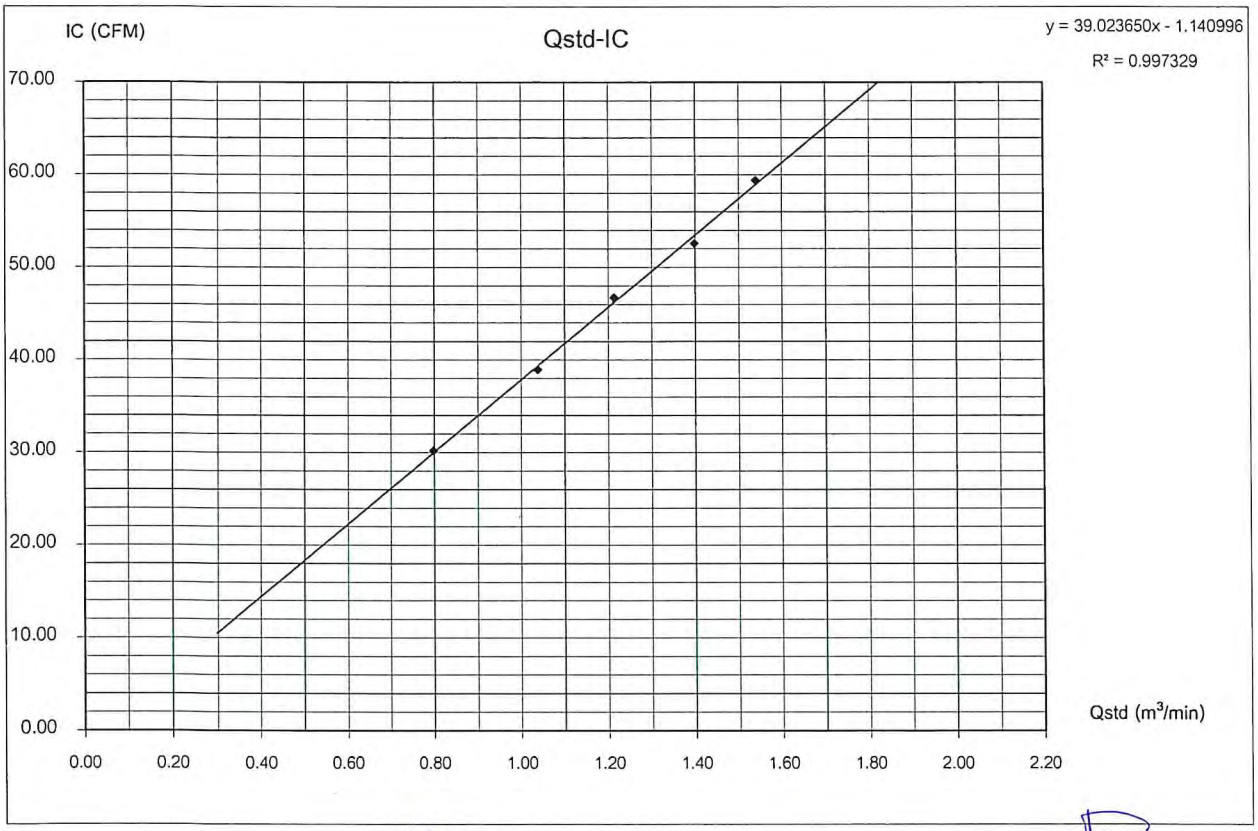
Sampler Location				*Date*	June 6, 2023
วัดบ้านเพชร (2022-01772)				*Start Time*	2:29 PM
Sampler Number	TSP No.A29	Transfer Standard Type	Orifice	*Stop Time*	2:39 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Thnisorn Pariman
Motor Serial Number	2014-02	Calibrator Serial Number	3883		
Recorder Serial Number	2135				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.4	1.4	2.8	1.62989	0.79801	31.0	30.20	305.0	738.0		
7	2.4	2.4	4.8	2.13403	1.03813	40.0	38.96	305.0	738.0		
10	3.3	3.3	6.6	2.50237	1.21357	48.0	46.75	305.0	738.0		
13	4.4	4.4	8.8	2.88949	1.39795	54.0	52.60	305.0	738.0		
18	5.3	5.4	10.7	3.18619	1.53927	61.0	59.42	305.0	738.0		
Linear Regresstion Y ON X : Y= mX + b							Average	305.0	738.0		

1	Slope (m)	2.09951	Linear Equation			r^2	0.997329	Pstd(mmHg)	760.0
2	Intercept (b)	-0.04553	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9986636	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99992	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.948766178	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.974046291	

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla) Technician

Approved By ..... (Mr.Panupon Podang) Environmental Scientist

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Head Office/Tax ID 0105 542 064 981

PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

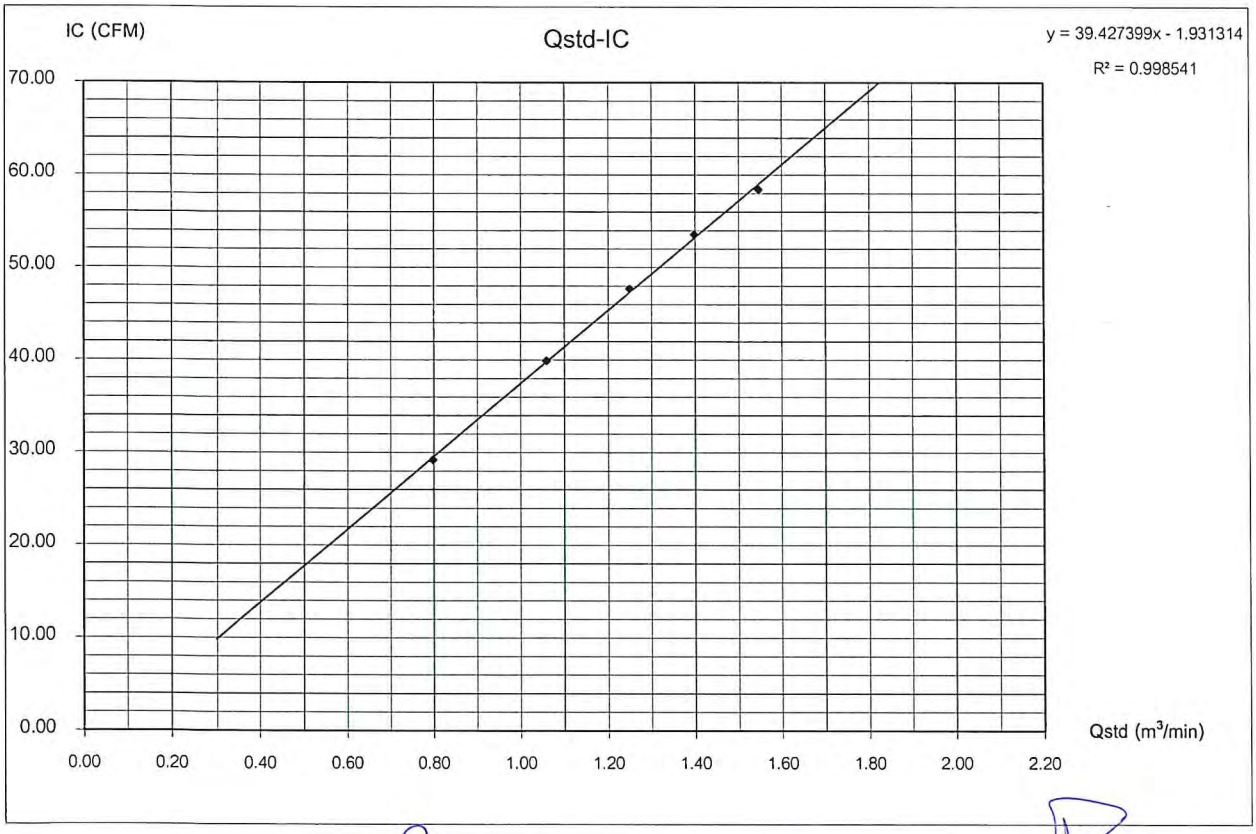
Sampler Location				*Date*	June 6, 2023
วัดบ้านเพชร (2022-01772)				*Start Time*	2:19 PM
Sampler Number	PM-10 No.12	Transfer Standard Type	Orifice	*Stop Time*	2:29 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Thnisorn Pariman
Motor Serial Number	B2012-10	Calibrator Serial Number	3883		
Recorder Serial Number	4650				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.4	1.4	2.8	1.62989	0.79801	30.0	29.22	305.0	738.0		
7	2.5	2.5	5.0	2.17803	1.05909	41.0	39.94	305.0	738.0		
10	3.5	3.5	7.0	2.57708	1.24916	49.0	47.73	305.0	738.0		
13	4.4	4.4	8.8	2.88949	1.39795	55.0	53.57	305.0	738.0		
18	5.4	5.4	10.8	3.20104	1.54635	60.0	58.44	305.0	738.0		
Linear Regresstion Y ON X : Y= mX + b							Average	305.0	738.0		

1	Slope (m)	2.09951	Linear Equation		r^2	0.998541	Pstd(mmHg)	760.0
2	Intercept (b)	-0.04553	Set Point Flow Rate (X) (m^3/min)	1.133	r	0.9992702	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99992	Final Set Flow Rate = (I)	0	(Pa/Pstd)*(Tstd/Ta)		0.948766178	
Result					C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.974046291	

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla)
Technician

Approved By ..... (Mr.Panupon Podang)
Environmental Scientist

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TSP HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

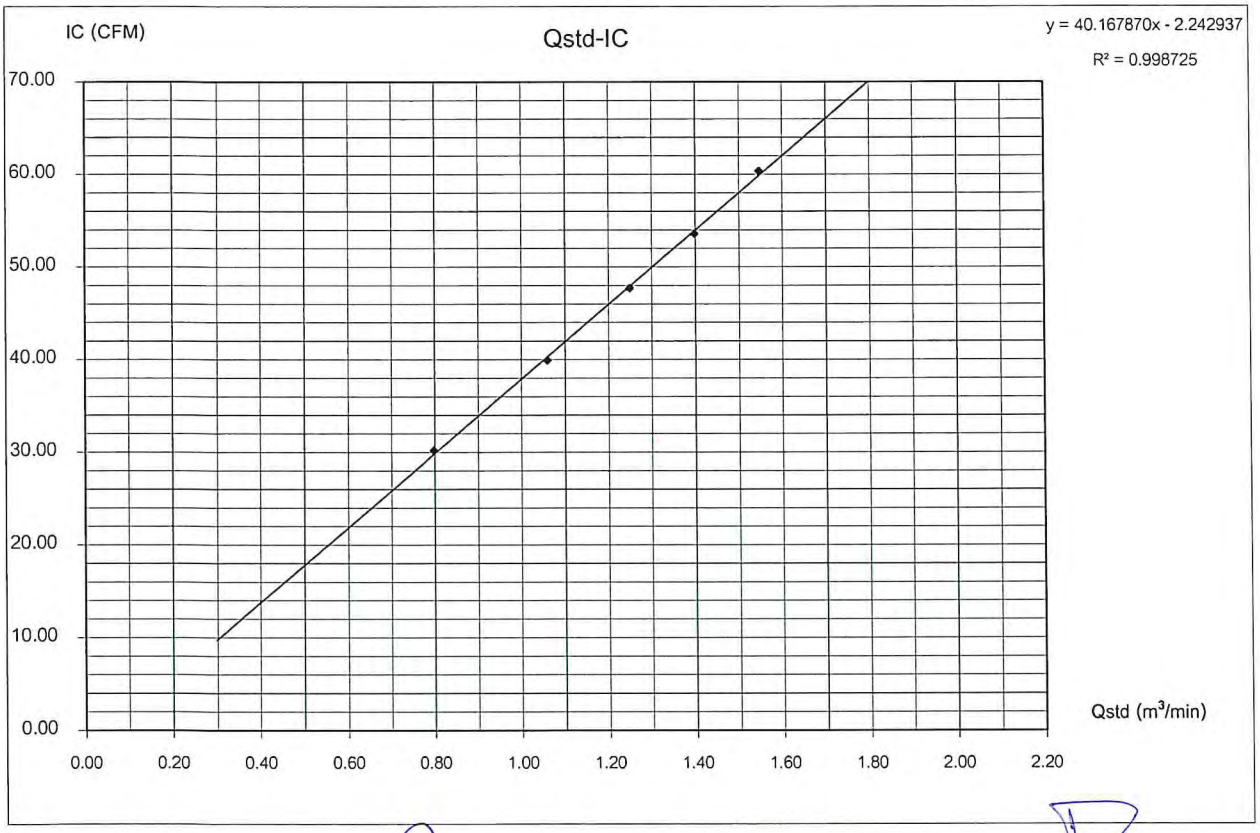
Sampler Location				*Date*	June 6, 2023
โรงเรียนบ้านหนองโสน (2022-01772)				*Start Time*	2:04 PM
Sampler Number	TSP No.A20	Transfer Standard Type	Orifice	*Stop Time*	2:14 PM
Instrument Model	HIVOL-BBCBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Thnisorn Pariman
Motor Serial Number	2142	Calibrator Serial Number	3883		
Recorder Serial Number	2397				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I$[(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.4	1.4	2.8	1.62989	0.79801	31.0	30.20	305.0	738.0		
7	2.5	2.5	5.0	2.17803	1.05909	41.0	39.94	305.0	738.0		
10	3.5	3.5	7.0	2.57708	1.24916	49.0	47.73	305.0	738.0		
13	4.4	4.4	8.8	2.88949	1.39795	55.0	53.57	305.0	738.0		
18	5.4	5.4	10.8	3.20104	1.54635	62.0	60.39	305.0	738.0		
Linear Regresstion Y ON X : Y= mX + b							Average	305.0	738.0		

1	Slope (m)	2.09951	Linear Equation			r^2	0.998725	Pstd(mmHg) 760.0
2	Intercept (b)	-0.04553	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9993623	T_{NTP} 298.0
3	Correlation Coefficient (r)	0.99992	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.948766178
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.974046291

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla) Technician

Approved By ..... (Mr.Panupon Podang) Environmental Scientist

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PM10 HIGH VOLUME AIR SAMPLER CALIBRATION REPORT

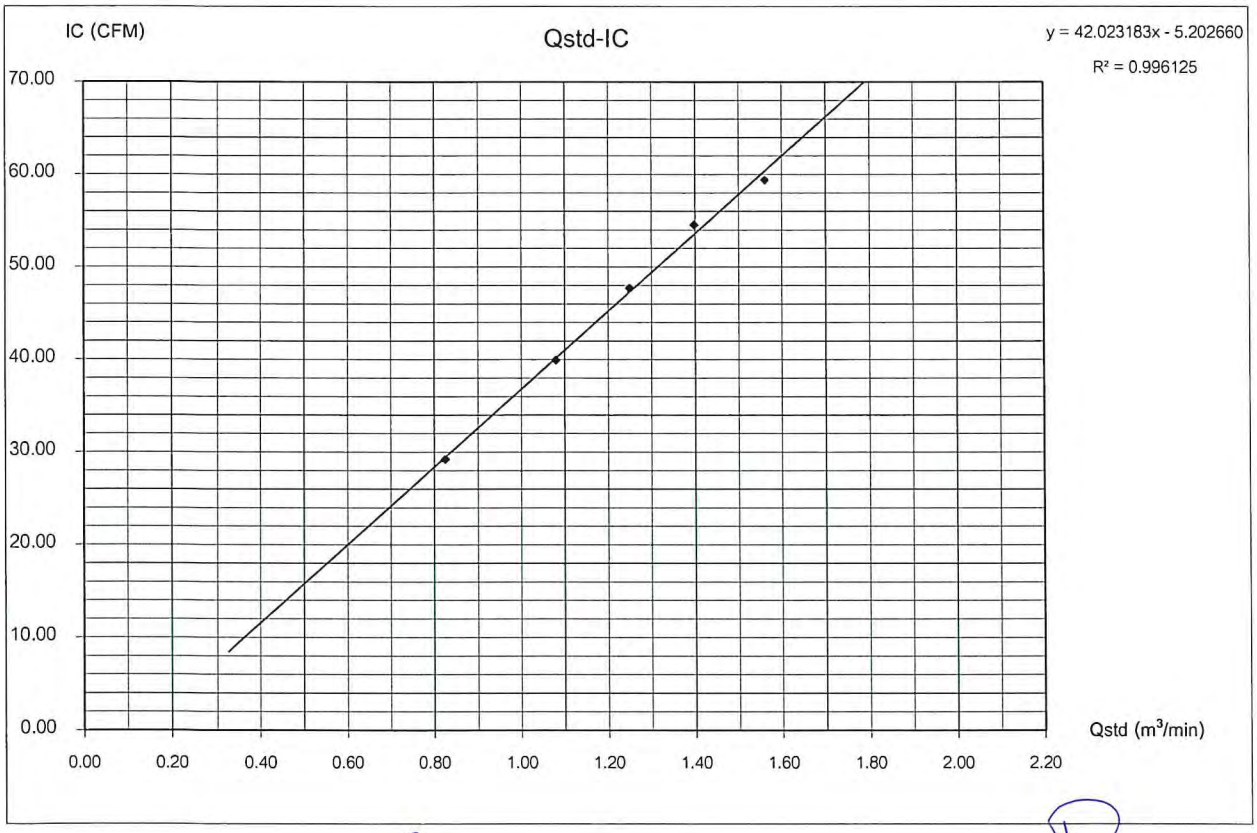
Sampler Location				*Date*	June 6, 2023
โรงเรียนบ้านหนองโสน (2022-01772)				*Start Time*	1:53 PM
Sampler Number	PM-10 No.12	Transfer Standard Type	Orifice	*Stop Time*	2:03 PM
Instrument Model	HIVOL-BMBBE	Calibrator Model	TE-5025A	*Calibrated By*	Mr.Thnisorn Pariman
Motor Serial Number	B2012-10	Calibrator Serial Number	3883		
Recorder Serial Number	4650				

Plate No.	(Delta H) Pressure Drop Across Orifice (inH_2O)			(A) $[\Delta H_2O(Pa/P_{std})(T_{std}/Ta)]^{1/2}$	(X) Qstd = (1/m)[(A-b)] (m^3/min)	(I) ample Flow Rate Indicatio (ft^3/min)	(Y) IC = I[(Pa/P_{std})(T_{std}/Ta)]$^{1/2}$	Temparature (°K = °C+273)	Barometric Pressure (mmHg)	Start Meter	Stop Meter
	Positive	Negative	ΔH_2O								
5	1.5	1.5	3.0	1.68710	0.82525	30.0	29.22	305.0	738.0		
7	2.6	2.6	5.2	2.22117	1.07963	41.0	39.94	305.0	738.0		
10	3.5	3.5	7.0	2.57708	1.24916	49.0	47.73	305.0	738.0		
13	4.4	4.4	8.8	2.88949	1.39795	56.0	54.55	305.0	738.0		
18	5.5	5.5	11.0	3.23055	1.56040	61.0	59.42	305.0	738.0		
Linear Regresstion Y ON X : Y= mX + b							Average	305.0	738.0		

1	Slope (m)	2.09951	Linear Equation			r^2	0.996125	Pstd(mmHg)	760.0
2	Intercept (b)	-0.04553	Set Point Flow Rate (X) (m^3/min)		1.133	r	0.9980606	T_{NTP}	298.0
3	Correlation Coefficient (r)	0.99992	Final Set Flow Rate = (I)		0	(Pa/Pstd)*(Tstd/Ta)		0.948766178	
Result						C=(Pa/Pstd)*(Tstd/Ta)^0.5		0.974046291	

COMMENT

Andersen Instruments, Inc.



Checked By ..... (Mr. Prayun Detkla) Technician

Approved By ..... (Mr.Panupon Podang) Environmental Scientist

TISCH Environmental

RECALIBRATION DUE DATE:
January 17, 2024

Certificate of Calibration

Calibration Certification Information				
Cal. Date:	January 17, 2023	**Rootsmeter S/N:** 438320	**Ta:** 295	°K
Operator:	Jim Tisch		**Pa:** 740.2	mm Hg
Calibration Model #:	TE-5025A	**Calibrator S/N:** **3362**		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4140	3.2	2.00
2	3	4	1	0.9920	6.4	4.00
3	5	6	1	0.8930	8.0	5.00
4	7	8	1	0.8490	8.8	5.50
5	9	10	1	0.7000	12.8	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H\left(Ta/Pa\right)}$ (y-axis)
0.9795	0.6927	1.4027	0.9957	0.7042	0.8928
0.9753	0.9832	1.9837	0.9914	0.9993	1.2626
0.9732	1.0898	2.2179	0.9892	1.1077	1.4117
0.9721	1.1450	2.3261	0.9881	1.1639	1.4806
0.9668	1.3811	2.8054	0.9827	1.4039	1.7856
QSTD	**m=**	**2.04234**	**QA**	**m=**	**1.27888**
	b=	**-0.01435**		**b=**	**-0.00913**
	r=	**0.99993**		**r=**	**0.99993**

Calculations

Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	**Va=**	ΔVol((Pa-ΔP)/Pa)
Qstd=	Vstd/ΔTime	**Qa=**	Va/ΔTime

For subsequent flow rate calculations:

Qstd= $1/m\left(\left(\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}\right)-b\right)$

Qa= $1/m\left(\left(\sqrt{\Delta H\left(Ta/Pa\right)}\right)-b\right)$

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg

Key
ΔH: calibrator manometer reading (in H2O)
ΔP: rootsmeter manometer reading (mm Hg)
Ta: actual absolute temperature (°K)
Pa: actual barometric pressure (mm Hg)
b: intercept
m: slope

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

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ge of Cleves, OH 45002

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TOLL FREE: (877)263-7610
FAX: (513)467-9009

TISCH Environmental

RECALIBRATION DUE DATE:
January 17, 2024

Certificate of Calibration

Calibration Certification Information				
Cal. Date:	January 17, 2023	**Rootsmeter S/N:** 438320	**Ta:** 295	°K
Operator:	Jim Tisch		**Pa:** 740.2	mm Hg
Calibration Model #:	TE-5025A	**Calibrator S/N:** **3883**		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4140	3.2	2.00
2	3	4	1	1.0110	6.4	4.00
3	5	6	1	0.9050	8.0	5.00
4	7	8	1	0.8620	8.8	5.50
5	9	10	1	0.7100	12.9	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H\left(Ta/Pa\right)}$ (y-axis)
0.9795	0.6927	1.4027	0.9957	0.7042	0.8928
0.9753	0.9647	1.9837	0.9914	0.9806	1.2626
0.9732	1.0753	2.2179	0.9892	1.0930	1.4117
0.9721	1.1277	2.3261	0.9881	1.1463	1.4806
0.9666	1.3615	2.8054	0.9826	1.3839	1.7856
QSTD	**m=**	**2.09951**	**QA**	**m=**	**1.31468**
	b=	**-0.04553**		**b=**	**-0.02898**
	r=	**0.99992**		**r=**	**0.99992**

Calculations

Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	**Va=**	ΔVol((Pa-ΔP)/Pa)
Qstd=	Vstd/ΔTime	**Qa=**	Va/ΔTime

For subsequent flow rate calculations:

Qstd= $1/m\left(\left(\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}\right)-b\right)$

Qa= $1/m\left(\left(\sqrt{\Delta H\left(Ta/Pa\right)}\right)-b\right)$

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg
Key	
ΔH: calibrator manometer reading (in H2O)	
ΔP: rootsmeter manometer reading (mm Hg)	
Ta: actual absolute temperature (°K)	
Pa: actual barometric pressure (mm Hg)	
b: intercept	
m: slope	

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

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FAX: (513)467-9005

Calibration Certificate ID
TH2036-001-011723-ACC-TH

METTLER TOLEDO

Mettler-Toledo (Thailand) Ltd.
846/4 - 846/5 Lasalle Rd., Bangna Tai Sub-District
Bangna District, Bangkok 10260
+66 2723 0382
MT-TH.ServiceSupport@mt.com

NSC-TISI-TIS 17025
CALIBRATION 0062

Accuracy Calibration Certificate

Customer

Company:	Environment Research & Technology Co., Ltd.		
Address:	25/114 Moo 6, Soi Chinaket 1, Ngamwongwan Rd., Toongsonghong		
City:	Laksi	**Contact:**	Ramita Taengthai
Zip / Postal:	10210		
State / Province:	Bangkok		
Order Number:	*0332617856*		

Weighing Device

Manufacturer:	Mettler Toledo	**Instrument Type:**	Weighing Instrument
Model:	AB204-S	**Asset Number:**	ERTC-L-IN-0048
Serial No.:	1123103723	**Terminal Model:**	N/A
Building:	N/A	**Terminal Serial No.:**	N/A
Floor:	4	**Terminal Asset No.:**	N/A
Room:	406		

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

Procedure

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

This calibration certificate contains measurements for As Found and As Left calibrations.

The sensitivity/span of the weighing instrument was adjusted before As Found and As Left calibrations with a built-in weight.

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

	Temperature		Humidity	
As Found	Start: 23.6 °C	End: 23.5 °C	Start: 34.6 %	End: 35.1 %
As Left	Start: 23.6 °C	End: 23.5 °C	Start: 35.0 %	End: 35.7 %

As Found Calibration Date:	17-Jan-2023	**Calibrator:**	Chawalit Martsuloke
As Left Calibration Date:	17-Jan-2023		
Issue Date:	19-Jan-2023	**Approved Signatory:**	Technical Manager / Head of Calibration Center

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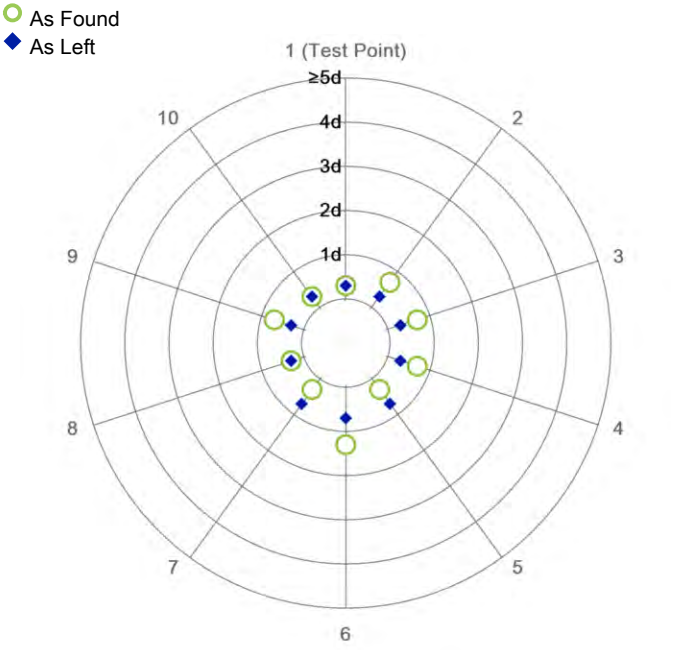
Measurement Results

Repeatability

Test Load: 100 g

	As Found	As Left
1	99.9992 g	100.0001 g
2	99.9991 g	100.0001 g
3	99.9991 g	100.0001 g
4	99.9991 g	100.0001 g
5	99.9992 g	100.0002 g
6	99.9993 g	100.0002 g
7	99.9992 g	100.0002 g
8	99.9992 g	100.0001 g
9	99.9991 g	100.0001 g
10	99.9992 g	100.0001 g

Standard Deviation	**0.00007 g**	**0.00005 g**



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

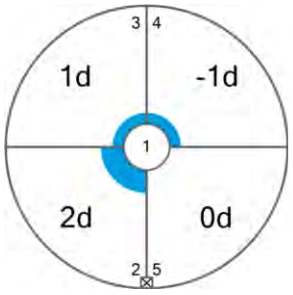
The results of this graph are based upon the absolute values of the differences from the mean value.

Eccentricity

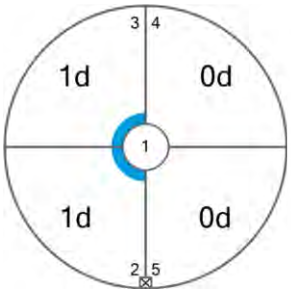
Test Load: 100 g

Position	As Found	As Left
1	99.9991 g	100.0001 g
2	99.9993 g	100.0002 g
3	99.9992 g	100.0002 g
4	99.9990 g	100.0001 g
5	99.9991 g	100.0001 g

Maximum Deviation	**0.0002 g**	**0.0001 g**



As Found



As Left

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

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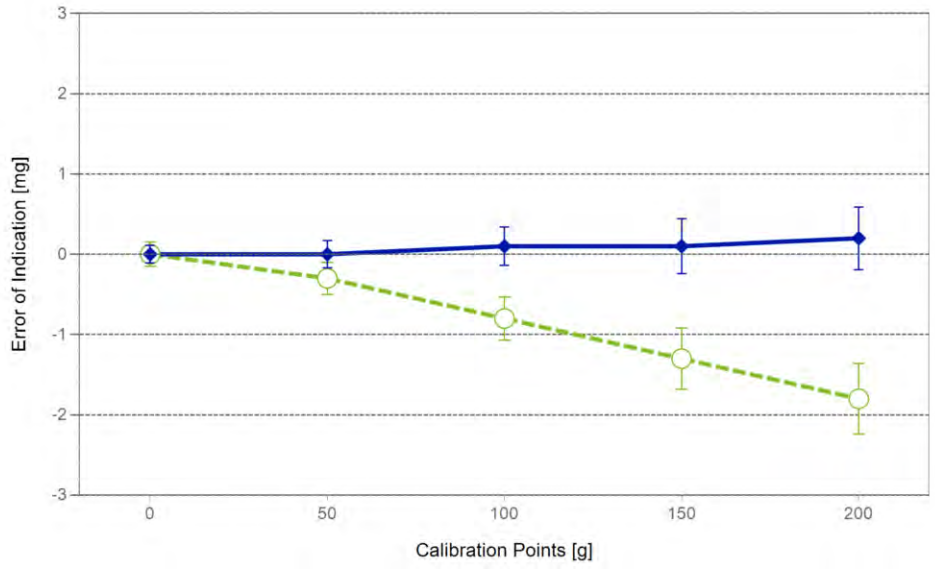
Error of Indication

As Found

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.15 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.16 mg	2
3	0.1000 g	0.0999 g	-0.0001 g	0.16 mg	2
4	0.5000 g	0.4999 g	-0.0001 g	0.16 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.16 mg	2
6	5.0000 g	5.0001 g	0.0001 g	0.16 mg	2
7	10.0000 g	10.0001 g	0.0001 g	0.17 mg	2
8	50.0000 g	49.9997 g	-0.0003 g	0.20 mg	2
9	100.0000 g	99.9992 g	-0.0008 g	0.27 mg	2
10	150.0000 g	149.9987 g	-0.0013 g	0.38 mg	2
11	200.0000 g	199.9982 g	-0.0018 g	0.44 mg	2

As Left

	Reference Value	Indication	Error of Indication	Expanded Uncertainty	k
1	0.0000 g	0.0000 g	0.0000 g	0.11 mg	2
2	0.0500 g	0.0500 g	0.0000 g	0.13 mg	2
3	0.1000 g	0.1000 g	0.0000 g	0.13 mg	2
4	0.5000 g	0.5000 g	0.0000 g	0.13 mg	2
5	1.0000 g	1.0000 g	0.0000 g	0.13 mg	2
6	5.0000 g	5.0001 g	0.0001 g	0.13 mg	2
7	10.0000 g	10.0000 g	0.0000 g	0.14 mg	2
8	50.0000 g	50.0000 g	0.0000 g	0.17 mg	2
9	100.0000 g	100.0001 g	0.0001 g	0.24 mg	2
10	150.0000 g	150.0001 g	0.0001 g	0.34 mg	2
11	200.0000 g	200.0002 g	0.0002 g	0.39 mg	2



As Found

As Left

For improved legibility of the graphics only increasing measurement points are shown and measurement points close to zero are not displayed.

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

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

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Test Equipment

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

Weight Set 1: OIML E2

Weight Set No.:	WS57	Date of Issue:	06-Jan-2022
Certificate Number:	177037	Calibration Due Date:	03-Jul-2023

Thermo Hygrometer

Equipment No.:	IN255	Date of Issue:	20-Jul-2022
Certificate Number:	22H1503	Calibration Due Date:	04-Jul-2023

Remarks

Equipment condition: Good

Next calibration according to customer's procedure

Calibration data not decide by calibration laboratory

End of Accredited Section

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

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Measurement Uncertainty of the Weighing Instrument in Use

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

Temperature coefficient for the evaluation of the measurement uncertainty in use: $3.0 \cdot 10^{-6}$ / K

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

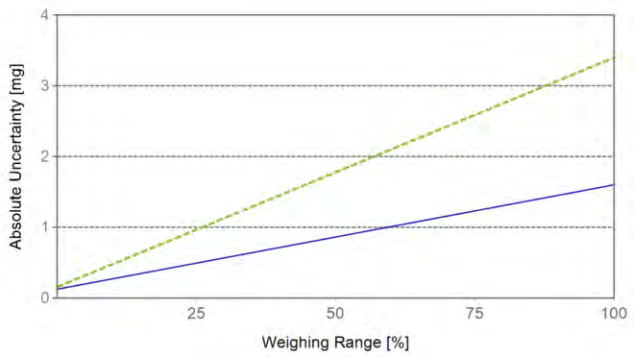
Linearization of Uncertainty Equation

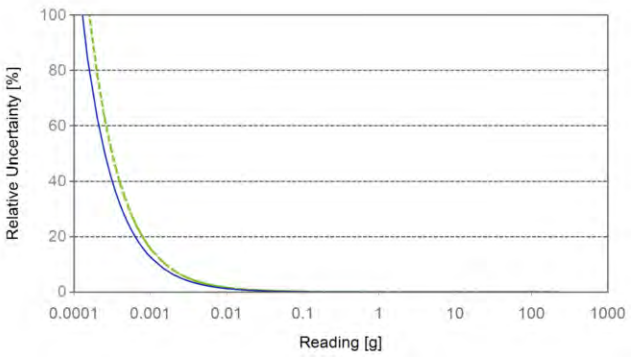
Range			As Found	As Left
	d	Max		
1	0.0001 g	220 g	U_1 = 0.16 mg + 0.0147 mg/g · R	U_1 = 0.13 mg + 0.00671 mg/g · R

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

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

Net Indication	As Found		As Left	
0.0220 g	0.16 mg	0.73%	0.13 mg	0.59%
0.2200 g	0.16 mg	0.074%	0.13 mg	0.060%
2.2000 g	0.19 mg	0.0087%	0.14 mg	0.0066%
22.0000 g	0.48 mg	0.0022%	0.28 mg	0.0013%
220.0000 g	3.4 mg	0.0015%	1.6 mg	0.00073%





As Found As Left

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GWP® Certificate

As Found

The weighing device meets the given process requirements.

As Left

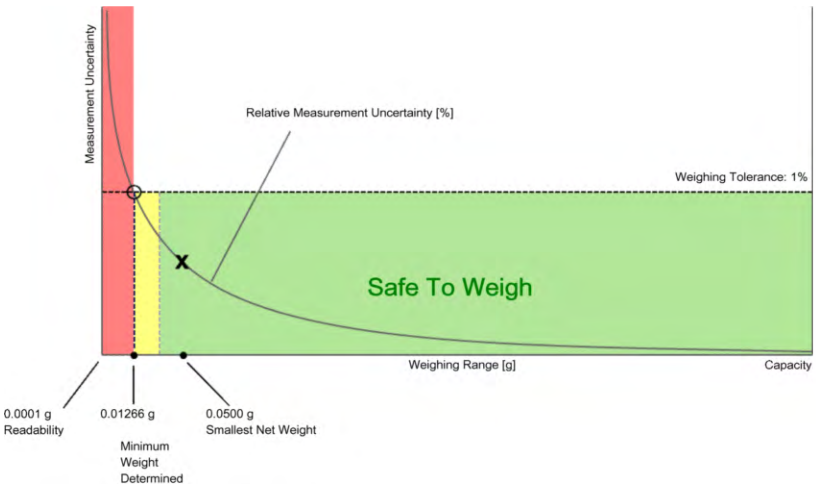
The weighing device meets the given process requirements.

Tests Performed: ☑ As Found ☑ As Left

Process Requirements

Weighing Tolerance: **1%** | Smallest Net Weight: **0.0500 g** | Safety Factor: **2**

Safe Weighing Range



While the values in this graph reflect the actual calibration results, the measurement uncertainty curves are simply a visual representation. This graph reflects As Left testing, unless only As Found was performed.

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Minimum Weight

As Found Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	**1**	**2**	**3**	**5**	**10**
0.1%	0.16012 g	0.32511 g	0.49518 g	0.85155 g	1.85026 g
0.2%	0.07947 g	0.16012 g	0.24199 g	0.40949 g	0.85155 g
0.5%	0.03165 g	0.06348 g	0.09550 g	0.16012 g	0.32511 g
1%	0.01580 g	0.03165 g	0.04754 g	0.07947 g	0.16012 g
2%	0.00789 g	0.01580 g	0.02372 g	0.03959 g	0.07947 g
5%	0.00316 g	0.00631 g	0.00947 g	0.01580 g	0.03165 g

Pass: The determined minimum weight meets the requirement for the smallest net weight.

As Left Minimum Weight Table

Minimum weights for different weighing tolerances and safety factors					
	Safety Factor				
Tolerance	**1**	**2**	**3**	**5**	**10**
0.1%	0.12735 g	0.25642 g	0.38726 g	0.65440 g	1.35584 g
0.2%	0.06346 g	0.12735 g	0.19166 g	0.32162 g	0.65440 g
0.5%	0.02533 g	0.05073 g	0.07620 g	0.12735 g	0.25642 g
1%	0.01266 g	0.02533 g	0.03802 g	0.06346 g	0.12735 g
2%	0.00633 g	0.01266 g	0.01899 g	0.03168 g	0.06346 g
5%	0.00253 g	0.00506 g	0.00759 g	0.01266 g	0.02533 g

Pass: The determined minimum weight meets the requirement for the smallest net weight.

At these net minimum weight values, the measurement uncertainty of the weighing device is equal to or less than 1/1 (no safety factor), 1/2, 1/3, 1/5, or 1/10 of the required tolerance. The values are calculated with k = 2 and based on the linear formula of the measurement uncertainty of the weighing device in use.

The safety factor for As Found is always 1. This implies no safety factor. As Found testing looks at the behavior of the instrument from the past until test occurred. For the past, it is necessary to know that the tolerance was met, but not the safety factor. The safety factor is a proactive measure to apply for future measurements.

Notes on minimum weight values in above table:

1. If "N/A" is shown above, no appropriate value could be calculated.
2. METTLER TOLEDO is not responsible for the definition of the process requirements.

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Measurement Results

Results Summary

	Repeatability	Eccentricity	Error of Indication
As Found	✓	✓	✓
As Left	✓	✓	✓

✓ = Passed

✗ = Failed

⚠ = Safety Factor not met

Repeatability

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Std. Deviation	Result	Std. Deviation	Result
0.1%	N/A	0.00007 g*	N/A	0.00005 g*	N/A
0.2%	0.00005 g		✗		⚠
0.5%	0.00013 g		✓		✓
1%	0.00025 g		✓		✓
2%	0.00050 g		✓		✓
5%	0.00125 g		✓		✓

*The calculated standard deviation value is below the rounding error of the balance. The 0.41*d rule is used for the assessment of this repeatability test and the calculation of the minimum weight.

The weighing tolerance is met if the standard deviation is less than or equal to the corresponding control limit.

Eccentricity

Test Load: 100 g

		As Found		As Left	
Tolerance	Control Limit	Deviation	Result	Deviation	Result
0.1%	0.0500 g	0.0002 g	✓	0.0001 g	✓
0.2%	0.1000 g		✓		✓
0.5%	0.2500 g		✓		✓
1%	0.5000 g		✓		✓
2%	1.0000 g		✓		✓
5%	2.5000 g		✓		✓

The weighing tolerance is met if the deviation is less than or equal to the corresponding control limit.

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METTLER TOLEDO Service

Error of Indication

As Found

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	-0.0003 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0000 g	-0.0008 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0000 g	-0.0013 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	-0.0018 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

As Left

		Control limits for various weighing tolerances					
Reference Value	Error	0.1%	0.2%	0.5%	1%	2%	5%
0.0000 g	0.0000 g	N/A	N/A	N/A	N/A	N/A	N/A
50.0000 g	0.0000 g	0.0250 g	0.0500 g	0.1250 g	0.2500 g	0.5000 g	1.2500 g
100.0000 g	0.0001 g	0.0500 g	0.1000 g	0.2500 g	0.5000 g	1.0000 g	2.5000 g
150.0000 g	0.0001 g	0.0750 g	0.1500 g	0.3750 g	0.7500 g	1.5000 g	3.7500 g
200.0000 g	0.0002 g	0.1000 g	0.2000 g	0.5000 g	1.0000 g	2.0000 g	5.0000 g
Result		✓	✓	✓	✓	✓	✓

The weighing tolerance is met if the error (of indication) for each test point is less than or equal to the corresponding control limit for that particular weighing tolerance. Results at or close to the zero point cannot be assessed.

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Calibration Data of NOx Analyzer

Analyzer Performance Test

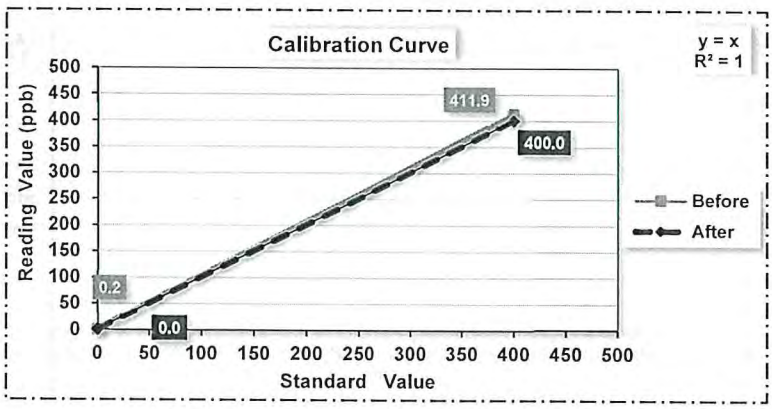
Equipment	Gas Analyzer (NOx)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APNA-370	**Scientist**	Panupon
Serial No.	KPACV8NA	**Calibration Date**	February 3, 2023
Analyzer Unit	ppb	**Time**	1:35 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value**								**% Abs Error**
		NO_x (ppb)		**NO (ppb)**		**NO_2 (ppb)**		**Stability**		
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	
Zero	0	0.6	0.0	0.2	0.0	0.4	0.0	-	-	-
Span	400	399.7	400.0	411.9	400.0	-12.2	0.0	-	-	3.0



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	0.9	1.1	Voltage of the measured NO value
Signal NOx	mV	13.4	12.8	Voltage of the measured NOx value
Detector	°C	42.3	42.3	43 °C ± 5 °C
Ambient	kPa	101.3	101.2	Current atmospheric pressure
DC 24V	V	23.8	23.8	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	1.19260	1.16020	0.50000 - 2.0000
NOx Slope	-	1.15730	1.21940	0.50000 - 2.0000

Calibrate By :
(MR.PANUPON PODANG)
February 3, 2023

Checked By :
(MS.SUTATIP IM-NOI)
February 3, 2023

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

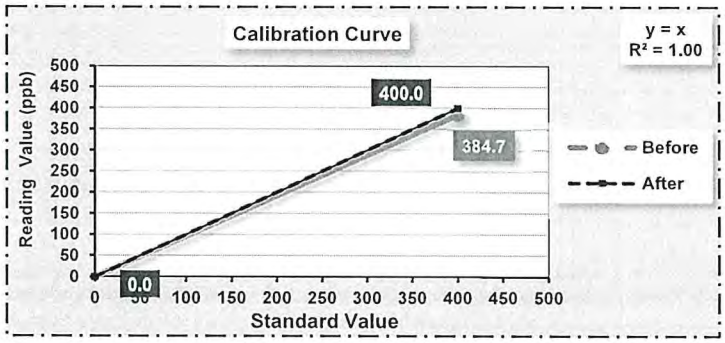
Equipment	Gas Analyzer (SO_2)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	Horiba	**Location**	Envi Research
Model	APSA-370	**Scientist**	Panupon
Serial No.	J000EMWB	**Calibration Date**	February 15, 2023
Analyzer Unit	ppb	**Time**	3:59 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppb)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	-0.1	0.0	-	-	-
Span	400	384.7	400.0	-	-	3.8



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL APSA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal (SO_2)	mV	20.9	22.9	Voltage of the measured SO2 value
LAMP	mV	240.9	242.7	200 mV - 1200 mV
CELL	°C	30.5	31.8	Ambient temperature + 5 °C - 15 °C
PUMP	Kpa	43.9	44.2	65 kPa or less
AMBIENT	kPa	101.0	101.6	Current atmospheric pressure
DC 24V	V	24.0	24.0	24 V ±0.5 V
DC 5V	V	4.9	4.9	5 V ±0.5 V

Calibrate By : (MR.PANUPON PODANG)
February 15, 2023

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Checked By : (MS.SUTATIP IM-NOI)
February 15, 2023

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Calibration Data of CO Analyzer

Analyzer Performance Test

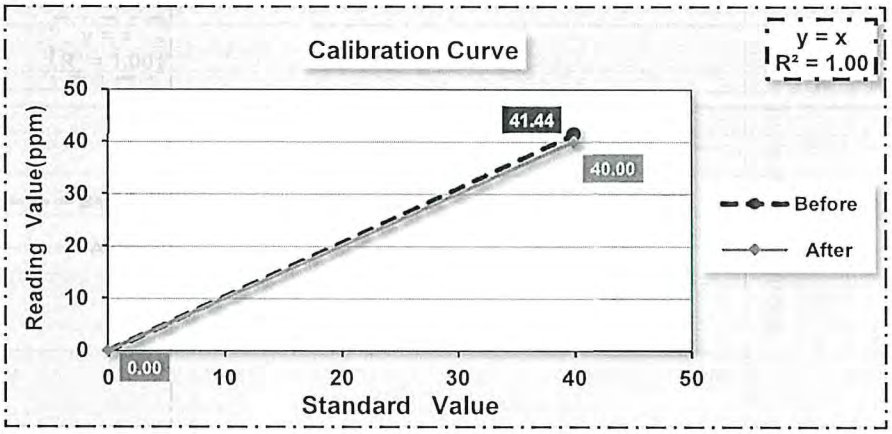
Equipment	Gas Analyzer (CO)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Scientist**	Panupon
Serial No.	YKAC090F	**Calibration Date**	February 9, 2023
Analyzer Unit	ppm	**Time**	3:06 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,487 ppm		
Cylinder No : EB0123013	NO = 46.1 ppm		
Expire Date : Oct 22, 2027	SO_2 = 46.0 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	-0.04	0.00	-	-	-
Span	40	41.44	40.00	-	-	3.60



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	3.5	4.1	Voltage of the measured CO Value
SIGNAL (COMP)	mV	0.2	0.3	Voltage of the interference component Value
CELL	°C	35.2	35.2	Ambient + (5 to 10 C)
PUMP	kpa	40.7	40.7	less than 65
AMBIENT	kpa	101.2	101.2	Atmospheric pressure
DC 24V	mV	23.9	23.9	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By : (MR.PANUPON PODANG)
February 9, 2023

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Checked By : (MS.SUTATIP IM-NOI)
February 9, 2023

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Calibration Data of NOx Analyzer

Analyzer Performance Test

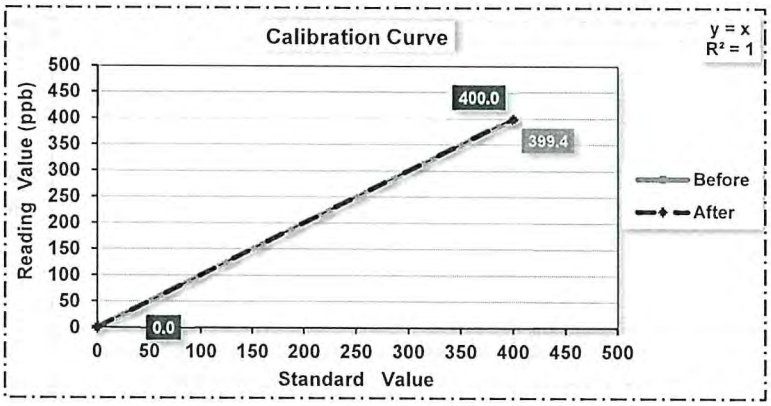
Equipment	Gas Analyzer (NOx)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APNA-370	**Scientist**	Panupon
Serial No.	J6GUBA4N	**Calibration Date**	July 29, 2019
Analyzer Unit	ppb	**Time**	6:08 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value**								**% Abs Error**
		NO_x (ppb)		**NO (ppb)**		**NO_2 (ppb)**		**Stability**		
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	
Zero	0	-0.1	0.0	-0.2	0.0	0.1	0.0	-	-	-
Span	400	401.5	400.0	399.4	400.0	2.1	0.0	-	-	0.2



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	0.4	0.4	Voltage of the measured NO value
Signal NOx	mV	5.0	5.6	Voltage of the measured NOx value
Detector	°C	40.5	40.5	43 °C ± 5 °C
Ambient	kPa	100.4	100.4	Current atmospheric pressure
DC 24V	V	23.6	23.6	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.90232	0.90314	0.50000 - 2.0000
NOx Slope	-	0.85254	0.86102	0.50000 - 2.0000

Calibrate By : **(MR.PANUPON PODANG)**
July 29, 2019

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Checked By : **(MS.SUTATIP IM-NOI)**
July 29, 2019

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

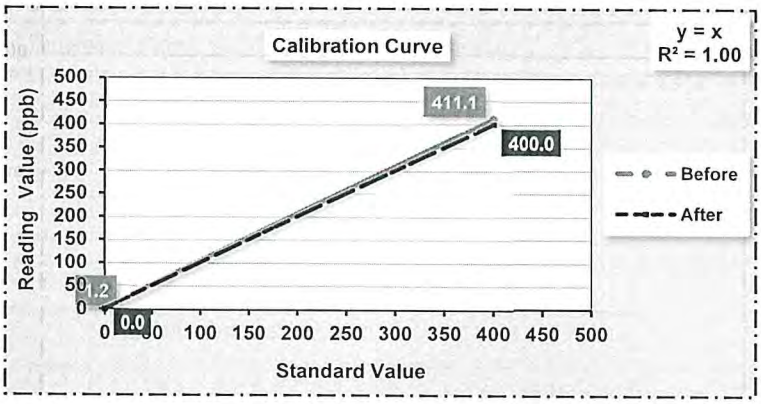
Equipment	Gas Analyzer (SO_2)	**Costomer Name**	อุตสาหกรรมโคราช
Manufacture	Thermo	**Location**	Envi Research
Model	43C	**Scientist**	Panupon
Serial No.	0335804022	**Calibration Date**	January 23, 2023
Analyzer Unit	ppb	**Time**	1:22 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value (ppb)**		**Stability**		**% Abs Error**
		Before	**After**	**Before**	**After**	
Zero	0	1.2	0.0	-	-	-
Span	400	411.1	400.0	-	-	2.8



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL 43C

Parameter	**Display As**	**Unit**	**Observed Value**		**Nominal Range**
			Before Adjust	**After Adjust**	
Range	**RANGE**	ppb	500	500	0 - 500 standard
Internal Temperature	**INTERNAL**	°c	30.9	31.5	8.0 °C to 47.0 °C
Chamber Temp	**CHAMBER**	°c	44.5	44.5	43.0 °C to 47.0 °C
Pressure	**PRESSURE**	mmHg	735.4	734.7	400.0 to 1,000
Sample Flow	**SAMP FLOW**	LPM	1.450	1.446	0.350 to 1.000
Lamp Intensity	**INTENSITY**	Hz	23,740	23,386	20,000 to 50,000
Lamp Voltage	**LAMP VOLTAGE**	V	864	865	750 to 1,200
SO2 Concentration	**SO2 CONCENTRATION**	ppb	2	1.5	0 to 10,000
Motherboard Status	**MOTHERBOARD STATUS**	-	OK	OK	OK
Interface Status	**INTERFACE STATUS**	-	OK	OK	OK

Calibrate By : (MR.PANUPON PODANG)
January 23, 2023

Checked By : (MS.SUTATIP IM-NOI)
January 23, 2023

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Calibration Data of CO Analyzer

Analyzer Performance Test

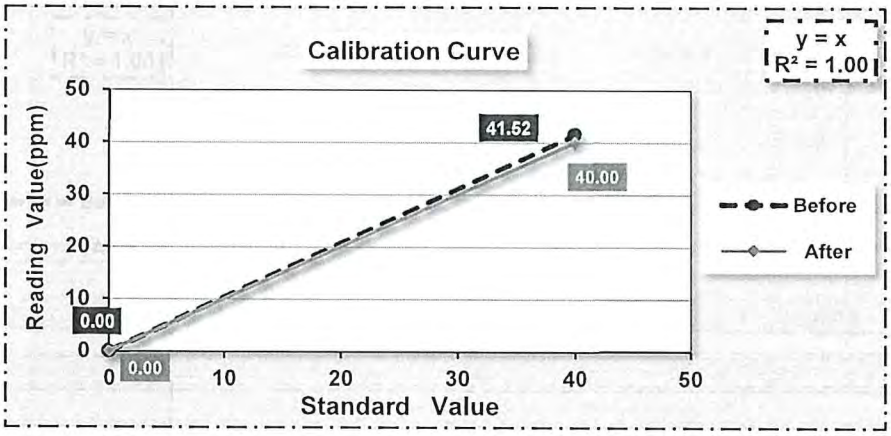
Equipment	Gas Analyzer (CO)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Scientist**	Panupon
Serial No.	4N02XP27	**Calibration Date**	February 9, 2023
Analyzer Unit	ppm	**Time**	3:14 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components Cylinder No : EB0123013 Expire Date : Oct 22, 2027	CO = 4,516 ppm NO = 55.3 ppm SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.00	0.00	-	-	-
Span	40	41.52	40.00	-	-	3.80



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	5	5.2	Voltage of the measured CO Value
SIGNAL (COMP)	mV	0.9	0.8	Voltage of the interference component Value
CELL	°C	33.1	32.7	Ambient + (5 to 10 C)
PUMP	kpa	38.7	38.6	less than 65
AMBIENT	kpa	101.2	101.6	Atmospheric pressure
DC 24V	mV	23.9	23.9	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By : (MR.PANUPON PODANG)
February 9, 2023

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Checked By : (MS.SUTATIP IM-NOI)
February 9, 2023

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Head Office/Tax ID 0105 542 064 981

Calibration Data of NOx Analyzer

Analyzer Performance Test

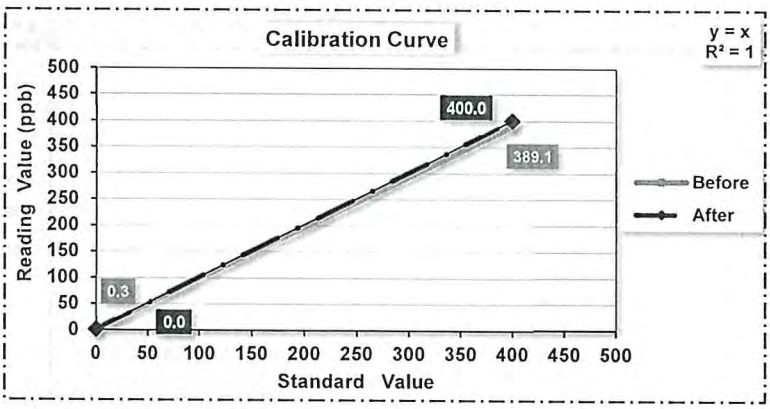
Equipment	Gas Analyzer (NOx)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APNA-370	**Scientist**	Panupon
Serial No.	NKDVYFRX	**Calibration Date**	February 8, 2023
Analyzer Unit	ppb	**Time**	2:04 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value**								**% Abs Error**
		NO_x (ppb)		**NO (ppb)**		**NO_2 (ppb)**		**Stability**		
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	
Zero	0	0.3	0.0	0.3	0.0	0.0	0.0	-	-	-
Span	400	391.4	400.0	389.1	400.0	2.3	0.0	-	-	2.7



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	1.0	1.3	Voltage of the measured NO value
Signal NOx	mV	13.3	126.0	Voltage of the measured NOx value
Detector	°C	41.9	41.9	43 °C ± 5 °C
Ambient	kPa	101.2	101.1	Current atmospheric pressure
DC 24V	V	23.8	23.5	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.93651	1.29610	0.50000 - 2.0000
NOx Slope	-	0.94621	1.19550	0.50000 - 2.0000

Calibrate By : (MR.PANUPON PODANG)
February 8, 2023

Checked By : (MS.SUTATIP IM-NOI)
February 8, 2023

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

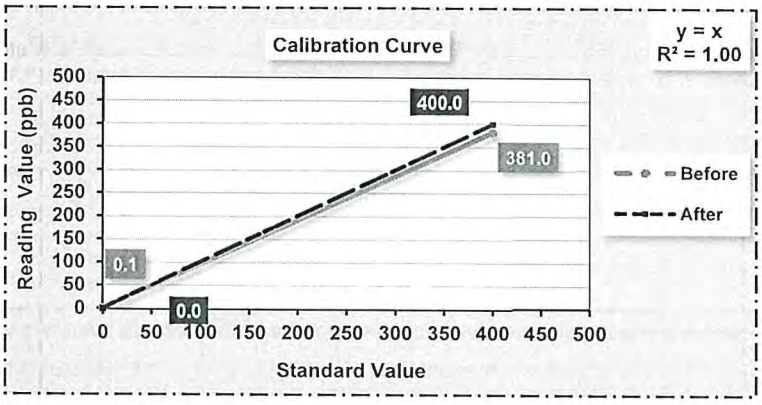
Equipment	Gas Analyzer (SO_2)	**Costomer Name**	อุตสาหกรรมโคราช
Manufacture	Thermo	**Location**	Envi Research
Model	43C	**Scientist**	Panupon
Serial No.	73370-373	**Calibration Date**	January 23, 2023
Analyzer Unit	ppb	**Time**	1:21 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value (ppb)**		**Stability**		**% Abs Error**
		Before	**After**	**Before**	**After**	
Zero	0	0.1	0.0	-	-	-
Span	400	381.0	400.0	-	-	4.8



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL 43C

Parameter	**Display As**	**Unit**	**Observed Value**		**Nominal Range**
			Before Adjust	**After Adjust**	
Range	**RANGE**	ppb	500	500	0 - 500 standard
Internal Temperature	**INTERNAL**	°c	31.7	32.2	8.0 °C to 47.0 °C
Chamber Temp	**CHAMBER**	°c	44.4	44.5	43.0 °C to 47.0 °C
Pressure	**PRESSURE**	mmHg	710.2	709.5	400.0 to 1,000
Sample Flow	**SAMP FLOW**	LPM	0.373	0.372	0.350 to 1.000
Lamp Intensity	**INTENSITY**	Hz	27,302	27,736	20,000 to 50,000
Lamp Voltage	**LAMP VOLTAGE**	V	974	976	750 to 1,200
SO2 Concentration	**SO2 CONCENTRATION**	ppb	1.9	2.4	0 to 10,000
Motherboard Status	**MOTHERBOARD STATUS**	-	OK	OK	OK
Interface Status	**INTERFACE STATUS**	-	OK	OK	OK

Calibrate By : (MR.PANUPON PODANG)
January 23, 2023

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Checked By : (MS.SUTATIP IM-NOI)
January 23, 2023

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Calibration Data of CO Analyzer

Analyzer Performance Test

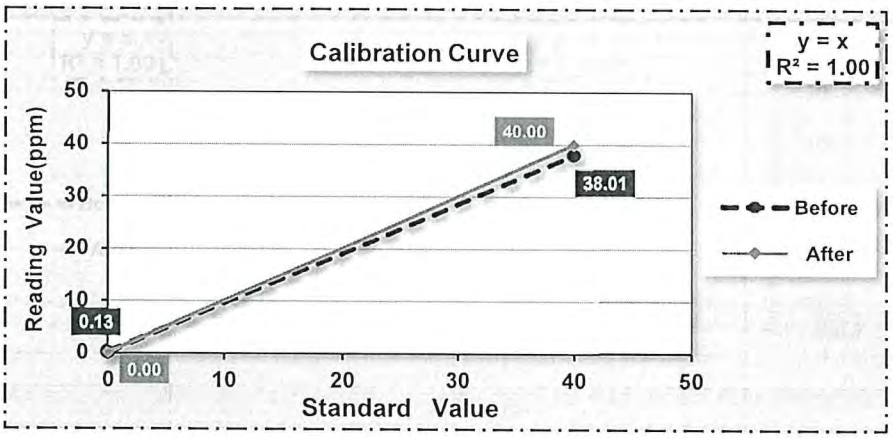
Equipment	Gas Analyzer (CO)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Scientist**	Panupon
Serial No.	C06YT0NC	**Calibration Date**	February 9, 2023
Analyzer Unit	ppm	**Time**	3:54 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components **Cylinder No :** EB0123013 **Expire Date :** Oct 22, 2027	CO = 4,487 ppm NO = 46.1 ppm SO_2 = 46.0 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.13	0.00	-	-	-
Span	40	38.01	40.00	-	-	4.98



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	1.1	1.1	Voltage of the measured CO Value
SIGNAL (COMP)	mV	0.0	0	Voltage of the interference component Value
CELL	°C	30.9	30.8	Ambient + (5 to 10 C)
PUMP	kpa	41.0	41.1	less than 65
AMBIENT	kpa	101.2	101.1	Atmospheric pressure
DC 24V	mV	24.0	24.0	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By : (MR.PANUPON PODANG)
February 9, 2023

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Checked By : (MS.SUTATIP IM-NOI)
February 9, 2023

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Calibration Data of NOx Analyzer

Analyzer Performance Test

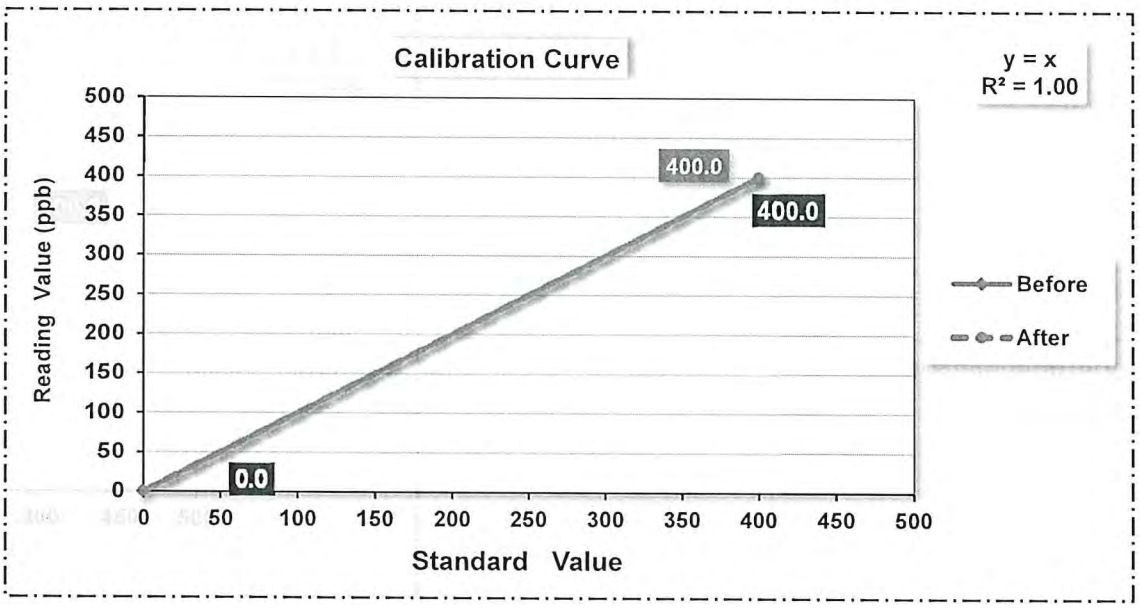
Equipment	Gas Analyzer (NOx)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	API	**Location**	Envi Research
Model	200A	**Scientist**	Panupon
Serial No.	56	**Calibration Date**	February 4, 2023
Analyzer Unit	ppb	**Time**	1:16 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value**								**% Abs Error**
		NO_x (ppb)		**NO (ppb)**		**NO_2 (ppb)**		**Stability**		
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	
Zero	0	0.2	0.0	-0.1	0.0	0.3	0.0	-	-	-
Span	400	406.6	405.0	400.0	400.0	6.6	5.0	-	-	0.0



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STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL 200A

Parameter	Display As	Unit	Observed Value		Nominal Range
			Before Adjust	After Adjust	
Range	RANGE	ppb	500	500	0 - 500 standard
Stability	STABIL	ppb	0.2	0.1	< 2 with zero air
Sample Flow	SAMP FL	cc / min	480.0	481.0	500 +/- 50
Ozone Flow	OZONE FL	cc / min	80.0	80.0	80 +/- 10
PMT signal	PMT	mV	78.5	41.2	0 to 5,000
Auto - Zero	AZERO	mV	33.5	33.3	-20 to 150
High Voltage Power Supply	HVPS	V	790.0	790.0	450 to 900
Reaction Cell Temperature	RCELL TEMP	°C	50.4	50.3	50 +/- 1
Box Temperature	BOX TEMP	°C	33.5	30.7	Ambient temp.+3 / -7
PMT Temperature	PMT TEMP	°C	7.2	7.1	7 +/- 1
Converter Temperature	MOLY TEMP	°C	314.6	314.4	315 +/- 5
Reaction Cell Pressure	RCEL	In - Hg - A	9.3	9.5	2 to 10 (Constant)
Sample Pressure	SAMP	In - Hg - A	31.1	31.0	Ambient - 1 (Constant)
NO_x Slope	NO_x SLOPE	-	1.3	1.3	1.000 +/- 0.300
NO_x Offset	NO_x OFFSET	mV	-1.8	-1.8	0 +/- 20
NO Slope	NO SLOPE	-	1.204	1.203	1.000 +/- 0.300
NO Offset	NO OFFSET	mV	-0.4	-0.4	0 +/- 20

Calibrate By : _____
(MR.PANUPON PODANG)
February 4, 2023

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Checked By : _____
(MS.SUTATIP IM-NOI)
February 4, 2023

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

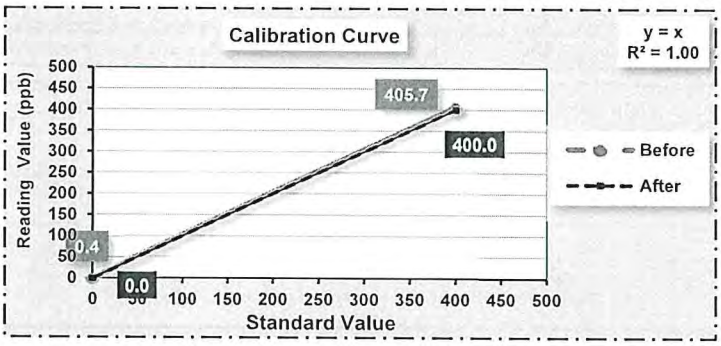
Equipment	Gas Analyzer (SO_2)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	Horiba	**Location**	Envi Research
Model	APSA-370	**Scientist**	Panupon
Serial No.	X7L602W6	**Calibration Date**	February 14, 2023
Analyzer Unit	ppb	**Time**	3:40 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value (ppb)**		**Stability**		**% Abs Error**
		Before	**After**	**Before**	**After**	
Zero	0	0.4	0.0	-	-	-
Span	400	405.7	400.0	-	-	1.4



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL APSA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal (SO_2)	mV	18.8	18.9	Voltage of the measured SO2 value
LAMP	mV	270.7	272.6	200 mV - 1200 mV
CELL	°C	32.8	33.5	Ambient temperature + 5 °C - 15 °C
PUMP	Kpa	41.2	41.4	65 kPa or less
AMBIENT	kPa	100.5	100.5	Current atmospheric pressure
DC 24V	V	24.0	24.0	24 V ±0.5 V
DC 5V	V	5.0	5.0	5 V ±0.5 V

Calibrate By : (MR.PANUPON PODANG)
February 14, 2023

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Checked By : (MS.SUTATIP IM-NOI)
February 14, 2023

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Calibration Data of CO Analyzer

Analyzer Performance Test

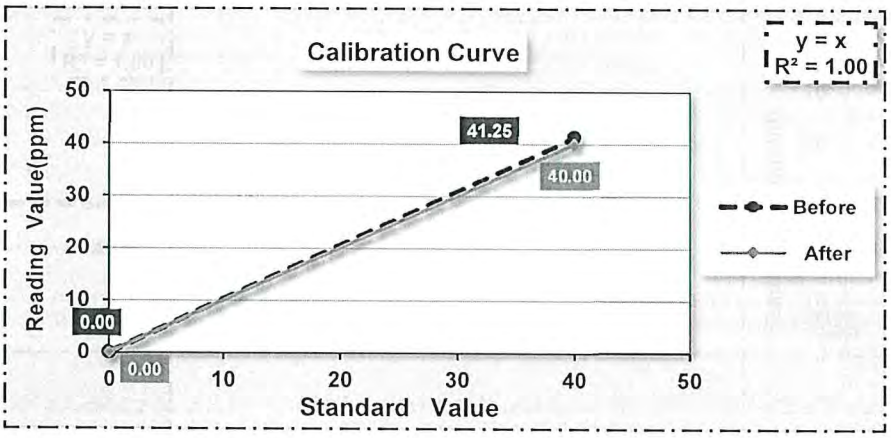
Equipment	Gas Analyzer (CO)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Scientist**	Panupon
Serial No.	JHG8PWA8	**Calibration Date**	February 10, 2023
Analyzer Unit	ppm	**Time**	1:33 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300T	0172
Standard Gas Components	CO = 4,487 ppm		
Cylinder No : EB0123013	NO = 46.1 ppm		
Expire Date : Oct 22, 2027	SO_2 = 46.0 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.00	0.00	-	-	-
Span	40	41.25	40.00	-	-	3.13



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	1.5	1.8	Voltage of the measured CO Value
SIGNAL (COMP)	mV	0.2	0.2	Voltage of the interference component Value
CELL	°C	34.5	34.7	Ambient + (5 to 10 C)
PUMP	kpa	54.1	42.1	less than 65
AMBIENT	kpa	101.3	101.2	Atmospheric pressure
DC 24V	mV	23.9	23.9	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By :
(MR.PANUPON PODANG)
February 10, 2023

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February 10, 2023

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Calibration Data of NOx Analyzer

Analyzer Performance Test

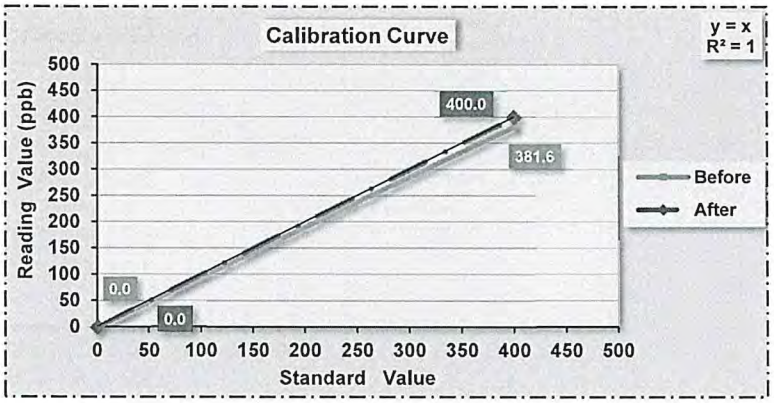
Equipment	Gas Analyzer (NOx)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APNA-370	**Quatation**	2022-01772
Serial No.	NGABK8F2	**Calibration Date**	June 1, 2023
Analyzer Unit	ppb	**Time**	1:46 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value**								**% Abs Error**
		NO_x (ppb)		**NO (ppb)**		**NO_2 (ppb)**		**Stability**		
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	
Zero	0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-
Span	400	380.8	400.0	381.6	400.0	-0.8	0.0	-	-	4.6



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	1.3	0.9	Voltage of the measured NO value
Signal NOx	mV	6.1	6.0	Voltage of the measured NOx value
Detector	°C	40.1	40.1	43 °C ± 5 °C
Ambient	kPa	100.3	100.3	Current atmospheric pressure
DC 24V	V	23.6	23.6	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	1.37250	1.44590	0.50000 - 2.0000
NOx Slope	-	1.30920	1.38670	0.50000 - 2.0000

Calibrate By : (MR.PANUPON PODANG)
June 1, 2023

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Checked By : (MS.SUTATIP IM-NOI)
June 1, 2023

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

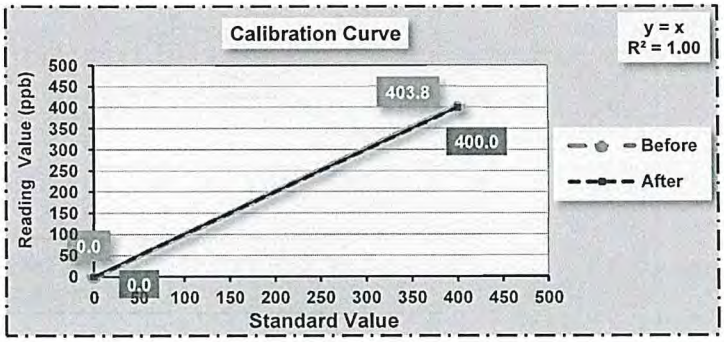
Equipment	Gas Analyzer (SO_2)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	Horiba	**Location**	Envi Research
Model	APSA-370	**Quatation**	2022-01772
Serial No.	JH9GS3FU	**Calibration Date**	June 1, 2023
Analyzer Unit	ppb	**Time**	10:44 AM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value (ppb)**		**Stability**		**% Abs Error**
		Before	**After**	**Before**	**After**	
Zero	0	0.0	0.0	-	-	-
Span	400	403.8	400.0	-	-	1.0



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL APSA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal (SO_2)	mV	21.1	21.8	Voltage of the measured SO2 value
LAMP	mV	837.4	834.8	200 mV - 1200 mV
CELL	°C	36.4	36.4	Ambient temperature + 5 °C - 15 °C
PUMP	Kpa	45.1	45.0	65 kPa or less
AMBIENT	kPa	101.2	101.1	Current atmospheric pressure
DC 24V	V	24.0	24.0	24 V ±0.5 V
DC 5V	V	5.0	5.0	5 V ±0.5 V

Calibrate By : (MR.PANUPON PODANG)
June 1, 2023

Checked By : (MS.SUTATIP IM-NOI)
June 1, 2023

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Head Office/Tax ID 0105 542 064 981

Calibration Data of CO Analyzer

Analyzer Performance Test

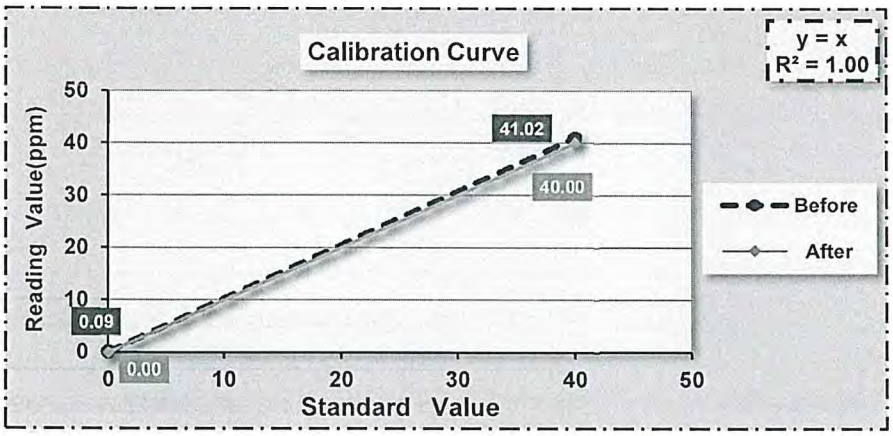
Equipment	Gas Analyzer (CO)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Quatation**	2022-01772
Serial No.	WNTLD9N8	**Calibration Date**	May 31, 2023
Analyzer Unit	ppm	**Time**	10:40 AM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.09	0.00	-	-	-
Span	40	41.02	40.00	-	-	2.55



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	35	32.7	Voltage of the measured CO Value
SIGNAL (COMP)	mV	23.5	22	Voltage of the interference component Value
CELL	°C	31.7	31.9	Ambient + (5 to 10 C)
PUMP	kpa	56.2	56.0	less than 65
AMBIENT	kpa	101.2	101.2	Atmospheric pressure
DC 24V	mV	23.9	23.9	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By : (MR.PANUPON PODANG)
May 31, 2023

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Checked By : (MS.SUTATIP IM-NOI)
May 31, 2023

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Calibration Data of NOx Analyzer

Analyzer Performance Test

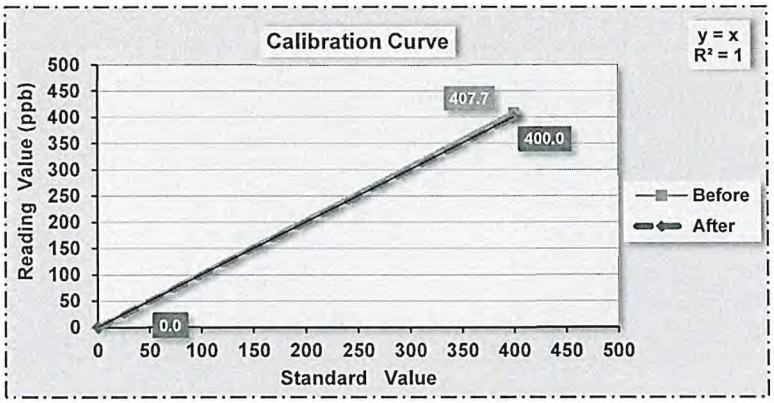
Equipment	Gas Analyzer (NOx)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APNA-370	**Quatation**	2022-01772
Serial No.	A4LUUFHB	**Calibration Date**	May 31, 2023
Analyzer Unit	ppb	**Time**	10:53 AM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value**								**% Abs Error**
		NO_x (ppb)		**NO (ppb)**		**NO_2 (ppb)**		**Stability**		
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	
Zero	0	-0.1	0.0	-0.1	0.0	0.0	0.0	-	-	-
Span	400	414.8	400.0	407.7	400.0	7.1	0.0	-	-	1.9



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	2.3	1.2	Voltage of the measured NO value
Signal NOx	mV	19.3	16.6	Voltage of the measured NOx value
Detector	°C	41.7	41.6	43 °C ± 5 °C
Ambient	kPa	100.3	100.2	Current atmospheric pressure
DC 24V	V	23.7	23.7	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.98410	0.86340	0.50000 - 2.0000
NOx Slope	-	1.00790	0.97080	0.50000 - 2.0000

Calibrate By : (MR.PANUPON PODANG)
May 31, 2023

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Checked By : (MS.SUTATIP IM-NOI)
May 31, 2023

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

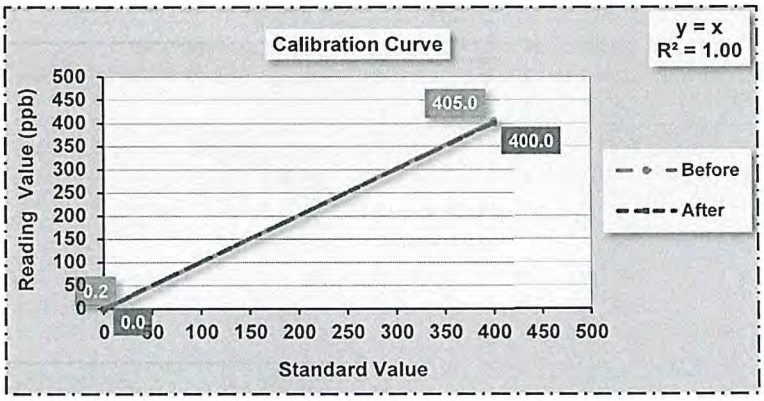
Equipment	Gas Analyzer (SO_2)	**Costomer Name**	อุตสาหกรรมโคราช
Manufacture	Thermo	**Location**	Envi Research
Model	43C	**Quatation**	2022-01772
Serial No.	0335804029	**Calibration Date**	May 31, 2023
Analyzer Unit	ppb	**Time**	10:31 AM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value (ppb)**		**Stability**		**% Abs Error**
		Before	**After**	**Before**	**After**	
Zero	0	0.2	0.0	-	-	-
Span	400	405.0	400.0	-	-	1.3



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL 43C

Parameter	**Display As**	**Unit**	**Observed Value**		**Nominal Range**
			Before Adjust	**After Adjust**	
Range	**RANGE**	ppb	500	500	0 - 500 standard
Internal Temperature	**INTERNAL**	°c	31.8	31.7	8.0 °C to 47.0 °C
Chamber Temp	**CHAMBER**	°c	43.8	43.9	43.0 °C to 47.0 °C
Pressure	**PRESSURE**	mmHg	722.6	725.7	400.0 to 1,000
Sample Flow	**SAMP FLOW**	LPM	0.643	0.643	0.350 to 1.000
Lamp Intensity	**INTENSITY**	Hz	26,662	26,657	20,000 to 50,000
Lamp Voltage	**LAMP VOLTAGE**	V	816	819	750 to 1,200
SO2 Concentration	**SO2 CONCENTRATION**	ppb	1.1	2.1	0 to 10,000
Motherboard Status	**MOTHERBOARD STATUS**	-	OK	OK	OK
Interface Status	**INTERFACE STATUS**	-	OK	OK	OK

Calibrate By : (MR.PANUPON PODANG)
May 31, 2023

Checked By : (MS.SUTATIP IM-NOI)
May 31, 2023

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Calibration Data of CO Analyzer

Analyzer Performance Test

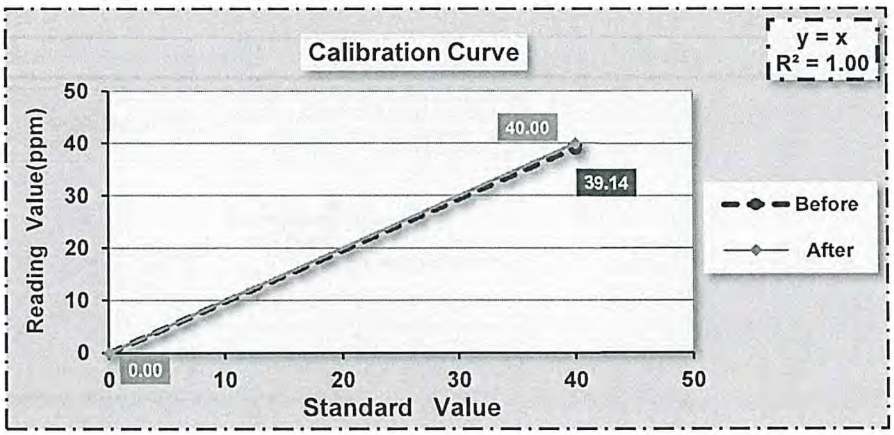
Equipment	Gas Analyzer (CO)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Quatation**	2022-01772
Serial No.	HXA8A4TG	**Calibration Date**	June 2, 2023
Analyzer Unit	ppm	**Time**	1:08 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	-0.01	0.00	-	-	-
Span	40	39.14	40.00	-	-	2.15



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL(MAIN)	mV	4.4	3.7	Voltage of the measured CO Value
SIGNAL (COMP)	mV	0.8	0.6	Voltage of the interference component Value
CELL	°C	37.8	37.6	Ambient + (5 to 10 C)
PUMP	kpa	40.0	39.9	less than 65
AMBIENT	kpa	100.9	100.9	Atmospheric pressure
DC 24V	mV	23.9	23.8	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By : (MR.PANUPON PODANG)
June 2, 2023

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Checked By : (MS.SUTATIP IM-NOI)
June 2, 2023

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Calibration Data of NOx Analyzer

Analyzer Performance Test

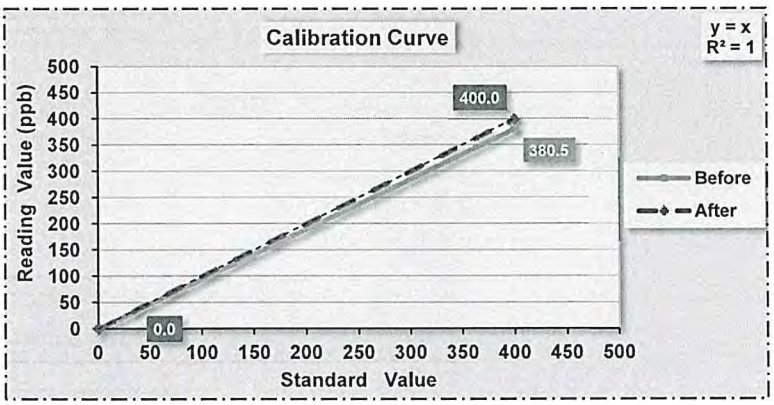
Equipment	Gas Analyzer (NOx)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APNA-370	**Quatation**	2022-01772
Serial No.	4VWFEBUK	**Calibration Date**	June 2, 2023
Analyzer Unit	ppb	**Time**	2:06 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value**								**% Abs Error**
		NO_x (ppb)		**NO (ppb)**		**NO_2 (ppb)**		**Stability**		
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	
Zero	0	-0.3	0.0	-0.2	0.0	-0.1	0.0	-	-	-
Span	400	393.4	400.0	380.5	400.0	12.9	0.0	-	-	4.9



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	0.0	0.0	Voltage of the measured NO value
Signal NOx	mV	9.1	6.1	Voltage of the measured NOx value
Detector	°C	40.9	40.9	43 °C ± 5 °C
Ambient	kPa	100.2	100.2	Current atmospheric pressure
DC 24V	V	23.5	23.5	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.76020	0.95090	0.50000 - 2.0000
NOx Slope	-	0.78580	0.79750	0.50000 - 2.0000

Calibrate By : (MR.PANUPON PODANG)
June 2, 2023

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Checked By : (MS.SUTATIP IM-NOI)
June 2, 2023

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

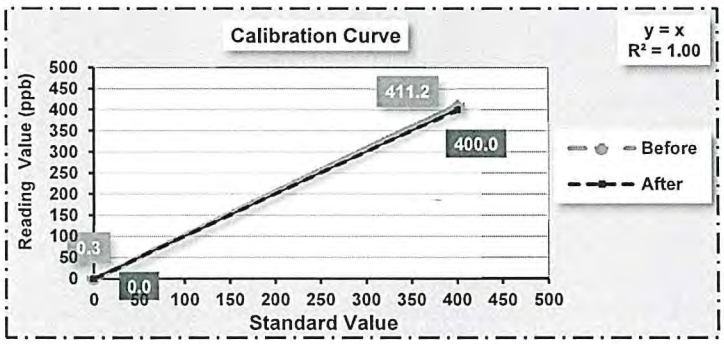
Equipment	Gas Analyzer (SO_2)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	Horiba	**Location**	Envi Research
Model	APSA-370	**Quatation**	2022-01772
Serial No.	V4HC9062	**Calibration Date**	June 2, 2023
Analyzer Unit	ppb	**Time**	1:55 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value (ppb)**		**Stability**		**% Abs Error**
		Before	**After**	**Before**	**After**	
Zero	0	0.3	0.0	-	-	-
Span	400	411.2	400.0	-	-	2.8



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL APSA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal (SO_2)	mV	12.4	12.9	Voltage of the measured SO2 value
LAMP	mV	223.8	221.9	200 mV - 1200 mV
CELL	°C	34.9	35.3	Ambient temperature + 5 °C - 15 °C
PUMP	Kpa	45.4	45.4	65 kPa or less
AMBIENT	kPa	101.0	101.0	Current atmospheric pressure
DC 24V	V	24.0	24.0	24 V ±0.5 V
DC 5V	V	4.9	4.9	5 V ±0.5 V

Calibrate By : (MR.PANUPON PODANG)
June 2, 2023

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Checked By : (MS.SUTATIP IM-NOI)
June 2, 2023

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Calibration Data of CO Analyzer

Analyzer Performance Test

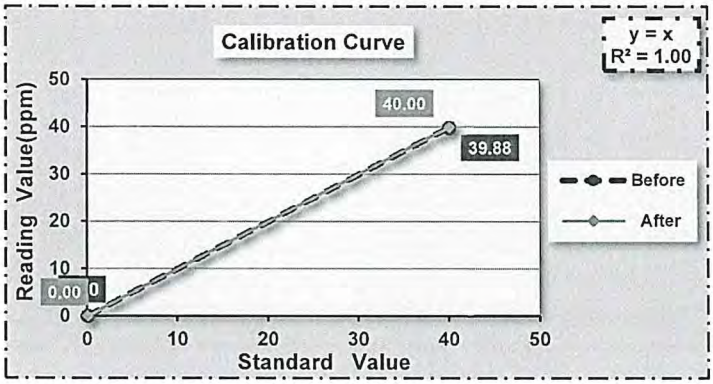
Equipment	Gas Analyzer (CO)	Customer Name	อุตสาหกรรมโคราช
Manufacture	HORIBA	Location	Envi Research
Model	APMA-360 CE	Quatation	2022-01772
Serial No.	577583094	Calibration Date	May 29, 2023
Analyzer Unit	ppm	Time	3:48 PM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppm)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.00	0.00	-	-	-
Span	40	39.88	40.00	-	-	0.30



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-360CE

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
SIGNAL (MAIN)	mV	15.1	13.1	Voltage of the measured CO Value
SIGNALI (COMP)	mV	1.1	0.8	Voltage of the interference component Value
CELL	°C	29.5	29.5	Ambient + (5 to 15 °C)
SAMPLE	L/min	1.5	1.5	1 L/min to 2 L/min
OVER FLOW	LPM	0.0	0.0	< 1.2

Calibrate By : (MR.PANUPON PODANG)
May 29, 2023

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Checked By : (MS.SUTATIP IM-NOI)
May 29, 2023

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Calibration Data of NOx Analyzer

Analyzer Performance Test

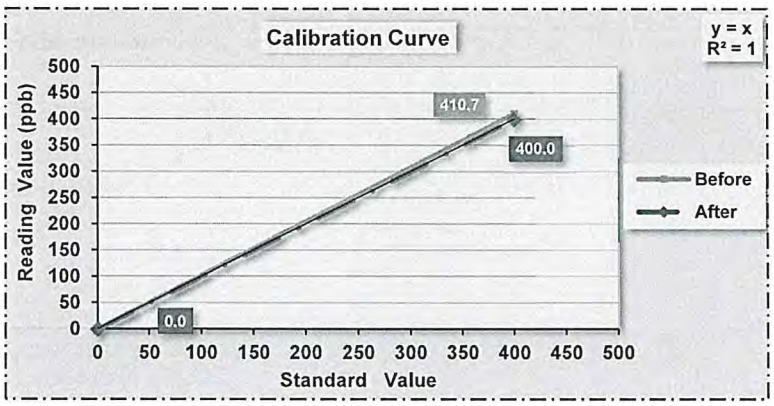
Equipment	Gas Analyzer (NOx)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APNA-370	**Quatation**	2022-01772
Serial No.	J6GUBA4N	**Calibration Date**	May 31, 2023
Analyzer Unit	ppb	**Time**	10:54 AM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value**								**% Abs Error**
		NO_x (ppb)		**NO (ppb)**		**NO_2 (ppb)**		**Stability**		
		Before	**After**	**Before**	**After**	**Before**	**After**	**Before**	**After**	
Zero	0	-1.4	0.0	-0.2	0.0	-1.2	0.0	-	-	-
Span	400	432.0	400.0	410.7	400.0	21.3	0.0	-	-	2.7



STATUS TEST AND VALIDATION OF NOx ANALYZER MODEL APNA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
Range	ppb	500	500	0 - 500 Standard
Signal NO	mV	1.4	0.9	Voltage of the measured NO value
Signal NOx	mV	12.6	10.1	Voltage of the measured NOx value
Detector	°C	41.5	41.5	43 °C ± 5 °C
Ambient	kPa	101.3	101.2	Current atmospheric pressure
DC 24V	V	23.8	23.8	24V ±0.5
DC 5V	V	5.0	5.0	5V ±0.5
NO Slope	-	0.86958	0.84617	0.50000 - 2.0000
NOx Slope	-	0.86469	0.99880	0.50000 - 2.0000

Calibrate By : (MR.PANUPON PODANG)
May 31, 2023

Checked By : (MS.SUTATIP IM-NOI)
May 31, 2023

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Calibration Data of SO_2 Analyzer

Analyzer Performance Test

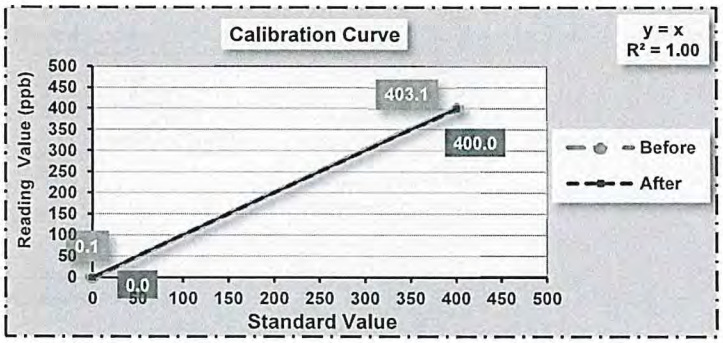
Equipment	Gas Analyzer (SO_2)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	Horiba	**Location**	Envi Research
Model	APSA-370	**Quatation**	2022-01772
Serial No.	12E8X34P	**Calibration Date**	June 1, 2023
Analyzer Unit	ppb	**Time**	10:56 AM

Instruments for Calibration

Instruments	Manufacture	Model	Serial Number
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,516 ppm		
Cylinder No : EB0123013	NO = 55.3 ppm		
Expire Date : Oct 22, 2027	SO_2 = 54.9 ppm		

Single Point Calibration

Standard Gas	Standard Gas Value	Analyzer Value (ppb)		Stability		% Abs Error
		Before	After	Before	After	
Zero	0	0.1	0.0	-	-	-
Span	400	403.1	400.0	-	-	0.8



STATUS TEST AND VALIDATION OF SO_2 ANALYZER MODEL APSA-370

Parameter	Unit	Observed Value		Nominal Range
		Before Adjust	After Adjust	
Range	ppb	500	500	0 - 500 Standard
Signal (SO_2)	mV	3.5	3.5	Voltage of the measured SO2 value
LAMP	mV	261.9	262.0	200 mV - 1200 mV
CELL	°C	37.5	38.3	Ambient temperature + 5 °C - 15 °C
PUMP	Kpa	43.7	43.6	65 kPa or less
AMBIENT	kPa	100.6	100.4	Current atmospheric pressure
DC 24V	V	23.9	23.9	24 V ±0.5 V
DC 5V	V	4.9	4.9	5 V ±0.5 V

Calibrate By : (MR.PANUPON PODANG)
June 1, 2023

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Checked By : (MS.SUTATIP IM-NOI)
June 1, 2023

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Calibration Data of CO Analyzer

Analyzer Performance Test

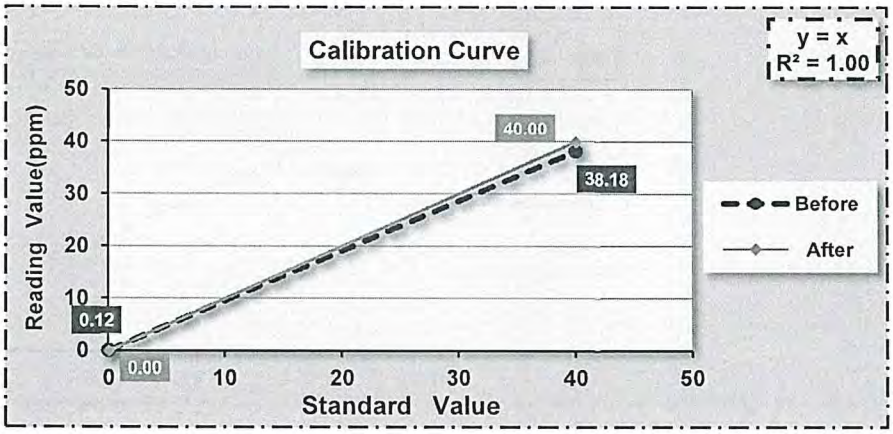
Equipment	Gas Analyzer (CO)	**Customer Name**	อุตสาหกรรมโคราช
Manufacture	HORIBA	**Location**	Envi Research
Model	APMA-370	**Quatation**	2022-01772
Serial No.	JHG8PWA8	**Calibration Date**	May 31, 2023
Analyzer Unit	ppm	**Time**	1:35 PM

Instruments for Calibration

Instruments	**Manufacture**	**Model**	**Serial Number**
Zero Air Supply	Thermo Env.	111	0700419829
Dynamic Dilution Calibrator	Tanabyte	300	0165
Standard Gas Components	CO = 4,487 ppm		
Cylinder No : EB0123013	NO = 46.1 ppm		
Expire Date : Oct 22, 2027	SO_2 = 46.0 ppm		

Single Point Calibration

Standard Gas	**Standard Gas Value**	**Analyzer Value (ppm)**		**Stability**		**% Abs Error**
		Before	**After**	**Before**	**After**	
Zero	0	0.12	0.00	-	-	-
Span	40	38.18	40.00	-	-	4.55



STATUS TEST AND VALIDATION OF CO ANALYZER MODEL APMA-370

Parameter	**Unit**	**Observed Value**		**Nominal Range**
		Before Adjust	**After Adjust**	
SIGNAL(MAIN)	mV	3.2	3.5	Voltage of the measured CO Value
SIGNAL (COMP)	mV	0.4	0.4	Voltage of the interference component Value
CELL	°C	33.8	34.1	Ambient + (5 to 10 C)
PUMP	kpa	52.4	52.4	less than 65
AMBIENT	kpa	100.8	100.7	Atmospheric pressure
DC 24V	mV	23.9	23.9	24+/- 0.5 V
DC 5V	mV	4.9	4.9	5+/- 0.5 V

Calibrate By : (MR.PANUPON PODANG)
May 31, 2023

envi research ENVIRONMENT RESEARCH & TECHNOLOGY CO., LTD.

Checked By : (MS.SUTATIP IM-NOI)
May 31, 2023

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 1
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E04NI99E15A0292	Reference Number:	160-401604495-1
Cylinder Number:	EB0123013	Cylinder Volume:	144.4 Cubic Feet
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12019	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Oct 22, 2019

Expiration Date: Oct 22, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	55.00 PPM	55.27 PPM	G1	+/- 0.8% NIST Traceable	10/14/2019, 10/22/2019
NITRIC OXIDE	55.00 PPM	55.27 PPM	G1	+/- 0.8% NIST Traceable	10/14/2019, 10/22/2019
SULFUR DIOXIDE	55.00 PPM	54.93 PPM	G1	+/- 0.9% NIST Traceable	10/14/2019, 10/22/2019
CARBON MONOXIDE	4500 PPM	4516 PPM	G1	+/- 0.6% NIST Traceable	10/14/2019
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	13010429	KAL004123	97.6 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Jul 23, 2025
NTRM	13010429	KAL004123	97.6 PPM NOx/NITROGEN	+/- 0.8%	Jul 23, 2025
NTRM	16010235	KAL004419	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Dec 23, 2021
NTRM	08012318	KAL004620	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR - CO - 000928781	FTIR	Sep 26, 2019
MKS FTIR - NO - 000928781	FTIR	Oct 18, 2019
MKS FTIR - NOx - 000928781	FTIR	Oct 18, 2019
MKS FTIR - SO2 - 000928781	FTIR	Oct 03, 2019

Triad Data Available Upon Request

NOTES: Gross Weight: 28.0 Kg, Net Weight: 4.6 Kg.

Approved for Release

THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 20 August, 2022 Certification No. 339/22

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WC90504A18 ID No. : No.14

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.6 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563

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

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : Watcharapol Signed :

Mr. Watcharapol Subwat

Mechanical Engineer

Mr. Pisood Promsut

(Authorised Signatory)

for the Chief

Sub-Standard Instrument

กรมอุตุนิยมวิทยา METEOROLOGICAL DEPARTMENT

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 339/22

20 August, 2022

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.2	0.82
5.00	-	-	-	4.5	0.50
7.04	-	-	-	6.3	0.74
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.3	0.71
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.3	0.71
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.2	0.82

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

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

กรมอุตุนิยมวิทยา METEOROLOGICAL DEPARTMENT

THAI METEOROLOGICAL DEPARTMENT

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

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 12 April, 2023 Certification No. 160/23

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III Product No. 7425

Serial No. : WE91016A20 ID No. : No.10

Customer : Environment Research & Technology Company Limited.
25/113-114 Moo 6 Soi Chinaket 1, Ngamwongwan Road,
Toongsonghong, Laksi, Bangkok 10210.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1009.1 hPa

NATIONAL STANDARD WIND TUNNEL :

: Thermal Anemometer 642 S/N 91563

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

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

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

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

---

Calibrated by : Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :

Mr. Pisood Promsut

(Authorised Signatory)

for the Chief

Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 160/23

12 April, 2023

Standard	HOOK GAGE NO. 1425			**TESTED ANEMOMETER**	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	**Velocity**	**Correction**
m/sec	inches H2O	inches H2O	m/sec	**m/sec**	**m/sec**
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.5	0.50
7.04	-	-	-	6.7	0.34
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.3	0.71
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.3	0.72

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

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau