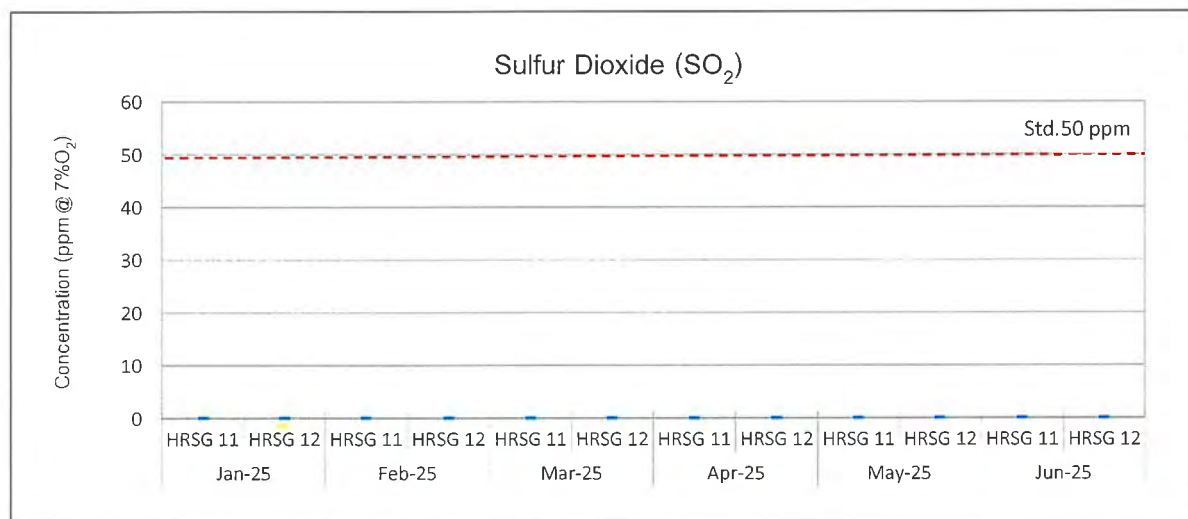
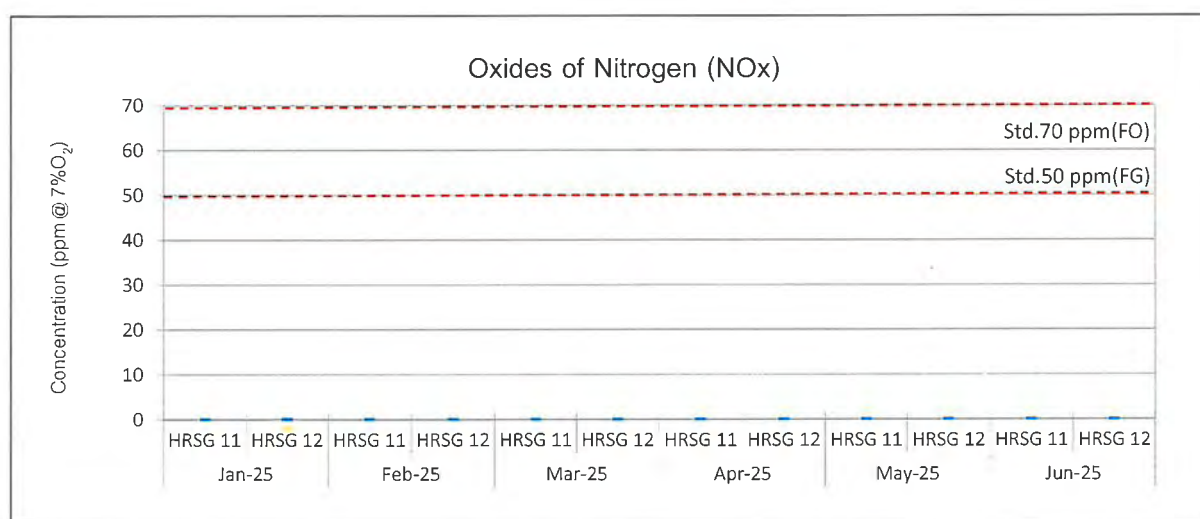


ภาคผนวก ค.4

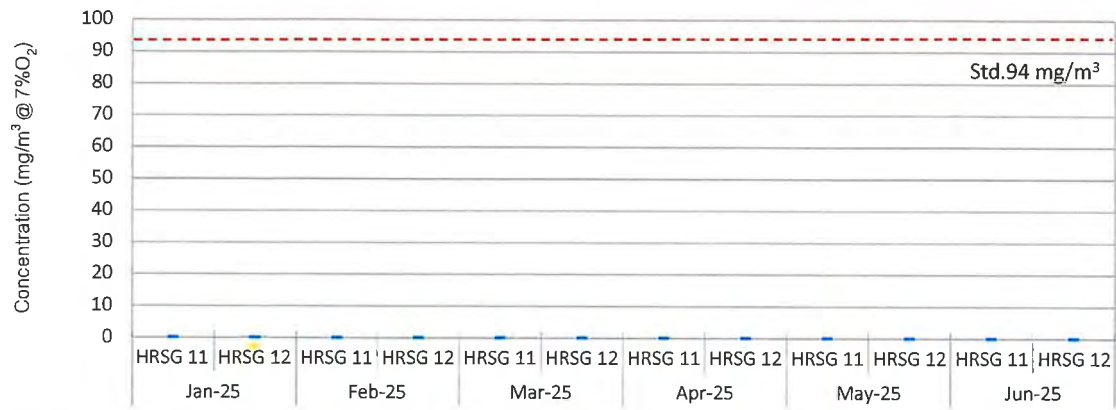
ข้อมูลระบบการตรวจวัดสารมลพิษแบบต่อเนื่อง (CEMs)

ระหว่างเดือนมกราคมถึงมิถุนายน พ.ศ. 2568

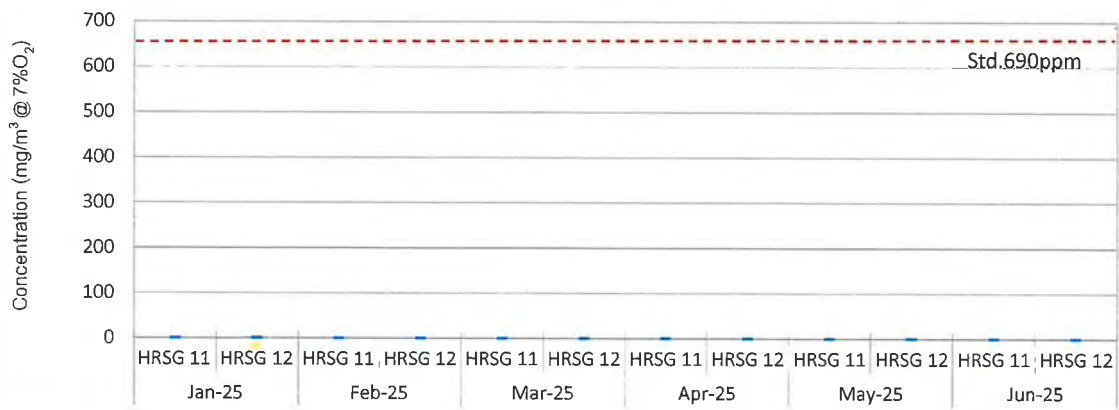
Block1		Jan-25		Feb-25		Mar-25		Apr-25		May-25		Jun-25	
		HRSG 11	HRSG 12	HRSG 11	HRSG 12	HRSG 11	HRSG 12	HRSG 11	HRSG 12	HRSG 11	HRSG 12	HRSG 11	HRSG 12
NO x	Min	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
	max	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
SO 2	Min	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
	max	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
TSP	Min	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
	max	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
CO	Min	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
	max	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown



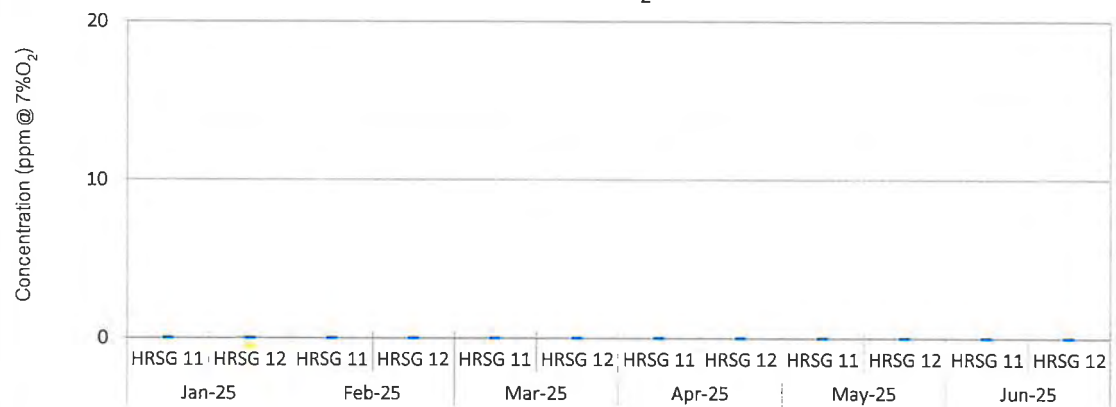
Total Suspended Particles (TSP)



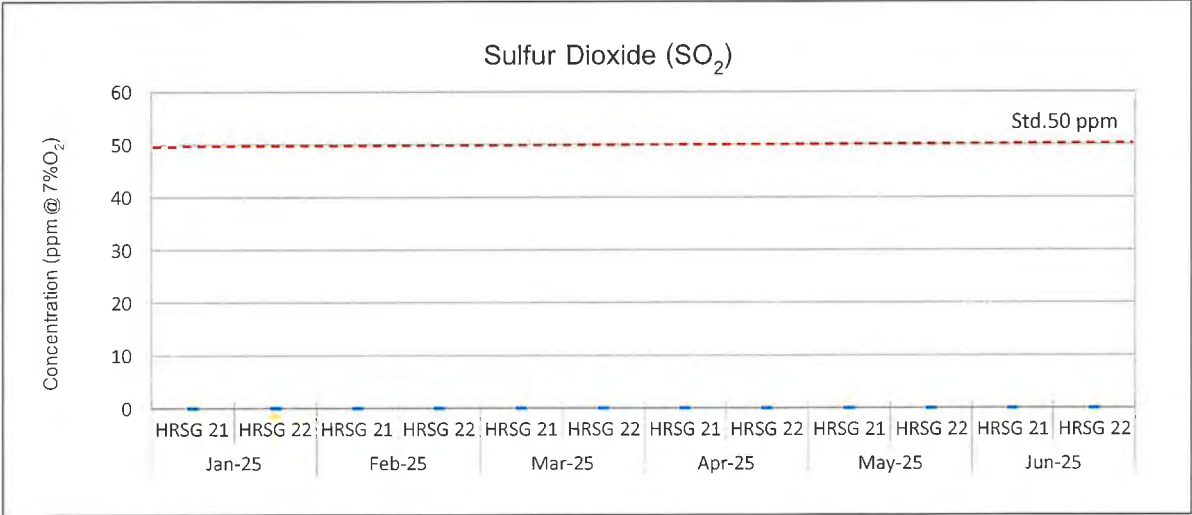
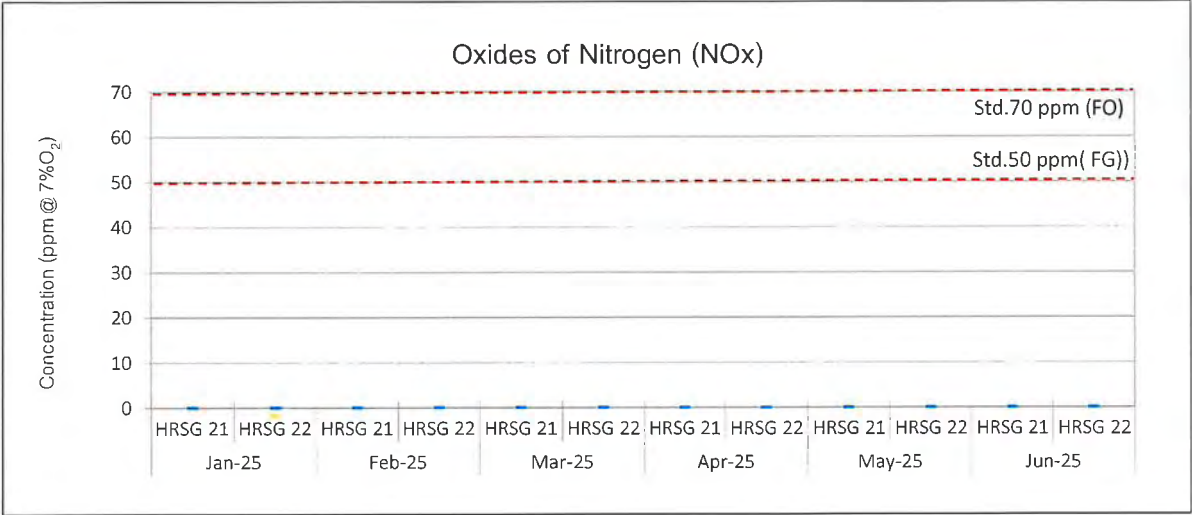
Carbon Monoxide (CO)



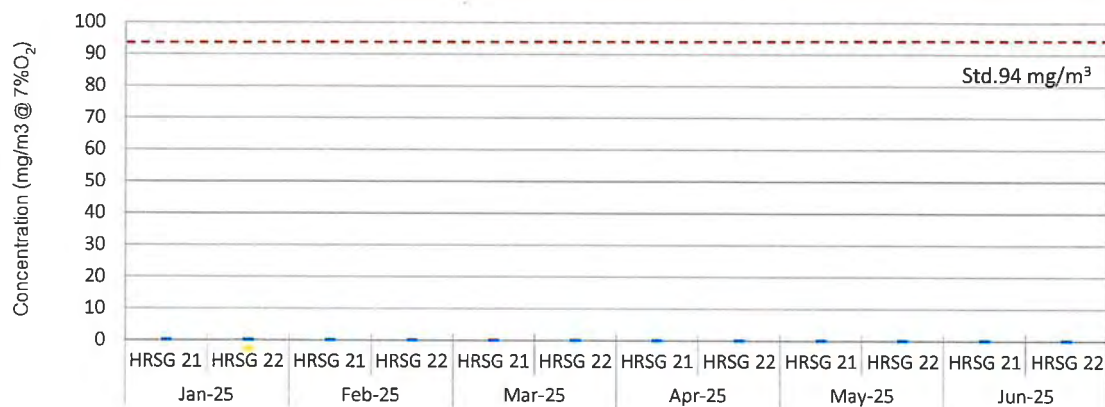
Oxygen (O₂)



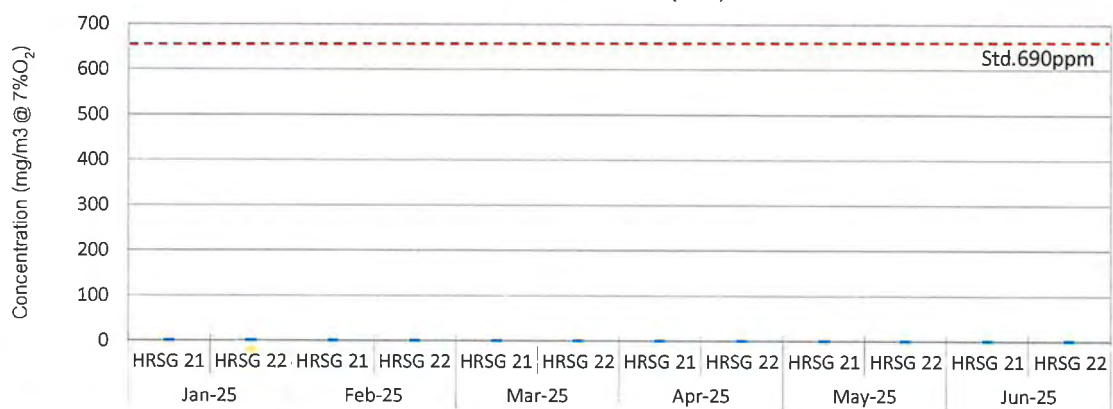
Block2		Jan-25		Feb-25		Mar-25		Apr-25		May-25		Jun-25	
		HRSG 21	HRSG 22	HRSG 21	HRSG 22	HRSG 21	HRSG 22	HRSG 21	HRSG 22	HRSG 21	HRSG 22	HRSG 21	HRSG 22
NO x	Min	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
	max	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
SO 2	Min	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
	max	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
TSP	Min	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
	max	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
CO	Min	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown
	max	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown	Shutdown



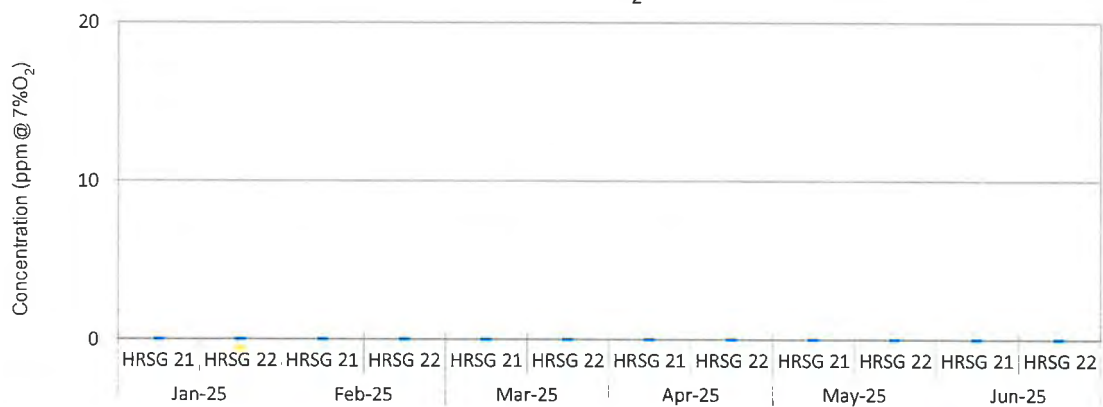
Total Suspended Particles (TSP)



Carbon Monoxide (CO)



Oxygen (O₂)



ภาคผนวก ง

ข้อมูลการสอบเทียบเครื่องมือ (Calibration Data Sheets)



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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Stack (CEMs)	Carbon Monoxide	Analyzer , System calibration, Star	-	-	-	-
Stack (CEMs)	Oxides of Nitrogen	Analyzer , System calibration, Star	-	-	-	-
Stack (CEMs)	Sulfur Dioxide	Analyzer , System calibration, Star	-	-	-	-
Stack (CEMs)	Oxygen	Analyzer , System calibration, Star	-	-	-	-
Stack	Total Suspended Particulate	Console Control Unit	BKK_FS0507	3-Jan-23	3-Jul-23	6
Stack	Total Suspended Particulate	Digital Balance	BKK_EN0002	8-Feb-23	8-Feb-24	12
Ambient	Particulate Matter (PM-10)	High Volume	NKH_FS0048	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_FS0387	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_FS0386	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	NKH_FS0045	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_FS0374	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	High Volume	BKK_FS0383	-	-	On site Calibration
Ambient	Particulate Matter (PM-10)	Digital Balance	BKK_EN0403	3-Jun-24	3-Jun-25	12
Ambient	Total Suspended Particulate	High Volume	BKK_FS0365	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_FS0366	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_FS0371	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_FS0364	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_FS0358	-	-	On site Calibration
Ambient	Total Suspended Particulate	High Volume	BKK_FS0360	-	-	On site Calibration
Ambient	Total Suspended Particulate	Digital Balance	BKK_EN0403	3-Jun-24	3-Jun-25	12
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_FS0728	3-Jan-25	3-Jul-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_FS1088	3-Jan-25	3-Jul-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_FS1086	3-Jan-25	3-Jul-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	NKH_FS0084	4-Jan-25	4-Jul-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	BKK_FS0800	3-Jan-25	3-Jul-25	6
Ambient	Nitrogen Dioxide	NO ₂ Analyzer	RYG_FS0461	4-Jan-25	4-Jul-25	6
Ambient	Sulfur Dioxide	SO ₂ Analyzer	BKK_FS0727	3-Jan-25	3-Jul-25	6
Ambient	Sulfur Dioxide	SO ₂ Analyzer	BKK_FS1087	3-Jan-25	3-Jul-25	6
Ambient	Sulfur Dioxide	SO ₂ Analyzer	BKK_FS1085	3-Jan-25	3-Jul-25	6
Ambient	Sulfur Dioxide	SO ₂ Analyzer	NKH_FS0085	4-Jan-25	4-Jul-25	6
Ambient	Sulfur Dioxide	SO ₂ Analyzer	BKK_FS0799	3-Jan-25	3-Jul-25	6
Ambient	Sulfur Dioxide	SO ₂ Analyzer	RYG_FS0460	4-Jan-25	4-Jul-25	6
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS0165	4-Jan-24	4-Jul-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS0159	21-May-24	21-Nov-25	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS0163	1-Apr-25	1-Oct-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS0157	14-Jan-25	14-Jul-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS1369	26-Nov-24	26-May-26	18
Ambient	Wind Speed / Wind Direction	Wind Speed / Wind Direction	BKK_FS0167	28-Jun-24	28-Dec-25	18
Noise	Leq 24 hrs	Sound Calibrator	BKK_FS0630	27-Jun-24	27-Jun-25	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0876	9-Jan-25	9-Jan-26	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0098	9-Jul-24	9-Jul-25	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0103	21-Jan-25	21-Jan-26	12
Noise	Leq 24 hrs	Sound Level Meter	BKK_FS0099	30-Aug-24	30-Aug-25	12
Noise	Leq 8 hrs	Sound Calibrator	BKK_FS0618	4-Dec-24	4-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0109	27-Jan-25	27-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0110	13-Dec-24	13-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0111	21-Jan-25	21-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0113	27-Jan-25	27-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0115	27-Jan-25	27-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0116	27-Jan-25	27-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0117	13-Dec-24	13-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0874	21-Jan-25	21-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0875	21-Jan-25	21-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0878	13-Dec-24	13-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0879	13-Dec-24	13-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0880	13-Dec-24	13-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0993	19-Sep-24	19-Sep-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0994	12-Nov-24	12-Nov-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0995	12-Nov-24	12-Nov-25	12



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Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Noise	Leq 8 hrs	Sound Calibrator	BKK_FS0631	16-Dec-24	16-Dec-25	18
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0030	27-Jan-25	27-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0033	21-Oct-24	21-Oct-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0107	21-Oct-24	21-Oct-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0108	27-Jan-25	27-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0100	30-Aug-24	30-Aug-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0111	21-Jan-25	21-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0116	27-Jan-25	27-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0876	9-Jan-25	9-Jan-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0877	3-Dec-24	3-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0879	13-Dec-24	13-Dec-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0929	19-Mar-25	19-Mar-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0968	28-Apr-25	28-Apr-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0969	28-Apr-25	28-Apr-26	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0993	19-Sep-24	19-Sep-25	12
Noise	Leq 8 hrs	Sound Level Meter	BKK_FS0994	12-Nov-24	12-Nov-25	12
Noise	Noise Contour	Sound Calibrator	BKK_FS0630	27-Jun-24	27-Jun-25	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0032	19-Sep-24	19-Sep-25	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0033	21-Oct-24	21-Oct-25	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0034	21-Oct-24	21-Oct-25	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0096	27-Jan-25	27-Jan-26	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0097	27-Jan-25	27-Jan-26	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0996	23-Aug-24	23-Aug-25	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0997	21-Jan-25	21-Jan-26	12
Noise	Noise Contour	Sound Level Meter	BKK_FS0998	14-Nov-24	14-Nov-25	12
Workplace	Ammonia	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	3
Workplace	Ammonia	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	3
Workplace	Ammonia	Air Sampling Pump	BKK_FS0319	12-May-25	12-Aug-25	3
Workplace	Ammonia	Air Sampling Pump	BKK_FS0321	12-May-25	12-Aug-25	3
Workplace	Ammonia	Spectrophotometer	BKK_EN0018	13-Sep-24	13-Sep-25	12
Workplace	Sodium hydroxide as NaOH	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	3
Workplace	Sodium hydroxide as NaOH	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	3
Workplace	Sodium hydroxide as NaOH	Air Sampling Pump	BKK_FS0317	12-May-25	12-Aug-25	3
Workplace	Chlorine	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	3
Workplace	Chlorine	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	3
Workplace	Chlorine	Air Sampling Pump	BKK_FS0317	12-May-25	12-Aug-25	3
Workplace	Iron (III) chloride	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	3
Workplace	Iron (III) chloride	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	3
Workplace	Iron (III) chloride	Air Sampling Pump	BKK_FS0318	12-May-25	12-Aug-25	3
Workplace	Iron (III) chloride	ICP-OES	BKK_EL0037	23-Sep-24	23-Mar-26	18
Workplace	Trisodium phosphate (Na ₃ PO ₄)	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	3
Workplace	Trisodium phosphate (Na ₃ PO ₄)	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	3
Workplace	Trisodium phosphate (Na ₃ PO ₄)	Air Sampling Pump	BKK_FS0316	12-May-25	12-Aug-25	3
Workplace	Trisodium phosphate (Na ₃ PO ₄)	Air Sampling Pump	BKK_FS0320	12-May-25	12-Aug-25	3
Workplace	Trisodium phosphate (Na ₃ PO ₄)	Air Sampling Pump	BKK_FS0325	12-May-25	12-Aug-25	3
Workplace	Trisodium phosphate (Na ₃ PO ₄)	ICP-OES	BKK_EL0037	23-Sep-24	23-Mar-26	18
Workplace	Sodium bisulfite	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	3
Workplace	Sodium bisulfite	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	3
Workplace	Sodium bisulfite	Air Sampling Pump	BKK_FS0316	12-May-25	12-Aug-25	3
Workplace	Sodium bisulfite	Air Sampling Pump	BKK_FS0320	12-May-25	12-Aug-25	3
Workplace	Sodium bisulfite	Air Sampling Pump	BKK_FS0325	12-May-25	12-Aug-25	3
Workplace	Sodium bisulfite	ICP-OES	BKK_EL0037	23-Sep-24	23-Mar-26	18
Workplace	Sulfuric Acid	DRYCAL FLOWMETER	BKK_FS0614	9-Sep-24	9-Sep-25	3
Workplace	Sulfuric Acid	DRYCAL FLOWMETER	BKK_FS0619	9-Sep-24	9-Sep-25	3
Workplace	Sulfuric Acid	Air Sampling Pump	BKK_FS0318	12-May-25	12-Aug-25	3
Workplace	Sulfuric Acid	Air Sampling Pump	BKK_FS0316	12-May-25	12-Aug-25	3
Workplace	Sulfuric Acid	Air Sampling Pump	BKK_FS0319	12-May-25	12-Aug-25	3
Workplace	Sulfuric Acid	Air Sampling Pump	BKK_FS0321	12-May-25	12-Aug-25	3
Workplace	Sulfuric Acid	Air Sampling Pump	BKK_FS0320	12-May-25	12-Aug-25	3



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Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Workplace	Sulfuric Acid	Air Sampling Pump	BKK_FS0323	12-May-25	12-Aug-25	3
Workplace	Sulfuric Acid	Air Sampling Pump	BKK_FS0325	12-May-25	12-Aug-25	3
Workplace	Sulfuric Acid	Ion Chromatography	BKK_EN0069	12-Jan-24	12-Jul-25	18
Heat	Heat Stress	Heat Stress Monitor	CHM_FS0099	20-Jun-24	20-Jun-25	12
Heat	Heat Stress	Heat Stress Monitor	CHM_FS0100	20-Jun-24	20-Jun-25	12
Heat	Heat Stress	Heat Stress Monitor	CHM_FS0101	21-Jun-24	21-Jun-25	12
Heat	Heat Stress	Heat Stress Monitor	CHM_FS0104	21-Jun-24	21-Jun-25	12
Heat	Heat Stress	Heat Stress Monitor	CHM_FS0105	5-Jun-24	5-Jun-25	12
Heat	Heat Stress	Heat Stress Monitor	CHM_FS0106	5-Jun-24	5-Jun-25	12
Illuminance	Illuminance	Lux Meter	BKK_FS1394	21-Nov-24	21-Nov-25	12
Noise	Noise Dose, TWA	Dose Badge Reader	BKK_FS1003	21-Mar-24	20-Mar-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0056	28-Aug-24	28-Aug-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0057	28-Aug-24	28-Aug-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0064	27-Sep-24	27-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0074	23-Sep-24	23-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0080	3-Oct-24	3-Oct-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0088	11-Sep-24	11-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0090	11-Sep-24	11-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0092	11-Sep-24	11-Sep-25	12
Noise	Noise Dose, TWA	Dose Badge Reader	BKK_FS1002	2-Dec-24	2-Dec-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0053	27-Sep-24	27-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0055	28-Aug-24	28-Aug-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS1047	11-Sep-24	11-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS1048	11-Sep-24	11-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0049	27-Sep-24	27-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0050	27-Sep-24	27-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0064	27-Sep-24	27-Sep-25	12
Noise	Noise Dose, TWA	Dosemeter	BKK_FS0078	27-Sep-24	27-Sep-25	12
Water Lab	Arsenic	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Arsenic	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Arsenic	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Barium	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Barium	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Barium	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Chromium	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Chromium	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Chromium	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Cadmium	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Cadmium	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Cadmium	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Copper	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Copper	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Copper	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Lead	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Lead	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Lead	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Iron	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Iron	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Iron	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Nickel	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Nickel	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Nickel	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Manganese	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Manganese	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Manganese	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Selenium	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Selenium	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Selenium	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18



right solutions.
right partner.

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Water Lab	Zinc	ICP-MS	BKK_EL0026	12-Dec-23	13-Jun-25	18
Water Lab	Zinc	Hot Block	BKK_EL0054	4-Mar-25	4-Sep-26	18
Water Lab	Zinc	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Mercury	DUO-CVAFS / CVAAS	BKK_EL0023	12-Dec-24	12-Jun-26	18
Water Lab	Temperature	pH Meter with Sensor	BKK_LG0031	17-Feb-25	17-Feb-26	12
Water Lab	BOD	DO Meter	BKK_EN0205	2-Feb-24	2-Aug-25	18
Water Lab	BOD	Incubator	BKK_EN0304	4-Mar-25	4-Mar-26	12
Water Lab	BOD	Burette	BKK_EN0171	27-Feb-24	27-Aug-25	18
Water Lab	COD	Hot Block	BKK_EN0370	2-Jan-25	2-Jan-26	12
Water Lab	COD	Spectrophotometer	BKK_EN0018	13-Sep-24	13-Sep-25	12
Water Lab	Total Suspended Solids	Electronic Top-Loading Balance	BKK_EN0003	2-Aug-24	2-Aug-25	12
Water Lab	Total Suspended Solids	Oven	BKK_EN0273	14-May-24	14-Nov-25	18
Water Lab	Total Dissolved Solids 180°C	Electronic Top-Loading Balance	BKK_EN0003	2-Aug-24	2-Aug-25	12
Water Lab	Total Dissolved Solids 180°C	Oven	BKK_EN0273	14-May-24	14-Nov-25	18
Water Lab	Oil & Grease	Electronic Top-Loading Balance	BKK_EN0003	2-Aug-24	2-Aug-25	12
Water Lab	Oil & Grease	Water Bath	BKK_EN0439	29-Oct-24	29-Oct-25	12
Water Lab	pH at 25 °C	pH meter	BKK_EN0342	17-Oct-24	17-Oct-25	12
Water Lab	Residual Free Chlorine	Chlorine Meter	BKK_LG0070	1-Apr-25	1-Apr-26	12
Water Lab	Organochlorine Pesticide	GC MSMS	BKK_EN0284	21-Nov-24	21-May-26	18
Water Lab	Volatile Organic Compound	Gas Chromatography (MSD)	BKK_EN0059	13-Dec-23	13-Jun-25	18
Water Lab	Cyanide	Spectrophotometer	BKK_EN0018	13-Sep-24	13-Sep-25	12
Water Lab	Cyanide	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	PCBs	GC MSMS	BKK_EN0284	21-Nov-24	21-May-26	18
Water Lab	Benzo(a)pyrene	Gas Chromatography (MSD)	BKK_EN0049	25-Oct-24	25-Apr-26	18
Water Lab	Vinyl chloride	Gas Chromatography (MSD)	BKK_EN0059	13-Dec-23	13-Jun-25	18
Water Lab	Ammonia Nitrogen	Discrete analyzer	BKK_EN0037	16-Aug-24	16-Aug-25	12
Water Lab	Total Hardness	Burette	BKK_EN0171	27-Feb-24	27-Aug-25	18
Water Lab	Color	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Turbidity	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Sulfide	Burette	BKK_EN0171	27-Feb-24	27-Aug-25	18
Water Lab	Sulfide	Chamber (Cooling Room)	BKK_EN0167	6-Dec-23	6-Jun-25	18
Water Lab	Nitrate nitrogen	Ion Chromatography	BKK_EN0427	21-Nov-24	21-Nov-25	12
Water Lab	Chloride	Ion Chromatography	BKK_EN0427	21-Nov-24	21-Nov-25	12
Water Lab	Sulfate	Ion Chromatography	BKK_EN0427	21-Nov-24	21-Nov-25	12
Water Lab	Conductivity	Conductivity meter	BKK_EN0373	26-Dec-24	26-Dec-25	12
Water Lab	Pyrethroid Group Pesticides	GC MSMS	BKK_EN0284	21-Nov-24	21-May-26	18



Collected by _____
(Mr. Wanchai Tangmanee)
Field Station (2)

Specimen No. _____
(Mr. Somsak Rattanasart)
Specimen (1)



Pitot Tube Calibration Data

Pitot Tube Identification Number: BOK_F00512 Calibration Date: 3 Jan 23
Lab test sheet Number: 258-1-13-01 Standard Pitot ID: BOK_F00411
Calibration Sheet No.: C-030123-BOK_F00512 Cp Standard: 0.99

Type S Pitot Tube Coefficient Data					
Test	Type s pitot tube Leg A/B	Standard pitot tube (ΔP, mmH ₂ O)	Type s pitot tube (ΔP, mmH ₂ O)	Cp (s)	Cp (s)
Test 1	Δ	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 2	Δ	12.00	17.00	0.840	-
	B	12.00	17.00	-	0.840
Test 3	Δ	12.00	16.80	0.846	-
	B	12.00	16.80	-	0.845
Cp				0.842	0.842

$$C_p = \frac{\Delta P}{\rho V^2 / 2}$$

$$\Delta P = \frac{\rho V^2}{2} C_p$$

$$V = \sqrt{\frac{2 \Delta P}{\rho C_p}}$$

$$V_{avg} = \frac{1}{N} \sum_{i=1}^N V_i$$

$$SE \leq 0.01$$

Calculated by: W. N. T. Approved by: S. P.
(Mr. W. N. T. Thompson) (Mr. S. P. Thompson)

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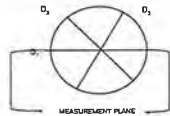


PROBE NOZZLE DIAMETER CALIBRATION DATA SHEET

Calibration Date: 3 Jan 23			Head ID: BOK_F00513		
Calibration Sheet No.: C-030123-BOK_F00513			Vendor Caliber ID: RVS_F00079		
Head ID #	Head Diameter (mm)			H - L ₀	$D_0 = D_1 + D_2 + 1$
	D ₁	D ₂	D ₃		
1	0.315	0.313	0.318	0.000	0.313
2	0.475	0.473	0.473	0.000	0.475
3	0.635	0.632	0.633	0.000	0.635
4	0.790	0.790	0.790	0.000	0.790
5	0.950	0.950	0.950	0.000	0.950
6	1.110	1.110	1.110	0.000	1.110
7	1.270	1.270	1.270	0.000	1.270
8	1.600	1.600	1.600	0.000	1.600

Where:
D₁, D₂, D₃ = Three different nozzle diameters in 60 degrees to each other, each measured to the nearest 0.025 mm.
ΔD = Maximum diameter difference any two diameters.
D_{avg} = (D₁ + D₂ + D₃) / 3

Calculated by: W. N. T. Approved by: S. P.
(Mr. W. N. T. Thompson) (Mr. S. P. Thompson)



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Sartorius (Thailand) Co., Ltd.
138 Rama 9 Road, Nongkhan, Bangkok 10110
Tel: +66 2642 8818 Fax: +66 2642 8827 Email: service@thailand.sartorius.com

Certificate of Calibration



Model Number: MS2245-100-DU Description: Analytical Balance
Serial Number: 20207342 ID No.: BOK_EN0002
Manufacturer: Sartorius
Customer Name: ALS Laboratory Group (Thailand) Co., Ltd.
Calibration Place: Balance Room

Calibrated by: Mr. Chanchal Iwama Calibration Date: Wednesday, February 08, 2023
Certificate No.: This calibration was conducted by using in-house calibration procedure number (JAF-003).
Based on UKAS LAB 14: 2018

Metrological data:
Capacity: 220 g Repeatability: 0.0001 g
Reasons for calibration: ☒ New Installation ☒ Internal / Periodic ☒ Significant Parameter Change
Ambient Conditions: Temperature: 23.2 °C ± 0.5 °C Humidity: 60.0 % RH ± 10.0 % RH Pressure: 1013.25 hPa ± 0.1 hPa

Measurement Method: UKAS Publication Ref: Lab 14
The measurement uncertainty is the expanded uncertainty which is calculated from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to national standards, which enables the user of the measurement to determine the uncertainty of the measurement according to the International Standard System of Units (SI). Report of Uncertainty is available on the back of the certificate.

Traceability:
Model Number: Description: Traceability: Certificate No.: Due Date:
MS2245-100-DU: Sartorius weight set (100g) (JAF-003) 100-471 00000000 14-Sep-2023
MS2245-100-DU: Sartorius weight set (100g) (JAF-003) 100-471 00000000 14-Sep-2023

This certificate is valid and applies the equipment only.
The certificate may not be reproduced or used in full or in part without the prior written approval of the Calibration Expert, Sartorius (Thailand) Co., Ltd.
SOP FAI 23 03 February 2022

Sartorius (Thailand) Co., Ltd.
138 Rama 9 Road, Nongkhan, Bangkok 10110
Tel: +66 2642 8818 Fax: +66 2642 8827 Email: service@thailand.sartorius.com

Certificate of Calibration

Model Number: MS2245-100-DU Certificate No.: 23020075
Description: Analytical Balance Issued Date: Monday, February 13, 2023
Serial Number: 20207342 Reference No.: 202345
ID No.: BOK_EN0002
Manufacturer: Sartorius Page No.: 2 of 2

Calibration Results : Without Adjustment

Repeatability		Eccentricity (Off-center loading error)	
The repeatability is the ability of a weighing instrument to deliver nearly identical results when the same load is weighed under the same conditions. The standard deviation (s) is a measure of the repeatability of the weighing instrument. The standard deviation (s) is a measure of the repeatability of the weighing instrument.		The eccentricity is the ability of a weighing instrument to deliver nearly identical results when the same load is weighed under the same conditions. The standard deviation (s) is a measure of the repeatability of the weighing instrument. The standard deviation (s) is a measure of the repeatability of the weighing instrument.	
Nominal Value (Low Load)	20.0000	20.0000	20.0000
20 g	20.0000	199.9999	199.9999
Tolerance	0.0001 g	0.0001 g	0.0001 g
Nominal Value (High Load)	20.0000	20.0000	20.0000
200 g	20.0000	199.9999	199.9999
Tolerance	0.0001 g	0.0001 g	0.0001 g
Standard Deviation		0.00004	

Linearity		Linearity	
The linearity is the ability of a weighing instrument to deliver nearly identical results when the same load is weighed under the same conditions. The standard deviation (s) is a measure of the repeatability of the weighing instrument. The standard deviation (s) is a measure of the repeatability of the weighing instrument.		The linearity is the ability of a weighing instrument to deliver nearly identical results when the same load is weighed under the same conditions. The standard deviation (s) is a measure of the repeatability of the weighing instrument. The standard deviation (s) is a measure of the repeatability of the weighing instrument.	
Nominal Value	Converted Mass Value	Displayed Value	Deviation
0.01	0.0100	0.0100	0.00000
0.1	0.1000	0.1000	0.00000
1	1.0000	1.0000	0.00000
2	2.0000	2.0000	0.00000
5	5.0000	5.0000	0.00000
10	10.0000	10.0000	0.00000
20	20.0000	20.0000	0.00000
50	50.0000	50.0000	0.00000
100	100.0000	100.0000	0.00000
200	200.0000	200.0000	0.00000

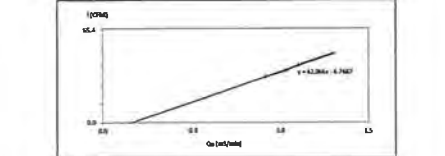
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High Volume Air Sampler Calibration Worksheet

Project Site: Kung Chai Power Generating Company Limited Barometric Pressure (mm Hg): 754.9
Calibration Location: Suthep-Pui Temperature (°C): 35.4
Calibration Date: 24-Apr-23 High Volume ID: RVS_F00045
Calibration Sheet No.: C-030123-BOK_F00045 High Volume Model: TS-500RE
Calibrator ID: BOK_F00045 High Volume V/N: 1546
Calibrator Model: TS-500RE Calibrator Slope: 1.0000
Calibrator V/N: 2385 Calibrator Intercept: -0.01206

Test No.	Delta P (Pa)	Q _a (m³/min)	Flow Chart (m³/min)	Linear Regression
1	2.2	0.917	32	Slope: 42.6405
2	2.8	1.033	36	Intercept: -4.7667
3	3.2	1.033	40	Correlation Coefficient: 0.9977
4	3.8	1.033	44	
5	4.4	1.033	48	



Calculated by: Vornich P. Approved by: S. P.
(Mr. Vornich P.) (Mr. S. P. Thompson)

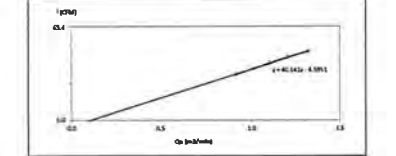
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High Volume Air Sampler Calibration Worksheet

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Calibration Location: Suthep-Pui Temperature (°C): 35.4
Calibration Date: 24-Apr-23 High Volume ID: RVS_F00045
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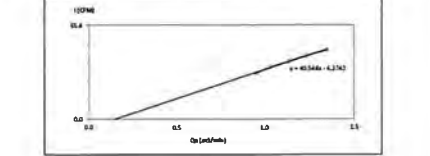
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High Volume Air Sampler Calibration Worksheet

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Calculated by: Vornich P. Approved by: S. P.
(Mr. Vornich P.) (Mr. S. P. Thompson)

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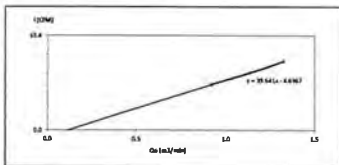


High Volume Air Sampler Calibration Worksheet

Project Site: **Kang Khut Power Generating Company Limited**
 Calibration Location: **SanPhuVat**
 Calibration Date: **24-Apr-25**
 Calibration Sheet No.: **C-240425-BKK-P20365**
 Calibrator ID: **BKK_P20365**
 Calibrator Model: **TE-5028A**
 Calibrator S/N: **2585**

Barometric Pressure (mm Hg): **754.9**
 Temperature (°C): **35.4**
 High Volume ID: **BKK_P20365**
 High Volume Model: **TE-5009E**
 High Volume S/N: **4164**
 Calibrator Slope: **1.6729**
 Calibrator Intercept: **-0.0192**

Test No.	Delta H ₂ O (inch)	Gas (m³/min)	Flow (CFM)	Linear Regression
1	3.8	1.3351	40	Slope: 37.513 Intercept: -4.6967 Correlation Coefficient: 0.9985
2	3.8	1.3351	40	
3	3.8	1.3351	40	
4	3.8	1.3351	40	
5	3.8	1.3351	40	



Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

(Mr. Roppong Intaraprasit)
Barro Field Coordinator Scientist (1)

FORM NO. F-04-075, REVISION NO.2, ISSUE DATE: 26/11/23

CERTIFICATE OF CALIBRATION

Certificate No.: **PST-0236-24**

WFO No.: **WFO-0035-24**

Client: **ALS LABORATORY SERVICES (THAILAND) CO., LTD.**
 Address: **554 Phrasang Road, Phrasang Road, Phrasang Road, Bangkok 10110**
 Contact: **Mr. Roppong Intaraprasit**
 Phone: **02-0123-4567**

Equipment: **TE-5009E**
 Manufacturer: **TE-5009E**
 Model: **TE-5009E**
 Serial No.: **4164**
 Location: **SanPhuVat**

Calibration Date: **24-Apr-25**
 Calibration Location: **SanPhuVat**
 Calibration Sheet No.: **C-240425-BKK-P20365**
 Calibrator ID: **BKK_P20365**
 Calibrator Model: **TE-5009E**
 Calibrator S/N: **4164**

Calibrator Slope: **1.6729**
 Calibrator Intercept: **-0.0192**

Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

(Mr. Roppong Intaraprasit)
Barro Field Coordinator Scientist (1)

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 Manufacturer: **TE-5009E**
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Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

(Mr. Roppong Intaraprasit)
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Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

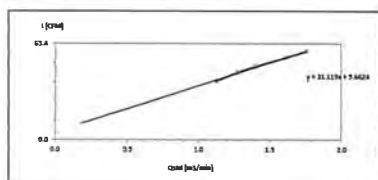
(Mr. Roppong Intaraprasit)
Barro Field Coordinator Scientist (1)

FORM NO. F-04-075, REVISION NO.2, ISSUE DATE: 26/11/23

High Volume Air Sampler Calibration Worksheet

Project Site: **Kang Khut Power Generating Company Limited**
 Calibration Location: **SanPhuVat**
 Calibration Date: **24-Apr-25**
 Calibration Sheet No.: **C-240425-BKK-P20365**
 Calibrator ID: **BKK_P20365**
 Calibrator Model: **TE-5009E**
 Calibrator S/N: **4164**

Test No.	Delta H ₂ O (inch)	Gas (m³/min)	Flow (CFM)	Linear Regression
1	3.8	1.3351	40	Slope: 37.513 Intercept: -4.6967 Correlation Coefficient: 0.9985
2	3.8	1.3351	40	
3	3.8	1.3351	40	
4	3.8	1.3351	40	
5	3.8	1.3351	40	



Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

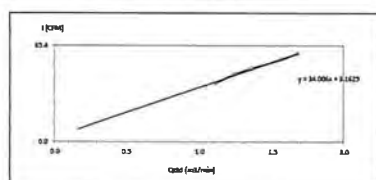
(Mr. Roppong Intaraprasit)
Barro Field Coordinator Scientist (1)

FORM NO. F-04-075, REVISION NO.2, ISSUE DATE: 26/11/23

High Volume Air Sampler Calibration Worksheet

Project Site: **Kang Khut Power Generating Company Limited**
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Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

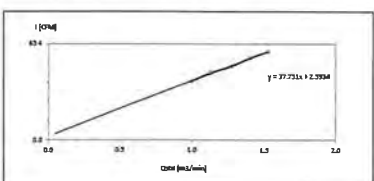
(Mr. Roppong Intaraprasit)
Barro Field Coordinator Scientist (1)

FORM NO. F-04-075, REVISION NO.2, ISSUE DATE: 26/11/23

High Volume Air Sampler Calibration Worksheet

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Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

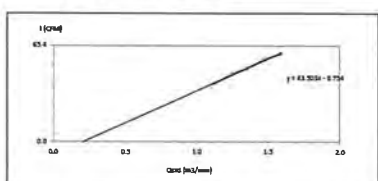
(Mr. Roppong Intaraprasit)
Barro Field Coordinator Scientist (1)

FORM NO. F-04-075, REVISION NO.2, ISSUE DATE: 26/11/23

High Volume Air Sampler Calibration Worksheet

Project Site: **Kang Khut Power Generating Company Limited**
 Calibration Location: **SanPhuVat**
 Calibration Date: **24-Apr-25**
 Calibration Sheet No.: **C-240425-BKK-P20365**
 Calibrator ID: **BKK_P20365**
 Calibrator Model: **TE-5009E**
 Calibrator S/N: **4164**

Test No.	Delta H ₂ O (inch)	Gas (m³/min)	Flow (CFM)	Linear Regression
1	3.8	1.3351	40	Slope: 37.513 Intercept: -4.6967 Correlation Coefficient: 0.9985
2	3.8	1.3351	40	
3	3.8	1.3351	40	
4	3.8	1.3351	40	
5	3.8	1.3351	40	



Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

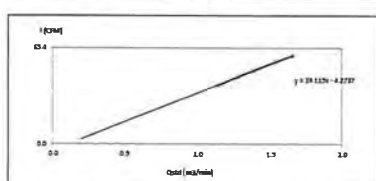
(Mr. Roppong Intaraprasit)
Barro Field Coordinator Scientist (1)

FORM NO. F-04-075, REVISION NO.2, ISSUE DATE: 26/11/23

High Volume Air Sampler Calibration Worksheet

Project Site: **Kang Khut Power Generating Company Limited**
 Calibration Location: **SanPhuVat**
 Calibration Date: **24-Apr-25**
 Calibration Sheet No.: **C-240425-BKK-P20365**
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2	3.8	1.3351	40	
3	3.8	1.3351	40	
4	3.8	1.3351	40	
5	3.8	1.3351	40	



Calibrated by: **Vonich P.**

(Mr. Vonich Phumphet)
Field Scientist(1)

Approved by: **Mr. Roppong Intaraprasit**

(Mr. Roppong Intaraprasit)
Barro Field Coordinator Scientist (1)

FORM NO. F-04-075, REVISION NO.2, ISSUE DATE: 26/11/23



High Volume Air Sampler Calibration Worksheet

Project Site: Living Reef Power Generating Company Limited Barometric Pressure (mm Hg): 754.8

Calibrate Location: ALSTV01010000 Temperature (°C): 35.4

Calibrate Date: 24-Jan-25 High Volume ID: BKX_F30060

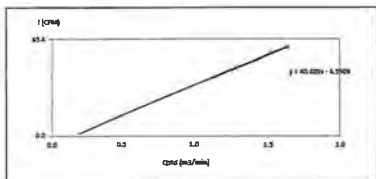
Calibrate Sheet No: C-240415-BKX_F30060 High Volume Model: 0.181

Collector ID: BKX_F30025 High Volume S/N: 1311

Collector Model: TE-5078A Collector Stage: L-0727

Collector S/N: 7465 Collector Laboratory: -0.01735

Test No.	Delta H ₂ O (mm)	Q _{air} (m³/min)	Chart (L/min)	Linear Regression
1	3.7	1.3454	60	Slope: 44.8029 Intercept: -4.5409 Correlation Coefficient: 0.9990
2	4.6	1.2791	66	
3	5.5	1.2422	70	
4	6.6	1.5231	76	
5	7.6	1.6352	80	



Calibrated by: Vanich P.
(Mr. Vanich Pungphit) Field Scientist (1)

Approved by: [Signature]
(Mr. Jirawat Jitworn) Assistant General Manager

FORM NO. F-04-073 REVISION NO. 3 ISSUE DATE: 20/11/23



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-26 Equipment Name: NOx Analyzer

Manufacturer: Telcoflex API Model: T200

Serial No.: 1993 Equipment ID: BKX_F30728

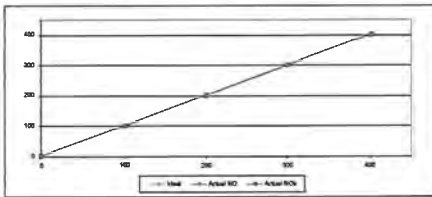
Collector Manufacturer: Telcoflex API Model: 700

Serial No.: 947 Cylinder No.: GM0027222

Std. Gas Concentration (PPM): 88.88 Cylinder Pressure (psi): 1800

Certified Date: 9-Feb-22 Expired Date: 9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	100.10	0.10	0.10	101.00	1.00	1.00
2	200.00	199.80	-0.20	-0.20	200.30	0.30	0.15
3	300.00	298.70	-1.30	-0.43	300.20	0.20	0.07
4	400.00	400.20	0.20	0.05	402.20	2.20	0.56
AVERAGE (%)							



Calibrated by: [Signature]
(Mr. Jirawat Sakom) Field Environmental Scientist (1)

Approved by: [Signature]
(Mr. Saraphut Jitworn) Assistant General Manager

ALS Laboratory Group
FORM NO. F-30-008 REVISION NO. 1 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-26 Equipment Name: NOx Analyzer

Manufacturer: HORIBA Model: APNA-370

Serial No.: PK13CYN0 Equipment ID: BKX_F31088

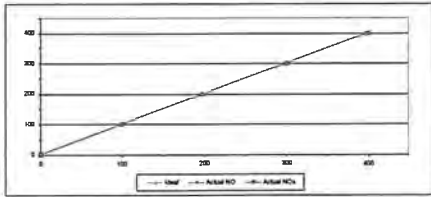
Collector Manufacturer: Telcoflex API Model: 700

Serial No.: 947 Cylinder No.: GM0027222

Std. Gas Concentration (PPM): 88.88 Cylinder Pressure (psi): 1800

Certified Date: 9-Feb-22 Expired Date: 9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.10	-0.90	-0.90	100.20	0.20	0.20
2	200.00	198.30	-1.70	-0.85	199.10	-0.90	-0.45
3	300.00	298.60	-1.40	-0.47	301.30	1.30	0.43
4	400.00	398.90	-1.10	-0.28	399.70	-0.30	-0.08
AVERAGE (%)							



Calibrated by: [Signature]
(Mr. Jirawat Sakom) Field Environmental Scientist (1)

Approved by: [Signature]
(Mr. Saraphut Jitworn) Assistant General Manager

ALS Laboratory Group
FORM NO. F-30-008 REVISION NO. 1 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-26 Equipment Name: NOx Analyzer

Manufacturer: HORIBA Model: APNA-370

Serial No.: 30X1B01M Equipment ID: BKX_F31088

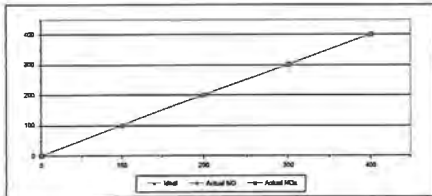
Collector Manufacturer: Telcoflex API Model: 700

Serial No.: 947 Cylinder No.: GM0027222

Std. Gas Concentration (PPM): 88.88 Cylinder Pressure (psi): 1800

Certified Date: 9-Feb-22 Expired Date: 9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.06	0.06	0.06	0.10	0.10	0.10
1	100.00	99.80	-0.20	-0.20	100.20	0.20	0.20
2	200.00	198.30	-1.70	-0.85	201.10	1.10	0.55
3	300.00	298.60	-1.40	-0.47	301.10	1.10	0.37
4	400.00	398.60	-1.40	-0.35	401.30	1.30	0.33
AVERAGE (%)							



Calibrated by: [Signature]
(Mr. Jirawat Sakom) Field Environmental Scientist (1)

Approved by: [Signature]
(Mr. Saraphut Jitworn) Assistant General Manager

ALS Laboratory Group
FORM NO. F-30-008 REVISION NO. 1 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-26 Equipment Name: NOx Analyzer

Manufacturer: HORIBA Model: APNA-370

Serial No.: GC3C2AS Equipment ID: NCH_F30084

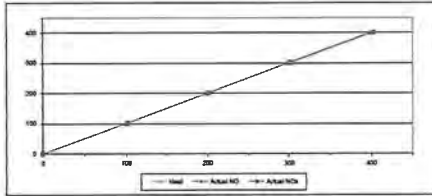
Collector Manufacturer: Telcoflex API Model: 700

Serial No.: 947 Cylinder No.: GM0027222

Std. Gas Concentration (PPM): 88.88 Cylinder Pressure (psi): 1800

Certified Date: 9-Feb-22 Expired Date: 9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.20	-0.80	-0.80	101.30	1.30	1.30
2	200.00	198.60	-1.40	-0.70	201.10	1.10	0.55
3	300.00	298.60	-1.40	-0.47	301.60	1.60	0.53
4	400.00	398.20	-1.80	-0.45	402.30	2.30	0.58
AVERAGE (%)							



Calibrated by: [Signature]
(Mr. Jirawat Sakom) Field Environmental Scientist (1)

Approved by: [Signature]
(Mr. Saraphut Jitworn) Assistant General Manager

ALS Laboratory Group
FORM NO. F-30-008 REVISION NO. 1 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-26 Equipment Name: NOx Analyzer

Manufacturer: HORIBA Model: APNA-370

Serial No.: HCW3P681 Equipment ID: BKX_F30080

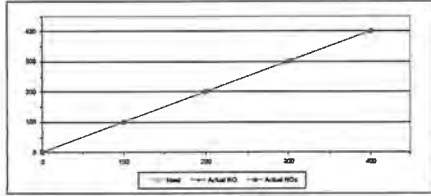
Collector Manufacturer: Telcoflex API Model: 700

Serial No.: 947 Cylinder No.: GM0027222

Std. Gas Concentration (PPM): 88.88 Cylinder Pressure (psi): 1800

Certified Date: 9-Feb-22 Expired Date: 9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.10	-0.90	-0.90	100.60	0.60	0.60
2	200.00	198.60	-1.40	-0.70	201.60	1.60	0.75
3	300.00	298.60	-1.40	-0.47	302.30	2.30	0.77
4	400.00	398.70	-1.30	-0.33	401.30	1.30	0.33
AVERAGE (%)							



Calibrated by: [Signature]
(Mr. Jirawat Sakom) Field Environmental Scientist (1)

Approved by: [Signature]
(Mr. Saraphut Jitworn) Assistant General Manager

ALS Laboratory Group
FORM NO. F-30-008 REVISION NO. 1 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-26 Equipment Name: NOx Analyzer

Manufacturer: HORIBA Model: APNA-370

Serial No.: 7987W411 Equipment ID: RYG_F30461

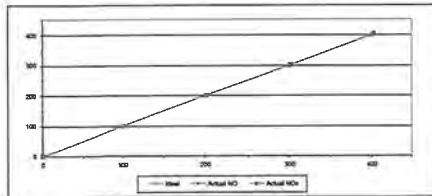
Collector Manufacturer: Telcoflex API Model: 700

Serial No.: 947 Cylinder No.: GM0027222

Std. Gas Concentration (PPM): 88.88 Cylinder Pressure (psi): 1800

Certified Date: 9-Feb-22 Expired Date: 9-Feb-30

Point	Ideal	Actual NO	Error NO	%Error NO	Actual NOx	Error NOx	%Error NOx
ZERO	0.00	0.10	0.10	0.10	0.10	0.10	0.10
1	100.00	99.70	-0.30	-0.30	100.10	0.10	0.10
2	200.00	201.00	1.00	0.50	201.00	1.00	0.50
3	300.00	298.70	-1.30	-0.43	302.10	2.10	0.70
4	400.00	398.60	-1.40	-0.35	402.60	2.60	0.66
AVERAGE (%)							



Calibrated by: [Signature]
(Mr. Jirawat Sakom) Field Environmental Scientist (1)

Approved by: [Signature]
(Mr. Saraphut Jitworn) Assistant General Manager

ALS Laboratory Group
FORM NO. F-30-008 REVISION NO. 1 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-26 Equipment Name: SO2 Analyzer

Manufacturer: Telcoflex API Model: T100

Serial No.: 1009 Equipment ID: BKX_F30727

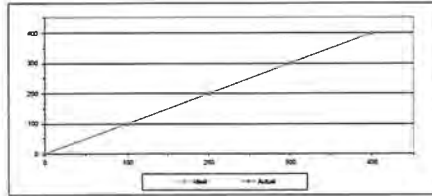
Collector Manufacturer: Telcoflex API Model: 700

Serial No.: 947 Cylinder No.: GM0027222

Std. Gas Concentration (PPM): 88.3 Cylinder Pressure (psi): 1800

Certified Date: 9-Feb-22 Expired Date: 9-Feb-30

Point	Ideal	Actual	Error	%Error
ZERO	0.00	0.10	0.10	0.10
1	100.00	98.60	-1.40	-1.40
2	200.00	200.20	0.20	0.10
3	300.00	301.60	1.60	0.53
4	400.00	397.90	-2.10	-0.53
AVERAGE (%)				



Calibrated by: [Signature]
(Mr. Jirawat Sakom) Field Environmental Scientist (1)

Approved by: [Signature]
(Mr. Saraphut Jitworn) Assistant General Manager

ALS Laboratory Group
FORM NO. F-30-008 REVISION NO. 1 ISSUE DATE: 02/04/12



MULTIPOINT CALIBRATION REPORT

Calibration Date: 3-Jan-26 Equipment Name: SO2 Analyzer

Manufacturer: HORIBA Model: APSA-370

Serial No.: XHV1389P Equipment ID: BKX_F31087

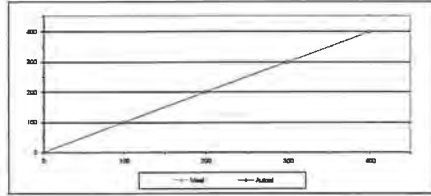
Collector Manufacturer: Telcoflex API Model: 700

Serial No.: 947 Cylinder No.: GM0027222

Std. Gas Concentration (PPM): 88.3 Cylinder Pressure (psi): 1800

Certified Date: 9-Feb-22 Expired Date: 9-Feb-30

Point	Ideal	Actual	Error	%Error
ZERO	0.00	0.10	0.10	0.10
1	100.00	99.10	-0.90	-0.90
2	200.00	198.90	-1.10	-0.55
3	300.00	298.10	-1.90	-0.63
4	400.00	398.30	-1.70	-0.43
AVERAGE (%)				



Calibrated by: [Signature]
(Mr. Jirawat Sakom) Field Environmental Scientist (1)

Approved by: [Signature]
(Mr. Saraphut Jitworn) Assistant General Manager

ALS Laboratory Group
FORM NO. F-30-008 REVISION NO. 1 ISSUE DATE: 02/04/12



Cert. No. : ACC24826
Job No. : YC67AC085
Pages : 3 of 3



Cert. No. : ACL25008
Job No. : YC68AC082
Pages : 1 of 8

Cert. No. : ACL25008
Job No. : YC68AC082
Pages : 3 of 8

Result of calibration:

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance Limit (dB)
94	94.24	0.24	0.18	0.40

2. Frequency

Specified frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Acceptance Limit (%)
1000	1001.7	0.2	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance Limit (%)
1.58	0.10	3.0

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

End of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RUDH
Model : NL-92 / Microphone UIC-52 / Pre-amplifier NII 34
Serial No : 0007151 / 158716 / 158717
ID No : BKE 750876

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
101 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHUANG PHATTANAKAN, KHUET SUAN LIANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 5) kPa
Relative Humidity : (30.0 ± 20) %

Received Date : 19 DECEMBER 2024
Calibration Date : 09 - 10 JANUARY 2025
Date of Issue : 13 JANUARY 2025

Calibrated by : Natchanon Petchum

Approved by : *T. Petch*
(Thamchai Petchum)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC 61672-1 (2013) Standard for sound level meter (SLM). The SLM had been to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For tests results of each item were made by observation of each instruments display and also with SLM's display

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY6057026	EP-0009-24	05-FEB-25
Waveform Generator	33110B	MY5307042	EP-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-RP-210207	18-FEB-25
Digital Multimeter	33461A	MY53220078	EEL-RP-210207	18-FEB-25
Digital Multimeter	34461A	MY60027773	EEL-RP-220207	15-FEB-25
Programmable Attenuator	MAAT-1975	62100114	EP-0009-24	06-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	N4-422A/J	34540493	AA-3401-24	05-FEB-25

2. This result of calibration was found accurate in shown date and place of calibration for this calibration only.

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

- National Institute of Metrology (Thailand)
- Thailand Institute of Scientific and Technological Research (TISTR)

Cert. No. : ACL25008
Job No. : YC68AC082
Pages : 3 of 8

Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
825 Hz	0.3	0.6
1000 Hz	0.3	0.6
5000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

T. Petch

Cert. No. : ACL25008
Job No. : YC68AC082
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
91.9 (93.94)	91.9	0.0	+0.3

2. Self-generated noise

2.1 Normal ear

Measured Value (dB)
16.8

2.2 The acceptance of the sound level meter was replaced by electrical signal data device.

Frequency Weighting	Value (dB)
A-weight	11.6
C-weight	17.7
Flat	23.5

3. Acoustical signal tests of frequency weightings

After free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limit
125	-0.1	-0.3	-0.3	+3.3
1000	0.1	-0.2	-0.2	+3.0
8000	2.4	2.5	2.5	+5.0

4. Electrical signal tests of frequency weightings

Weighting network response with reference to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limit
50	-0.1	-0.1	-0.1	+2.0
125	0.0	0.0	0.0	+1.5
250	0.0	0.0	-0.1	+1.5
500	0.0	0.0	-0.1	+1.5
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.0	0.0	+2.0
4000	0.0	0.0	0.0	+3.0
8000	0.0	0.1	0.1	+5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
A-weight	94.0	94.0	0.0	+0.3
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.3

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Imp	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limit (dB)
A-weight	94.0	94.0	0.0	+0.3

T. Petch

Cert. No. : ACL25008
Job No. : YC68AC082
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
117.0	117.0	0.0	+1.1
116.0	116.0	0.0	+1.1
115.0	115.0	0.0	+1.1
114.0	114.0	0.0	+1.1
113.0	113.0	0.0	+1.1
112.0	112.0	0.0	+1.1
111.0	111.0	0.0	+1.1
110.0	110.0	0.0	+1.1
109.0	109.0	0.0	+1.1
108.0	108.0	0.0	+1.1
107.0	107.0	0.0	+1.1
106.0	106.0	0.0	+1.1
105.0	105.0	0.0	+1.1
104.0	104.0	0.0	+1.1
103.0	103.0	0.0	+1.1
102.0	102.0	0.0	+1.1
101.0	101.0	0.0	+1.1
100.0	100.0	0.0	+1.1
99.0	99.0	0.0	+1.1
98.0	98.0	0.0	+1.1
97.0	97.0	0.0	+1.1
96.0	96.0	0.0	+1.1
95.0	95.0	0.0	+1.1
94.0	94.0	0.0	+1.1
93.0	93.0	0.0	+1.1
92.0	92.0	0.0	+1.1
91.0	91.0	0.0	+1.1
90.0	90.0	0.0	+1.1
89.0	89.0	0.0	+1.1
88.0	88.0	0.0	+1.1
87.0	87.0	0.0	+1.1
86.0	86.0	0.0	+1.1
85.0	85.0	0.0	+1.1
84.0	84.0	0.0	+1.1
83.0	83.0	0.0	+1.1
82.0	82.0	0.0	+1.1
81.0	81.0	0.0	+1.1
80.0	80.0	0.0	+1.1
79.0	79.0	0.0	+1.1
78.0	78.0	0.0	+1.1
77.0	77.0	0.0	+1.1
76.0	76.0	0.0	+1.1
75.0	75.0	0.0	+1.1
74.0	74.0	0.0	+1.1
73.0	73.0	0.0	+1.1
72.0	72.0	0.0	+1.1
71.0	71.0	0.0	+1.1
70.0	70.0	0.0	+1.1
69.0	69.0	0.0	+1.1
68.0	68.0	0.0	+1.1
67.0	67.0	0.0	+1.1
66.0	66.0	0.0	+1.1
65.0	65.0	0.0	+1.1
64.0	64.0	0.0	+1.1
63.0	63.0	0.0	+1.1
62.0	62.0	0.0	+1.1
61.0	61.0	0.0	+1.1
60.0	60.0	0.0	+1.1
59.0	59.0	0.0	+1.1
58.0	58.0	0.0	+1.1
57.0	57.0	0.0	+1.1
56.0	56.0	0.0	+1.1
55.0	55.0	0.0	+1.1
54.0	54.0	0.0	+1.1
53.0	53.0	0.0	+1.1
52.0	52.0	0.0	+1.1
51.0	51.0	0.0	+1.1
50.0	50.0	0.0	+1.1
49.0	49.0	0.0	+1.1
48.0	48.0	0.0	+1.1
47.0	47.0	0.0	+1.1
46.0	46.0	0.0	+1.1
45.0	45.0	0.0	+1.1
44.0	44.0	0.0	+1.1
43.0	43.0	0.0	+1.1
42.0	42.0	0.0	+1.1
41.0	41.0	0.0	+1.1
40.0	40.0	0.0	+1.1
39.0	39.0	0.0	+1.1
38.0	38.0	0.0	+1.1
37.0	37.0	0.0	+1.1
36.0	36.0	0.0	+1.1
35.0	35.0	0.0	+1.1
34.0	34.0	0.0	+1.1
33.0	33.0	0.0	+1.1
32.0	32.0	0.0	+1.1
31.0	31.0	0.0	+1.1
30.0	30.0	0.0	+1.1
29.0	29.0	0.0	+1.1
28.0	28.0	0.0	+1.1
27.0	27.0	0.0	+1.1
26.0	26.0	0.0	+1.1
25.0	25.0	0.0	+1.1

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8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
130	94.0	94.0	0.0	+1.1

9. Time burst response

Time Weighting	Time burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
Fast	2	1	116.0	117.0	0.0	+1.1
	2	8	117.0	117.0	0.0	+1.1
	200	800	116.0	116.0	0.0	+1.1
Slow	2	8	116.0	116.0	0.0	+1.1
	200	800	117.0	117.0	0.0	+1.1
	2	8	116.0	116.0	0.0	+1.1
SEL	2	8	116.0	116.0	0.0	+1.1
	200	800	116.0	116.0	0.0	+1.1
	2	8	116.0	116.0	0.0	+1.1

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10. Peak C sound level

Number of cycle	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limit (dB)
10 test signal	130.0	130.0	0.0	+1.0
Continuous	130.0	130.0	0.0	+1.0
Dir	133.4	133.3	-0.1	+1.0

11. Overhaul indication			
Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.4	-0.1	+1.5



Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Pre-amplifier NH-24
Serial No : 00655231 / 158757 / 56769
ID No.: BKK-130098

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 10, PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHUT SUAN LUANG,
BANGKOK, 10250 THAILAND

Location :
Ambient Temperature : (23.0 ± 3.3) °C
Pressure : (101.3 ± 0.3) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date : 02 JULY 2024
Calibration Date : 04-10 JULY 2024
Date of Issue : 12 JULY 2024

Calibrated by :

Thanasak Pongpattana

Approved by :

T. Petch
(Thanasak Pongpattana)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Calibration Procedure : (S.M.)

Calibration Method :

This equipment was calibrated by following an (IEC-61672) (C013) Standard for class 1 meter (SLM).
The SLM had been to Acoustical and Electrical standard tests of frequency weighting with Automatic checker and Reference Standard Instruments.

For each result of each item was made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1 Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Frequency Standard	3323A	MY46017976	EF-6609-24	05 FEB-25
Waveform Generator	33311B	MY53203742	EF-6607-24	04 FEB-25
Digital Multimeter	34461A	MY53229184	EEL-BP-21-0257	11 FEB-25
Digital Multimeter	34461A	MY53229076	EEL-BP-20-0267	15 FEB-25
Digital Multimeter	34461A	MY56024275	EEL-BP-22-0267	15 FEB-25
Programmable Attenuator	MA7-10P5	62106114	EF-6608-24	03 FEB-25
Conductor Microphone	4180	297740	AA-1001-24	12 FEB-25
Microphone Amplifier	NA-42KAI	3456495	AA-1001-24	05 FEB-25

2. This result of calibration was found accurate as shown on date and place of work for this calibrated item only.

3. This certificate is transferable to the automatic system of unit maintained at :

- National Institute of Metrology (Thailand)
- Thailand Institute of Scientific and Technological Research (TISTR)

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
For 125 Hz	0.3	0.6
For 1000 Hz	0.3	0.6
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For 4 kHz to 10 kHz	0.3	0.7
For 10 kHz to 20 kHz	—	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level accuracy on the reference level range	0.2	0.3
8. Level accuracy including the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C sound level	0.2	0.3
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1



Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.0 (93.0)	93.0	0.0	+0.3

2. Self-generated noise

2.1 Noise test

Measured Value (dB)
15.6

2.2 The microphone's free sound level meter was replaced by electrical signal generator.

Frequency Weighting (dB)	Measured Value (dB)
A-weight	11.2
C-weight	17.4
Flat	23.2

3. Acoustical signal tests of frequency weightings

Meter free-field accurate response at a level of 94 dB

Frequency (Hz)	Deviation from standard frequency weighting reference level (dB)	Acceptance Limits (dB)
125	0.4	+1.5
1000	-0.1	+1.0
5000	-2.5	+1.0

4. Electrical signal tests of frequency weightings

Weighting network response with reference to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
63	-0.1	-0.1	-0.1	+2.0
125	0.0	0.0	-0.1	+1.5
250	0.0	0.0	0.0	+1.5
500	0.0	0.0	-0.1	+1.5
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.0	0.0	+2.0
4000	0.0	0.0	0.0	+3.0
8000	0.0	0.1	0.1	+5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	94.0	0.0	+0.2
C-weight	94.0	0.0	+0.2
Flat	94.0	0.0	+0.2

5.2 Time-weightings at 1 kHz

Frequency Weighting (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	+0.1
Slow	94.0	0.0	+0.1
Long	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting (dB)	SLM Display at initial (dB)	SLM Display at final (dB)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.3



Level accuracy including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Audio	94.0	94.0	0.0	+1.5

9. Time burst response

Time Weighting	Time burst duration, 75 ms	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Fast	2	1	108.0	107.6	-0.4	+1.5, -0.9
		2	112.0	111.6	-0.4	+1.5, -0.9
Slow	2	1	108.0	108.6	+0.6	+1.5, -0.9
		2	112.0	111.6	-0.4	+1.5, -0.9
SEL	2	1	108.0	108.6	+0.6	+1.5, -0.9
		2	112.0	111.6	-0.4	+1.5, -0.9

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, 1/2 cycle (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Continuous	125.0	125.0	0.0	+1.0
Cycle	126.4	126.4	0.0	+1.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Continuous	125.0	125.1	+0.1	+0.5
Positive half cycle	125.4	125.2	-0.2	+0.5
Negative half cycle	125.4	125.1	-0.3	+0.5

11. Overload indication

Measured value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Positive over half cycle	0.2	+1.5
Negative over half cycle	0.2	+1.5

12. High level stability

Frequency Weighting (dB)	SLM Display at initial (dB)	SLM Display at final (dB)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	127.0	127.0	0.0	+0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2
or any value following calculation providing a level of confidence of approximately 95 %.

End of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Pre-amplifier NH-24
Serial No.:
ID No.: BKK-130103

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 10, PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHUT SUAN LUANG,
BANGKOK, 10250 THAILAND

Location :
Ambient Temperature : (23.0 ± 3.3) °C
Pressure : (101.3 ± 0.3) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date : 07 JANUARY 2025
Calibration Date : 21 JANUARY 2025
Date of Issue : 24 JANUARY 2025

Calibrated by :

Thanasak Pongpattana

Approved by :

T. Petch
(Thanasak Pongpattana)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Calibration Procedure : CP-AC-01

Cert. No. : ACL25065
Job No. : VCMAC0858
Pages : 3 of 8

Calibration Method :

This equipment was calibrated by GILSON on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For test results of each item were made by observation of each instrument display and also with SLM's display

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	3320DA	MY60027016	EE-0007-24	05 FEB 25
Waveform Generator	3351B	MY53202742	EE-0007-24	05 FEB 25
Digital Multimeter	34461A	MY53202104	EE-0007-24	15 FEB 25
Digital Multimeter	34461A	MY53202076	EE-0007-24	15 FEB 25
Digital Multimeter	34461A	MY60024273	EE-0007-24	15 FEB 25
Programmable Attenuator	MAT-1070	62100114	EE-0007-24	05 FEB 25
Condenser Microphone	4130	2977900	AA-1003-24	12 FEB 25
Measuring Amplifier	NA-42KAI	3456495	AA-1003-24	05 FEB 25

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

3. This certificate is traceable to the international system of units maintained at :

- 1.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

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Summary of Measurement Result :

Parameter	Uncertainty (dB)	Measurement-permitted uncertainty of measurement (dB)
1. Absolute accuracy	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For 4 kHz to 10 kHz	0.3	0.7
For 10 kHz to 20 kHz	0.3	1.0
5. Frequency and tone weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level accuracy on the reference level range	0.2	0.3
8. Level accuracy including the level range around	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C sound level	0.2	0.3
11. Overload indication	0.2	0.2
12. High level stability	0.1	0.1

Cert. No. : ACL25065
Job No. : VCMAC0858
Pages : 3 of 8

Result of calibration :

1. Absolute accuracy

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.9 (150)	93.9	0.0	+0.3

2. Self-generated noise

2.1 Normal tone

Measured Value (dB)
146

2.2 The self-generated noise was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A-weight	11.6
C-weight	17.4
Flat	25.2

3. Acoustical signal tests of frequency weightings

After five-fold average response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
125	1.0	1.0	1.0	+1.5
1000	0.7	0.7	0.7	+1.0
8000	-2.5	-2.5	-2.5	+1.0

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4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
43	0.0	-0.1	-0.1	+2.0
125	0.0	0.0	0.0	+1.5
250	0.0	0.0	-0.1	+1.5
500	0.0	0.0	-0.1	+1.5
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.0	0.0	+2.0
4000	0.0	0.0	0.0	+3.0
8000	0.0	0.1	0.1	+3.0

5. Frequency and tone weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Tone weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Log	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.1

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7. Level accuracy on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	+1.1
116.0	116.0	0.0	+1.1
115.0	115.0	0.0	+1.1
114.0	114.0	0.0	+1.1
113.0	113.0	0.0	+1.1
112.0	112.0	0.0	+1.1
111.0	111.0	0.0	+1.1
110.0	110.0	0.0	+1.1
109.0	109.0	0.0	+1.1
108.0	108.0	0.0	+1.1
107.0	107.0	0.0	+1.1
106.0	106.0	0.0	+1.1
105.0	105.0	0.0	+1.1
104.0	104.0	0.0	+1.1
103.0	103.0	0.0	+1.1
102.0	102.0	0.0	+1.1
101.0	101.0	0.0	+1.1
100.0	100.0	0.0	+1.1
99.0	99.0	0.0	+1.1
98.0	98.0	0.0	+1.1
97.0	97.0	0.0	+1.1
96.0	96.0	0.0	+1.1
95.0	95.0	0.0	+1.1
94.0	94.0	0.0	+1.1
93.0	93.0	0.0	+1.1
92.0	92.0	0.0	+1.1
91.0	91.0	0.0	+1.1
90.0	90.0	0.0	+1.1
89.0	89.0	0.0	+1.1
88.0	88.0	0.0	+1.1
87.0	87.0	0.0	+1.1
86.0	86.0	0.0	+1.1
85.0	85.0	0.0	+1.1
84.0	84.0	0.0	+1.1
83.0	83.0	0.0	+1.1
82.0	82.0	0.0	+1.1
81.0	81.0	0.0	+1.1
80.0	80.0	0.0	+1.1
79.0	79.0	0.0	+1.1
78.0	78.0	0.0	+1.1
77.0	77.0	0.0	+1.1
76.0	76.0	0.0	+1.1
75.0	75.0	0.0	+1.1
74.0	74.0	0.0	+1.1
73.0	73.0	0.0	+1.1
72.0	72.0	0.0	+1.1
71.0	71.0	0.0	+1.1
70.0	70.0	0.0	+1.1
69.0	69.0	0.0	+1.1
68.0	68.0	0.0	+1.1
67.0	67.0	0.0	+1.1
66.0	66.0	0.0	+1.1
65.0	65.0	0.0	+1.1
64.0	64.0	0.0	+1.1
63.0	63.0	0.0	+1.1
62.0	62.0	0.0	+1.1
61.0	61.0	0.0	+1.1
60.0	60.0	0.0	+1.1
59.0	59.0	0.0	+1.1
58.0	58.0	0.0	+1.1
57.0	57.0	0.0	+1.1
56.0	56.0	0.0	+1.1
55.0	55.0	0.0	+1.1
54.0	54.0	0.0	+1.1
53.0	53.0	0.0	+1.1
52.0	52.0	0.0	+1.1
51.0	51.0	0.0	+1.1
50.0	50.0	0.0	+1.1
49.0	49.0	0.0	+1.1
48.0	48.0	0.0	+1.1
47.0	47.0	0.0	+1.1
46.0	46.0	0.0	+1.1
45.0	45.0	0.0	+1.1
44.0	44.0	0.0	+1.1
43.0	43.0	0.0	+1.1
42.0	42.0	0.0	+1.1
41.0	41.0	0.0	+1.1
40.0	40.0	0.0	+1.1
39.0	39.0	0.0	+1.1
38.0	38.0	0.0	+1.1
37.0	37.0	0.0	+1.1
36.0	36.0	0.0	+1.1
35.0	35.0	0.0	+1.1
34.0	34.0	0.0	+1.1
33.0	33.0	0.0	+1.1
32.0	32.0	0.0	+1.1
31.0	31.0	0.0	+1.1
30.0	30.0	0.0	+1.1
29.0	29.0	0.0	+1.1
28.0	28.0	0.0	+1.1
27.0	27.0	0.0	+1.1
26.0	26.0	0.0	+1.1
25.0	25.0	0.0	+1.1
24.0	24.0	0.0	+1.1
23.0	23.0	0.0	+1.1
22.0	22.0	0.0	+1.1
21.0	21.0	0.0	+1.1
20.0	20.0	0.0	+1.1
19.0	19.0	0.0	+1.1
18.0	18.0	0.0	+1.1
17.0	17.0	0.0	+1.1
16.0	16.0	0.0	+1.1
15.0	15.0	0.0	+1.1
14.0	14.0	0.0	+1.1
13.0	13.0	0.0	+1.1
12.0	12.0	0.0	+1.1
11.0	11.0	0.0	+1.1
10.0	10.0	0.0	+1.1
9.0	9.0	0.0	+1.1
8.0	8.0	0.0	+1.1
7.0	7.0	0.0	+1.1
6.0	6.0	0.0	+1.1
5.0	5.0	0.0	+1.1
4.0	4.0	0.0	+1.1
3.0	3.0	0.0	+1.1
2.0	2.0	0.0	+1.1
1.0	1.0	0.0	+1.1
0.0	0.0	0.0	+1.1

Cert. No. : ACL25065
Job No. : VCMAC0858
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8. Level accuracy including the level range around

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	+1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	+1.1

9. Time burst response

Time Weighting	Time burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	+1.5, -5.0
	2	8	117.0	117.0	0.0	+1.0, -2.5
	200	800	134.0	134.0	0.0	+1.0
Slow	2	8	108.0	108.0	0.0	+1.5, -5.0
	200	800	127.6	127.6	0.0	+1.0
	0.25	1	99.0	99.0	-0.1	+1.5, -5.0
SEL	2	8	108.0	108.0	0.0	+1.0, -2.5
	200	800	128.0	128.0	0.0	+1.0

T. Petch

T. Petch

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10. Peak C sound level

Cert. No. : ACL25065
Job No. : VCMAC0858
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Number of cycle test used	Anticipated Value (dB)	Measured Value, Leq, (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	135.0	135.0	0.0	+3.0
One	133.4	133.4	0.0	+3.0

Number of cycle test used	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	135.0	135.0	0.0	+2.0
Pretest half cycle	135.4	135.3	-0.1	+2.0
Posttest half cycle	135.4	135.3	-0.1	+2.0

11. Overload indication

Measured value (dB)		Deviated	Acceptance
Positive	Negative	Value	Limits
one-half cycle	one-half cycle	(dB)	(dB)
0.0	0.0	0.0	0.0

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	+0.3

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

End of Calibration Certificate

T. Petch

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone : LC-52 / Pre-amplifier : NH-24
Serial No. : 0005242 / 197742 / -4097
ID No. : BJK 175099

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATHANAKAN 40 PHATHANAKAN ROAD
KHUAEANG PHATHANAKAN KHUET SAN LUANG
BANGKOK, 10250 THAILAND

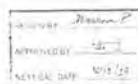
Location : (12.9 ± 0.3) °C
Ambient Temperature : (101.4 ± 1.1) kPa
Pressure : (9.0 ± 0.2) °C
Relative Humidity :

Received Date : 09 AUGUST 2024
Calibration Date : 30 AUGUST 2024
Date of Issue : 03 SEPTEMBER 2024

Calibrated by : Natchanon Petch

Approved by : T. Petch
(Thailand)

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other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL24262
Job No. : VCBAC0139
Pages : 2 of 6

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by Gilson on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For test results of each item were made by observation of each instrument display and also with SLM's display.

Cert. No.: ACL24262
Job No.: VCB7ACB139
Pages: 3 of 8

Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
1. Absolute sensitivity	±0.2	N/A
2. Self-generated noise	±0.2	N/A
3. Antennated signal tests of frequency weightings		
125 Hz	±0.3	±0.6
1000 Hz	±0.3	±0.6
1000 Hz	±0.3	±0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	±0.3	±0.6
For > 4 kHz to 10 kHz	±0.3	±0.7
For > 10 kHz to 20 kHz	±0.3	±0.8
5. Frequency and time weightings at 1 kHz	±0.2	±0.2
6. Long-term stability	±0.1	±0.1
7. Level linearity on the reference level range	±0.2	±0.3
8. Level linearity including the level range extend	±0.2	±0.3
9. Time hysteresis	±0.2	±0.3
10. Peak C sound level	±0.2	±0.3
11. Overload indication	±0.2	±0.3
12. High level stability	±0.1	±0.3

T. Petch

Result of calibration:

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.0 (93.0)	93.0	0.0	±0.3

2. Self-generated noise

2.1. Normal law

Measured Value (dB)
77.4

2.2. The maximum of the sound level meter was regulated by increased signal input device.

Frequency Weighting	Weighting (dB)
A-weight	13.4
C-weight	22.4
Flat	27.2

3. Antennated signal tests of frequency weightings

Mean free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from standard frequency weighting response curve (dB)	Acceptance Limit (dB)
125	0.1	±1.5
1000	-0.1	±1.6
1000	-1.5	±3.0

4. Electrical signal tests of frequency weightings

Weighting network response with noise at 1 kHz

Frequency (Hz)	Deviation from standard frequency weighting response curve (dB)	Acceptance Limit (dB)
0	0.0	±0.2
125	0.0	±1.2
250	0.0	±1.5
500	0.0	±1.5
1000	0.0	±1.0
2000	0.0	±2.0
4000	0.0	±3.0
8000	0.0	±3.0

5. Frequency and time weightings at 1 kHz

Frequency Weighting	Accepted Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Accepted Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Imp	94.0	94.0	0.0	±0.1

6. Level - time stability

Frequency Weighting	SLM Display at Initial (dB)	SLM Display at Final (dB)	Deviation Value (dB)	Acceptance Limit (dB)
A-weight	94.0	94.0	0.0	±0.3

T. Petch

Cert. No.: ACL24262
Job No.: VCB7ACB139
Pages: 6 of 8

7. Level linearity on the reference level range

Accepted Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
117.0	117.0	0.0	±1.1
116.0	116.0	0.0	±1.1
115.0	115.0	0.0	±1.1
114.0	114.0	0.0	±1.1
113.0	113.0	0.0	±1.1
112.0	112.0	0.0	±1.1
111.0	111.0	0.0	±1.1
110.0	110.0	0.0	±1.1
109.0	109.0	0.0	±1.1
108.0	108.0	0.0	±1.1
107.0	107.0	0.0	±1.1
106.0	106.0	0.0	±1.1
105.0	105.0	0.0	±1.1
104.0	104.0	0.0	±1.1
103.0	103.0	0.0	±1.1
102.0	102.0	0.0	±1.1
101.0	101.0	0.0	±1.1
100.0	100.0	0.0	±1.1
99.0	99.0	0.0	±1.1
98.0	98.0	0.0	±1.1
97.0	97.0	0.0	±1.1
96.0	96.0	0.0	±1.1
95.0	95.0	0.0	±1.1
94.0	94.0	0.0	±1.1
93.0	93.0	0.0	±1.1
92.0	92.0	0.0	±1.1
91.0	91.0	0.0	±1.1
90.0	90.0	0.0	±1.1
89.0	89.0	0.0	±1.1
88.0	88.0	0.0	±1.1
87.0	87.0	0.0	±1.1
86.0	86.0	0.0	±1.1
85.0	85.0	0.0	±1.1
84.0	84.0	0.0	±1.1
83.0	83.0	0.0	±1.1
82.0	82.0	0.0	±1.1
81.0	81.0	0.0	±1.1
80.0	80.0	0.0	±1.1
79.0	79.0	0.0	±1.1
78.0	78.0	0.0	±1.1
77.0	77.0	0.0	±1.1
76.0	76.0	0.0	±1.1
75.0	75.0	0.0	±1.1

T. Petch

8. Level linearity including the level range extend

Range	Accepted Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
130	94.0	94.0	0.0	±1.1

Range	Accepted Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
130	30.0	30.1	0.1	±0.3

9. Time hysteresis

Time Weighting	Time burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	±0.5
	2	8	117.0	117.0	0.0	±0.7
	200	800	134.0	134.0	0.0	±1.0
Slow	2	8	108.0	108.0	0.0	±0.5
	200	300	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	±0.5
SEL	2	8	108.0	108.0	0.0	±0.5
	200	800	128.0	128.0	0.0	±1.0

10. Peak C sound level

Number of cycle test signal	Accepted Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
Continuous	133.0	133.0	0.0	±1.0
One	136.4	136.3	-0.1	±1.0

Number of cycle test signal	Accepted Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

11. Overload indication

Number of cycle test signal	Accepted Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
Continuous	133.0	133.0	0.0	±1.0
Positive half cycle	135.4	135.2	-0.2	±1.0
Negative half cycle	135.4	135.2	-0.2	±1.0

12. High level stability

Frequency Weighting	SLM Display at Initial (dB)	SLM Display at Final (dB)	Deviation Value (dB)	Acceptance Limit (dB)
A-weight	137.0	137.0	0.0	±1.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2

or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

T. Petch

Cert. No.: ACC24689
Job No.: VCB7ACB178
Pages: 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR
Manufacturer : RION
Model : NC-74
Serial No.: 3462567
ID No.: BKK_F50618

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATHANAKAN 40, PHATHANAKAN ROAD,
KHUANG PHATHANAKAN, KHUAT SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3.3) °C
Pressure : (101.3 ± 3.3) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date : 13 NOVEMBER 2024
Calibration Date : 04 DECEMBER 2024
Date of Issue : 04 DECEMBER 2024

Calibrated by : Nubakorn Pitsanquun

Approved by : T. Petch
(Thumakul Petchu)

REVIEW BY :
APPROVED BY :
NEXT CAL DATE : 04/12/25

Calibration Procedure : CP-AC-01

Calibration Method : This equipment was calibrated by follow on IEC-60942:2000 Standard.

The sound pressure level, frequency and total duration of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33011B	MY5320242	EE-0007-24	05-07-25
Digital Multimeter	3361A	MY5320204	EE-0007-24	15-07-25
Digital Multimeter	3361A	MY5320205	EE-0007-24	15-07-25
Digital Multimeter	3361A	MY6020273	EE-0007-24	15-07-25
Programmable Attenuator	MAT-1070	6210114	EE-0006-24	05-07-25
Consumer Microphone	4180	2977900	AA-1001-24	10-03-25
Measuring Amplifier	NA-400A	3450495	AA-1002-24	05-07-25
Audio Analyzer	AVR-3360A	Y74106069	EE-0007-24	05-07-25

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

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T. Petch

T. Petch

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2
or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Calibration Certificate

Equipment: SOUND LEVEL METER
Manufacturer: RION
Model: NL-42 / Microphone UC-52 / Pre-amplifier N1-24
Serial No.: 00815519 / 157785 / 48094
ID No.: BKK-FS0109

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHUET SUAN LUANG,
BANGKOK, 10250 THAILAND

Location:
Ambient Temperature: (23.0 ± 3.3) °C
Pressure: (101.3 ± 3.3) kPa
Relative Humidity: (30.0 ± 20.0) %

Received Date: 14 JANUARY 2025
Calibration Due: 27 JANUARY 2025
Date of Issue: 10 JANUARY 2025

Calibrated by: Nidhokra Pimpaporn

Approved by: T. Petch
(Thanakul Petchum)

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Cert. No.: ACL25093
Job No.: VCBAC0063
Page: 1 of 8

Calibration Procedure: CP-AC-01

Calibration Method: This equipment was calibrated by follow on IEC-61672-1 (2013) Standard for sound level meter (SLM). The SLM had been to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.
For test results of each items were made by observation of each instrument display and also with SLM's display

Condition of this result of calibration:

1. Reference Standard Instruments

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	09-11-25
Waveform Generator	33511B	MY53302742	EF-0007-24	05-11-25
Digital Multimeter	33461A	MY32200104	EXLBP 21A0267	13 FEB-25
Digital Multimeter	33461A	MY32200106	EXLBP 22A0267	15 FEB-25
Digital Multimeter	33461A	NY60024273	EXLBP 22A0267	15 FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-11-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-11-25

2. This result of calibration was found accurate on dates and place of calibration for this calibrated item only.

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

1. National Institute of Metrology (Thailand).
2. Thailand Institute of Science and Technological Research (TISTR)

Cert. No.: ACL25093
Job No.: VCBAC0063
Page: 2 of 8

Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.8
1000 Hz	0.3	0.6
8000 Hz	0.3	0.3
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.8
For 4 kHz to 10 kHz	0.3	0.7
For 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity on the level range tested	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C-weight level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No.: ACL25093
Job No.: VCBAC0063
Page: 3 of 8

Cert. No.: ACL25093
Job No.: VCBAC0063
Page: 4 of 8

Cert. No.: ACL25093
Job No.: VCBAC0063
Page: 5 of 8

Cert. No.: ACL25093
Job No.: VCBAC0063
Page: 6 of 8

Result of calibration:

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (97.94)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Weighting (dB)
A-weight	12.5
C-weight	12.5
Flat	12.5

3. Acoustical signal tests of frequency weightings

Make free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.5	0.5	±1.5
1000	0.2	0.2	0.2	±1.0
8000	-0.9	-0.9	-0.9	±1.0

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.0	-0.0	±2.0
125	0.0	0.0	-0.1	±1.5
250	0.0	-0.0	-0.0	±1.5
500	0.0	0.0	-0.1	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±1.0
8000	0.0	0.1	0.2	±0.9

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Long	94.0	94.0	0.0	±0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2

Cert. No.: ACL25093
Job No.: VCBAC0063
Page: 7 of 8

Cert. No.: ACL25093
Job No.: VCBAC0063
Page: 8 of 8

Cert. No.: ACL24000
Page: 1 of 8

4. Level linearity (including the level range control)

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.1

5. Time burst response

Time Weighting	Time burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 -0.0
	2	8	117.0	117.0	0.0	1.0 ± 2.0
	200	100	134.0	134.0	0.0	±1.0
Slow	2	8	128.0	128.0	0.0	1.5 ± 0.0
	200	100	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.2 ± 0.0
SLI	2	8	106.0	106.0	0.0	1.0 ± 0.5
	200	100	126.0	126.0	0.0	±1.0

10. Peak C-weight level

Number of cycle test signal	Anticipated Value (dB)	Measured Value, L _{peak} (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	113.4	113.4	0.0	±0.9

Number of cycle test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	113.0	113.0	0.0	±2.0
Positive half cycle	115.4	115.2	-0.2	±2.0
Negative half cycle	115.4	115.2	-0.2	±2.0

11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive over-half cycle	0.1	±1.5
Negative over-half cycle	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	117.0	117.0	0.0	±0.3

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

End of Calibration Certificate

Calibration Certificate

Equipment: SOUND LEVEL METER
Manufacturer: RION
Model: NL-42 / Microphone UC-52 / Pre-amplifier N1-24
Serial No.: 00815520 / 158771 / 58772
ID No.: BKK-FS0110

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHUET SUAN LUANG,
BANGKOK, 10250 THAILAND

Location:
Ambient Temperature: (23.0 ± 3.3) °C
Pressure: (101.3 ± 3.3) kPa
Relative Humidity: (30.0 ± 20.0) %

Received Date: 08 DECEMBER 2024
Calibration Due: 13 DECEMBER 2024
Date of Issue: 18 DECEMBER 2024

Calibrated by: Nidhokra Pimpaporn

Approved by: T. Petch
(Thanakul Petchum)

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SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

439-4152 Srinakharin Road, Bangkum, Bangkok, 10500 Thailand
Tel: +66 2433 8338 Email: cal@calibrationlab.com

SITHIPORN
ASSOCIATES



Cert. No. : ACL24408
Job No. : VCMAC0945
Page : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC 61672-1 (2013) Standard for sound level meter (SLM).
The SLM had tests in Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For test results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05-01-25
Waveform Generator	33311B	MY52302742	EF-0007-24	05-01-25
Digital Multimeter	33461A	MY53220104	EF-0021-24	13-03-25
Digital Multimeter	33461A	MY53220076	EF-0021-24	13-03-25
Digital Multimeter	34461A	MY60024733	EF-0021-24	13-03-25
Programmable Attenuator	MAT-1079	62100114	EF-0008-24	05-02-25
Condenser Microphone	4189	2977900	AA-1001-24	13-03-25
Measuring Amplifier	NA-42CAJ	34360495	AA-1001-24	05-01-25

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

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

- National Institute of Metrology (Thailand).
- Thailand Institute of Science and Technological Research (TISTR).

SITHIPORN ASSOCIATES CO., LTD.
CALIBRATION LABORATORY

439-4152 Srinakharin Road, Bangkum, Bangkok, 10500 Thailand
Tel: +66 2433 8338 Email: cal@calibrationlab.com

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Cert. No. : ACL24408
Job No. : VCMAC0945
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Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weighting		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
5000 Hz	0.3	0.7
4. Electrical signal tests of frequency weighting		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weighting at 1 kHz	0.2	0.3
6. Long-term stability	0.2	0.3
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range extend	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak-C sound level	0.2	0.3
11. Overload indication	0.2	0.25
12. High level stability	0.3	0.3

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Result of calibration :

1. Absolute sensitivity

Reference	Measured	Deviation	Acceptance
Amplitude (dB)	Value (dB)	(dB)	Limit (dB)
93.9 (93.94)	93.9	0.0	+0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.6

2.2 The measuring of the sound level meter was replaced by electrical signal input device:

Frequency Weighting (dB)	Measured Value (dB)
A-weight	79.8
C-weight	16.9
Flat	22.6

3. Acoustical signal tests of frequency weighting

More free-field accurate response at a level of 64 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limit
125	0.5	0.6	0.6	+1.5
1000	0.2	0.2	0.2	+1.0
5000	-0.7	-0.5	-0.5	+0.0

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4. Electrical signal tests of frequency weighting

Weighting network response with relative to 1 kHz

Frequency (Hz)	Deviation from reference frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	+2.0
125	0.0	0.0	0.1	+1.5
250	0.1	0.0	0.0	+1.5
500	0.0	0.1	0.0	+1.5
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.1	0.0	+2.0
4000	0.0	0.0	0.0	+1.0
5000	0.0	0.1	0.1	+3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.3
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.3

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Log	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.1	0.1	+0.3

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7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	+1.1
118.0	118.0	0.0	+1.1
119.0	119.0	0.0	+1.1
120.0	120.0	0.0	+1.1
121.0	121.0	0.0	+1.1
122.0	122.0	0.0	+1.1
123.0	123.0	0.0	+1.1
124.0	124.0	0.0	+1.1
125.0	125.0	0.0	+1.1
126.0	126.0	0.0	+1.1
127.0	127.0	0.0	+1.1
128.0	128.0	0.0	+1.1
129.0	129.0	0.0	+1.1
130.0	130.0	0.0	+1.1
131.0	131.0	0.0	+1.1
132.0	132.0	0.0	+1.1
133.0	133.0	0.0	+1.1
134.0	134.0	0.0	+1.1
135.0	135.0	0.0	+1.1
136.0	136.0	0.0	+1.1
137.0	137.0	0.0	+1.1
138.0	138.0	0.0	+1.1
139.0	139.0	0.0	+1.1
140.0	140.0	0.0	+1.1
141.0	141.0	0.0	+1.1
142.0	142.0	0.0	+1.1
143.0	143.0	0.0	+1.1
144.0	144.0	0.0	+1.1
145.0	145.0	0.0	+1.1
146.0	146.0	0.0	+1.1
147.0	147.0	0.0	+1.1
148.0	148.0	0.0	+1.1
149.0	149.0	0.0	+1.1
150.0	150.0	0.0	+1.1
151.0	151.0	0.0	+1.1
152.0	152.0	0.0	+1.1
153.0	153.0	0.0	+1.1
154.0	154.0	0.0	+1.1
155.0	155.0	0.0	+1.1
156.0	156.0	0.0	+1.1
157.0	157.0	0.0	+1.1
158.0	158.0	0.0	+1.1
159.0	159.0	0.0	+1.1
160.0	160.0	0.0	+1.1
161.0	161.0	0.0	+1.1
162.0	162.0	0.0	+1.1
163.0	163.0	0.0	+1.1
164.0	164.0	0.0	+1.1
165.0	165.0	0.0	+1.1
166.0	166.0	0.0	+1.1
167.0	167.0	0.0	+1.1
168.0	168.0	0.0	+1.1
169.0	169.0	0.0	+1.1
170.0	170.0	0.0	+1.1
171.0	171.0	0.0	+1.1
172.0	172.0	0.0	+1.1
173.0	173.0	0.0	+1.1
174.0	174.0	0.0	+1.1
175.0	175.0	0.0	+1.1
176.0	176.0	0.0	+1.1
177.0	177.0	0.0	+1.1
178.0	178.0	0.0	+1.1
179.0	179.0	0.0	+1.1
180.0	180.0	0.0	+1.1
181.0	181.0	0.0	+1.1
182.0	182.0	0.0	+1.1
183.0	183.0	0.0	+1.1
184.0	184.0	0.0	+1.1
185.0	185.0	0.0	+1.1
186.0	186.0	0.0	+1.1
187.0	187.0	0.0	+1.1
188.0	188.0	0.0	+1.1
189.0	189.0	0.0	+1.1
190.0	190.0	0.0	+1.1
191.0	191.0	0.0	+1.1
192.0	192.0	0.0	+1.1
193.0	193.0	0.0	+1.1
194.0	194.0	0.0	+1.1
195.0	195.0	0.0	+1.1
196.0	196.0	0.0	+1.1
197.0	197.0	0.0	+1.1
198.0	198.0	0.0	+1.1
199.0	199.0	0.0	+1.1
200.0	200.0	0.0	+1.1
201.0	201.0	0.0	+1.1
202.0	202.0	0.0	+1.1
203.0	203.0	0.0	+1.1
204.0	204.0	0.0	+1.1
205.0	205.0	0.0	+1.1
206.0	206.0	0.0	+1.1
207.0	207.0	0.0	+1.1
208.0	208.0	0.0	+1.1
209.0	209.0	0.0	+1.1
210.0	210.0	0.0	+1.1
211.0	211.0	0.0	+1.1
212.0	212.0	0.0	+1.1
213.0	213.0	0.0	+1.1
214.0	214.0	0.0	+1.1
215.0	215.0	0.0	+1.1
216.0	216.0	0.0	+1.1
217.0	217.0	0.0	+1.1
218.0	218.0	0.0	+1.1
219.0	219.0	0.0	+1.1
220.0	220.0	0.0	+1.1
221.0	221.0	0.0	+1.1
222.0	222.0	0.0	+1.1
223.0	223.0	0.0	+1.1
224.0	224.0	0.0	+1.1
225.0	225.0	0.0	+1.1
226.0	226.0	0.0	+1.1
227.0	227.0	0.0	+1.1
228.0	228.0	0.0	+1.1
229.0	229.0	0.0	+1.1
230.0	230.0	0.0	+1.1
231.0	231.0	0.0	+1.1
232.0	232.0	0.0	+1.1
233.0	233.0	0.0	+1.1
234.0	234.0	0.0	+1.1
235.0	235.0	0.0	+1.1
236.0	236.0	0.0	+1.1
237.0	237.0	0.0	+1.1
238.0	238.0	0.0	+1.1
239.0	239.0	0.0	+1.1
240.0	240.0	0.0	+1.1
241.0	241.0	0.0	+1.1
242.0	242.0	0.0	+1.1
243.0	243.0	0.0	+1.1
244.0	244.0	0.0	+1.1
245.0	245.0	0.0	+1.1
246.0	246.0	0.0	+1.1
247.0	247.0	0.0	+1.1
248.0	248.0	0.0	+1.1
249.0	249.0	0.0	+1.1
250.0	250.0	0.0	+1.1
251.0	251.0	0.0	+1.1
252.0	252.0	0.0	+1.1
253.0	253.0	0.0	+1.1
254.0	254.0	0.0	+1.1
255.0	255.0	0.0	+1.1
256.0	256.0	0.0	+1.1
257.0	257.0	0.0	+1.1
258.0	258.0	0.0	+1.1
259.0	259.0	0.0	+1.1
260.0	260.0	0.0	+1.1
261.0	261.0	0.0	+1.1
262.0	262.0	0.0	+1.1
263.0	263.0	0.0	+1.1
264.0	264.0	0.0	+1.1
265.0	265.0	0.0	+1.1
266.0	266.0	0.0	+1.1
267.0	267.0	0.0	+1.1
268.0	268.0	0.0	+1.1
269.0	269.0	0.0	+1.1
270.0	270.0	0.0	+1.1
271.0	271.0	0.0	+1.1
272.0	272.0	0.0	+1.1
273.0	273.0	0.0	+1.1
274.0	274.0	0.0	+1.1
275.0	275.0	0.0	+1.1
276.0	276.0	0.0	+1.1
277.0	277.0	0.0	

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Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute accuracy	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
5000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C-weight level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

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Result of calibration:

1. Absolute accuracy

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (92.94)	93.9	0.0	+0.3

2. Self-generated noise

Measured Value (dB)
14.2

2.3 The acceptance of the sound level meter was replaced by electrical signal input device.

Frequency Weighting (Hz)	Weighting (dB)
A-weight	10.5
C-weight	17.4
Flat	23.0

3. Acoustical signal tests of frequency weightings

Many free-field acoustic responses are a level of 94 dB

Frequency (Hz)	Deviation from sound frequency weighting response curve (dB)	Flat	C-weight	A-weight	Acceptance Limits (dB)
125	0.6	0.6	0.6	0.6	+1.3
1000	0.1	0.1	0.1	0.1	+1.0
5000	-1.9	-1.9	-1.9	-1.9	+3.0

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4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)	Flat	C-weight	A-weight	Acceptance Limits (dB)
83	0.0	0.0	0.1	0.1	+2.0
125	0.0	0.0	0.0	0.0	+1.5
250	0.0	0.0	0.0	0.0	+1.5
500	0.0	0.1	0.0	0.0	+1.5
1000	0.0	0.0	0.0	0.0	+1.0
2000	0.0	0.1	0.0	0.0	+2.0
4000	0.0	0.0	0.0	0.0	+3.0
8000	0.0	0.1	0.0	0.0	+3.0

5. Frequency and time weightings at 1 kHz

Frequency Weighting (dB)	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Time weighting at 1 kHz

Frequency Weighting (dB)	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.3
Slow	94.0	94.0	0.0	+0.3
Long	94.0	94.0	0.0	+0.3

6. Long-term stability

Frequency Weighting (dB)	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.3

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7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	+1.3
136.0	136.0	0.0	+1.3
135.0	135.0	0.0	+1.3
134.0	134.0	0.0	+1.3
133.0	133.0	0.0	+1.3
132.0	132.0	0.0	+1.3
131.0	131.0	0.0	+1.3
129.0	129.0	0.0	+1.3
124.0	124.0	0.0	+1.3
119.0	119.0	0.0	+1.3
114.0	114.0	0.0	+1.3
109.0	109.0	0.0	+1.3
104.0	104.0	0.0	+1.3
99.0	99.0	0.0	+1.3
94.0	94.0	0.0	+1.3
89.0	89.0	0.0	+1.3
84.0	84.0	0.0	+1.3
79.0	79.0	0.0	+1.3
74.0	74.0	0.0	+1.3
69.0	69.0	0.0	+1.3
64.0	64.0	0.0	+1.3
59.0	59.0	0.0	+1.3
54.0	54.0	0.0	+1.3
49.0	49.0	0.0	+1.3
44.0	44.0	0.0	+1.3
39.0	39.0	0.0	+1.3
34.0	34.0	0.0	+1.3
29.0	29.0	0.0	+1.3
24.0	24.0	0.0	+1.3
19.0	19.0	0.0	+1.3
14.0	14.0	0.0	+1.3
9.0	9.0	0.0	+1.3
4.0	4.0	0.0	+1.3

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8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	+1.3

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	+1.3

9. Time burst response

Time Weighting	Time burst duration, T _b	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	106.0	107.0	-0.1	1.5;-1.0
	2	6	117.0	117.0	0.0	1.0;-2.5
	200	800	134.0	134.1	0.1	+1.0
Slow	2	6	108.0	108.0	0.0	1.3;-3.0
	200	800	127.8	127.8	0.0	+1.0
	0.25	1	96.0	96.9	-0.9	1.3;-3.0
SEL	2	6	108.0	108.0	0.0	1.0;-2.5
	200	800	128.0	128.1	0.1	+1.0

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10. Peak C-weight level

Number of cycle test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	+3.0
One	133.4	133.3	-0.1	+3.0

Number of cycle test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	+2.0
Positive half cycle	135.4	135.2	-0.2	+2.0
Negative half cycle	135.4	135.2	-0.2	+2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.6	89.5	-0.1	+1.3

12. High level stability

Frequency Weighting (dB)	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	127.0	127.0	0.0	+0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2
or any value following calculation, providing a level of confidence of approximately 95%

End of Calibration Certificate

T. Pich

431 43th Srinakharinwirot, Bangkok, Bangkok, Bangkok, 10700 Thailand
Tel: +66 2 622 4322 E-mail: sithiporn@thai.comCert. No. : ACL25866
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Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC 52 / Pre-amplifier N1 24
Serial No. : 008-15231 / 17066 / 73129
ID No. : DKK, P20113

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KIRAWANG PHATTANAKAN, KHUAT SUAN LUANG,
BANGKOK, 10250 THAILANDLocation :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %Received Date : 14 JANUARY 2025
Calibration Date : 27 JANUARY 2025
Date of Issue : 30 JANUARY 2025REVIEW BY :
APPROVED BY :
NEXT CAL DATE : 27/01/26

Calibrated by : Natsakorn Piampon

Approved by : T. Pich
(Natsakorn Piampon)This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
other than as full, except with the prior written approval of the Head of Calibration Laboratory.

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on (IEC-61677-1 (2013) Standard for sound level meter (SLM).
The SLM had been to Acoustical and Electrical signal tests of frequency weighting with A-weight, C-weight and Reference
Standard Instruments.

For test results of each item were made by observation of each instrument display and also with SLM's display

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Serial No.	Cert. No.	Due Date
Waveform Generator	332110A	MY48017076	05-FEB-25
Waveform Generator	332110B	MY53202742	05-FEB-25
Digital Multimeter	33461A	MY5320104	13-FEB-25
Digital Multimeter	33461A	MY5320076	15-FEB-25
Digital Multimeter	34461A	MY6002473	15-FEB-25
Programmable Attenuator	MAT 1070	62100114	05-FEB-25
Condenser Microphone	4180	2977900	12-FEB-25
Measuring Amplifier	NA-42KAI	14560495	05-FEB-25

2. This result of calibration was issued according to observation data and phase of calibration for this calibrated item only.

3. This certificate is available to the structural system of unit maintained at

1.1 National Institute of Metrology (Thailand)

1.2 Thailand Institute of Scientific and Technological Research (TISTR)

Cert. No. : ACL25866
Job No. : VCMAC0863
Page : 3 of 8Cert. No. : ACL25866
Job No. : VCMAC0863
Page : 3 of 8

Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute accuracy	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
5000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Time burst response	0.2	0.35
10. Peak C-weight level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

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Cert. No. : ACL25894
Job No. : VCMAC0063
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Result of calibration:

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.9 (93.94)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.2

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A-weight	11.2
C-weight	17.4
Flat	23.0

3. Acoustical signal tests of frequency weightings

Mean free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from various frequency weighting response curves (dB)	Acceptance Limits (dB)
125	0.3	±0.3
1000	0.1	±0.3
8000	-0.2	±0.3

Cert. No. : ACL25894
Job No. : VCMAC0063
Page : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with respect to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	±0.6
125	0.0	0.0	-0.1	±0.5
250	0.0	0.0	-0.1	±0.5
500	0.0	0.0	-0.1	±0.5
1000	0.0	0.0	0.0	±0.0
2000	0.0	0.0	0.0	±0.0
4000	0.0	0.0	0.0	±0.0
8000	0.0	0.1	0.1	±0.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Imp	94.0	94.0	0.0	±0.1

6. Long-term stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.3

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Job No. : VCMAC0063
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7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.0
135.0	135.0	0.0	±1.0
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
127.0	127.0	0.0	±1.1
119.0	119.0	0.0	±1.1
118.0	118.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
29.0	29.0	0.0	±1.1
24.0	24.0	-0.1	±1.1
19.0	19.0	-0.1	±1.1
14.0	14.0	-0.1	±1.1
9.0	9.0	-0.1	±1.1
4.0	4.0	-0.1	±1.1

Cert. No. : ACL25894
Job No. : VCMAC0063
Page : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.9	-0.1	±1.1

9. Time input response

Time Weighting	Time burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.0	0.0	±0.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -0.0
	200	800	127.6	127.6	0.0	-11.0
	0.25	1	99.0	98.8	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.0	0.0	±0.0

Cert. No. : ACL25894
Job No. : VCMAC0063
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10. Peak C-weight level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±1.0
One	133.4	133.4	0.0	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	133.8	133.2	-0.6	±2.0
Negative half cycle	135.4	134.2	-1.2	±2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.6	0.1	±1.5

12. High level stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

401, 402 / Phatthanakan Road, Phatthanakan, Bangkok, Thailand 10110 (Thailand)
Tel: 081-552-1170 / 1170-143 / 1170-149
Email: calibration@sithiporn.comCert. No. : ACL25895
Page : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : ME-42 / Microphone UC-52 / Pre-amplifier BII-24
Serial No. : DBS1525 / 1170-143 / 1170-149
ID No. : BKC, 150115

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
134 PHATHANAKAN RD, PHATHANAKAN ROAD,
KIDWANG PHATHANAKAN, KIDWANG PHATHANAKAN,
BANGKOK, 10250 THAILAND.Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (1013.0 ± 3) hPa
Relative Humidity : (50.0 ± 20) %Received Date : 14 JANUARY 2025
Calibration Date : 27-28 JANUARY 2025
Date of issue : 30 JANUARY 2025REVIEW BY : *[Signature]*
APPROVED BY : *[Signature]*
NEXT CAL DATE : 27-28 FEB 2026

Calibrated by : Nadekorn Pongpissarn

Approved by : *T. Petchani*
(Thanakul Petchani)This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
other than in full, except with the prior written approval of the head of Calibration Laboratory.

Calibration Procedure : CP-AC-01

Cert. No. : ACL25895
Job No. : VCMAC0063
Page : 2 of 8

Calibration Method :

This equipment was calibrated by follow on IEC 61672-3 (2013) Standard for sound level meter (SLM).
The SLM had been to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference
Standard Instruments.
For test results of each item were made by observation of each instrument's display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33210A	MY48017076	EF-0006-24	05 FEB 25
Waveform Generator	33511B	MY53102742	EF-0007-24	03 FEB 25
Digital Multimeter	34461A	MY53201064	EEL-BP 214/267	13 FEB 25
Digital Multimeter	34461A	MY53200766	EEL-BP 200/267	15 FEB 25
Digital Multimeter	34461A	MY53200767	EEL-BP 227/267	15 FEB 25
Programmable Attenuator	MA1-1070	62100114	EF-0008-24	05 FEB 25
Customer Microphone	4152	2917000	AA-(001-24)	12 FEB 25
Measuring Amplifier	NA-42KAI	3456095	AA-(001-24)	05 FEB 25

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

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

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Science and Technological Research (TISTR)

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.8
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.8
For >4 kHz to 50 kHz	0.3	0.7
For >50 kHz to 70 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.3	0.3
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C-weight level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.3	0.3

Cert. No. : ACL25895
Job No. : VCMAC0063
Page : 3 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
93.9 (93.94)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A-weight	12.6
C-weight	18.3
Flat	24.7

3. Acoustical signal tests of frequency weightings

Mean free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
125	0.4	0.4	0.4	±1.5
1000	0.1	0.1	0.1	±1.0
8000	-1.0	-1.0	-1.0	±1.0

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Job No. : VCMAC0963
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4. Electrical signal line of frequency weighting

Weighting network response with reference to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	-2.0
125	0.0	0.0	0.0	-1.5
250	0.0	0.0	0.0	-1.5
500	0.0	0.0	0.0	-1.5
1000	0.0	0.0	0.0	-1.0
2000	0.0	0.0	0.0	-2.0
4000	0.0	0.0	0.0	-3.0
8000	0.0	0.1	0.1	-3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Log	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.1

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Cert. No. : ACL25095
Job No. : VCMAC0963
Page : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	+1.1
116.0	116.0	0.0	+1.1
115.0	115.0	0.0	+1.1
114.0	114.0	0.0	+1.1
113.0	113.0	0.0	+1.1
112.0	112.0	0.0	+1.1
111.0	111.0	0.0	+1.1
110.0	110.0	0.0	+1.1
109.0	109.0	0.0	+1.1
108.0	108.0	0.0	+1.1
107.0	107.0	0.0	+1.1
106.0	106.0	0.0	+1.1
105.0	105.0	0.0	+1.1
104.0	104.0	0.0	+1.1
103.0	103.0	0.0	+1.1
102.0	102.0	0.0	+1.1
101.0	101.0	0.0	+1.1
100.0	100.0	0.0	+1.1
99.0	99.0	0.0	+1.1
98.0	98.0	0.0	+1.1
97.0	97.0	0.0	+1.1
96.0	96.0	0.0	+1.1
95.0	95.0	0.0	+1.1
94.0	94.0	0.0	+1.1
93.0	93.0	0.0	+1.1
92.0	92.0	0.0	+1.1
91.0	91.0	0.0	+1.1
90.0	90.0	0.0	+1.1
89.0	89.0	0.0	+1.1
88.0	88.0	0.0	+1.1
87.0	87.0	0.0	+1.1
86.0	86.0	0.0	+1.1
85.0	85.0	0.0	+1.1
84.0	84.0	0.0	+1.1
83.0	83.0	0.0	+1.1
82.0	82.0	0.0	+1.1
81.0	81.0	0.0	+1.1
80.0	80.0	0.0	+1.1
79.0	79.0	0.0	+1.1
78.0	78.0	0.0	+1.1
77.0	77.0	0.0	+1.1
76.0	76.0	0.0	+1.1
75.0	75.0	0.0	+1.1

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Job No. : VCMAC0963
Page : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	+1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	+1.1

9. Time burst response

Time Weighting	Time burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	-1.5 - 1.0
	2	8	117.0	117.0	0.0	-1.0 - 2.5
	200	800	124.0	124.0	0.0	+1.0
Slow	2	1	108.0	108.0	0.0	-1.5 - 1.0
	200	800	127.0	127.0	0.0	-1.0
	0.25	1	99.0	98.9	-0.1	-1.5 - 1.0
SEL	2	8	108.0	108.0	0.0	-1.0 - 2.5
	200	800	128.0	128.0	0.0	+1.0

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Job No. : VCMAC0963
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10. Peak C-weight level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	115.0	115.0	0.0	+1.0
One	115.4	115.3	-0.1	+1.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	115.0	115.0	0.0	+1.0
Positive half cycle	115.4	115.3	-0.1	+1.0
Negative half cycle	115.4	115.2	-0.2	+1.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance limits (dB)
Positive one-half cycle	Negative half cycle		
99.5	99.6	0.1	+1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	117.0	117.0	0.0	+0.1

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2 or any value following calculation using a level of confidence of approximately 95 %

End of Calibration Certificate

T. Petch

410-4101 Sathorn Road Bangkok, Thailand 10120
Tel: +66 2 610 8300 Email: sathorn@sigmaprecision.comCert. No. : ACL25096
Page : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NI-47 / Microphone UC-57 / Preamp/eq NI 34
Serial No. : 00K38326 / 111754 / 11770
ID No. : BICE_P50116

Condition As Found :

GOOD

Customer :

ALS LABORATORY GROUP (THAILAND) CO., LTD
101 PHATTANAKAN 40 PHATTANAKAN ROAD,
KHUANG PHATTANAKAN, KHUANG PHATTANAKAN,
BANGKOK, 10250 THAILAND

Location :

Ambient Temperature : (23.0 ± 1.1) °C
Pressure : (101.3 ± 1.1) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date :

14 JANUARY 2023

Calibration Date :

27 JANUARY 2023

Date of Issue :

30 JANUARY 2023

Calibrated by :

Natchorn Pichapong

Approved by :

T. Petch
(Thasakul Pichapong)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory

Cert. No. : ACL25096
Job No. : VCMAC0963
Page : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC 61672-3 (2013) Standard for sound level meter (SLM). The SLM had tests in Acoustical and Electrical signal line of frequency weighting with A-weight chamber and Reference Standard Instruments.

For tests results of each item were made by observation of each instrument's display and also with SLMV display.

Condition of this result of calibration :

1. Reference Standard Instruments

Instrument	Model	Serial No.	Cert. No.	Due Date
Uncertainty	112.0A	MY4013076	EE-0049-24	05 FEB 25
Waveform Generator	33111B	MY53302742	EE-0007-24	05 FEB 25
Waveform Generator	33461A	MY53320104	EE-0012-24	05 FEB 25
Digital Multimeter	34461A	MY5320076	EE-0012-24	05 FEB 25
Digital Multimeter	34461A	MY6002713	EE-0012-24	05 FEB 25
Programmable Attenuator	16A11 (P)	42100114	EE-0005-24	05 FEB 25
Conductance Microphone	4140	2977900	AA-1001-24	05 FEB 25
Measuring Amplifier	NA-40KA	3456095	AA-1001-24	05 FEB 25

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

3. This certificate is traceable to the national system of unit measurement at

3.1 National Institute of Metrology (Thailand).

3.2 Thailand law of Science and Technological Research (TIS 18).

T. Petch

Cert. No. : ACL25096
Job No. : VCMAC0963
Page : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustic signal line of frequency weighting		
125 Hz	0.1	0.6
1000 Hz	0.1	0.6
4. Electrical signal line of frequency weighting		
Flat 10 Hz to 4 kHz	0.1	0.6
Flat 4 kHz to 19 kHz	0.1	0.7
Flat 10 Hz to 20 kHz	0.1	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.3
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.1
8. Level linearity including the level range control	0.2	0.1
9. Time burst response	0.2	0.1
10. Peak C-weight level	0.2	0.1
11. Overload indication	0.2	0.1
12. High level stability	0.1	0.1

T. Petch

Cert. No. : ACL25096
Job No. : VCMAC0963
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
93.0 (93.0)	93.0	0.0	+0.1

2. Self-generated noise

2.1 Normal test

Measured value (dB)
11.7

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A-weight	0.9
C-weight	16.0
Flat	21.7

3. Acoustical signal lines of frequency weighting

Matrix free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.0	0.0	+1.5
1000	0.1	0.1	0.1	+1.0
1000	-2.6	-2.6	-2.6	+1.0

T. Petch

Cert. No. : ACL25096
Job No. : VCMAC0963
Page : 5 of 8

4. Electrical signal line of frequency weighting

Weighting network response with reference to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.1	0.0	0.0	-2.0
125	-0.1	0.0	0.0	-1.5
250	0.0	0.0	0.0	-1.5
500	0.0	0.1	0.0	-1.5
1000	-0.1	0.0	0.0	-1.0
2000	0.0	0.1	0.1	-2.0
4000	0.0	0.1	0.1	-3.0
8000	0.0	0.1	0.1	-3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Log	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.1

T. Petch

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	+1.3
116.0	116.0	0.0	+1.3
115.0	115.0	0.0	+1.3
114.0	114.0	0.0	+1.3
113.0	113.0	0.0	+1.3
112.0	112.0	0.0	+1.3
111.0	111.0	0.0	+1.3
110.0	110.0	0.0	+1.3
109.0	109.0	0.0	+1.3
108.0	108.0	0.0	+1.3
107.0	107.0	0.0	+1.3
106.0	106.0	0.0	+1.3
105.0	105.0	0.0	+1.3
104.0	104.0	0.0	+1.3
103.0	103.0	0.0	+1.3
102.0	102.0	0.0	+1.3
101.0	101.0	0.0	+1.3
100.0	100.0	0.0	+1.3
99.0	99.0	0.0	+1.3
98.0	98.0	0.0	+1.3
97.0	97.0	0.0	+1.3
96.0	96.0	0.0	+1.3
95.0	95.0	0.0	+1.3
94.0	94.0	0.0	+1.3
93.0	93.0	0.0	+1.3
92.0	92.0	0.0	+1.3
91.0	91.0	0.0	+1.3
90.0	90.0	0.0	+1.3
89.0	89.0	0.0	+1.3
88.0	88.0	0.0	+1.3
87.0	87.0	0.0	+1.3
86.0	86.0	0.0	+1.3
85.0	85.0	0.0	+1.3
84.0	84.0	0.0	+1.3
83.0	83.0	0.0	+1.3
82.0	82.0	0.0	+1.3
81.0	81.0	0.0	+1.3
80.0	80.0	0.0	+1.3
79.0	79.0	0.0	+1.3
78.0	78.0	0.0	+1.3
77.0	77.0	0.0	+1.3
76.0	76.0	0.0	+1.3
75.0	75.0	0.0	+1.3

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	+1.3

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	79.0	79.0	0.0	+1.3

9. Tone burst response

Time	Tone burst duration, T ₀	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	105.0	105.0	0.0	+1.3
	2	4	117.0	117.0	0.0	+1.3
	200	300	134.0	134.0	0.0	+1.3
Slow	2	4	105.0	105.0	0.0	+1.3
	200	300	127.6	127.6	0.0	+1.3
SLI	0.25	1	99.0	99.0	0.0	+1.3
	2	4	106.0	106.0	0.0	+1.3
	200	300	128.0	128.0	0.0	+1.3

10. Peak C sound level

Number of cycle in 1 sec (total)	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	+1.3
One	133.4	133.4	0.0	+1.3

Number of cycle in 1 sec (total)	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	+1.3
Positive half cycle	133.4	133.4	0.0	+1.3
Negative half cycle	133.4	133.4	0.0	+1.3

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limit (dB)
Positive one-half cycle	Negative one-half cycle		
99.5	99.5	0.0	+1.3

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	+0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2, or any value following calculation given a level of confidence of approximately 95 %

Date of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preamplifier NI-24
Serial No. : 0055637 / 15791 / 42096
ID No. : BEK Y58117

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KLUANG PHATTHANAKAN, KIET SUAN LUANG,
BANGKOK, 10250 THAILAND

Location :
Ambient Temperature : (23.0 ± 1) °C
Pressure : (101.3 ± 1) kPa
Relative Humidity : (50.0 ± 2) %

Received Date : 06 DECEMBER 2024
Calibration Date : 13-16 DECEMBER 2024
Date of Issue : 16 DECEMBER 2024

Calibrated by : Nidulakorn Pongpreecha

Approved by :
(Thasakol Pongchum)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
other than as full, except with the prior written approval of the Head of Calibration Laboratory

Calibration Procedure : CPAC-01

Calibration Method :

This equipment was calibrated by follow on (DIN-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had been to Acoustical and Electrical signal tests of frequency weighting with A-weight character and Reference Standard Instruments.

For each result of each item were check by observation of each Instruments display and also with SLM's display

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY46017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	34461A	MY52200104	EELBP 216267	13-FEB-25
Digital Multimeter	34461A	MY52200076	EELBP 204267	15-FEB-25
Digital Multimeter	34461A	MY50024273	EELBP 2210267	15-FEB-25
Programmable Attenuator	MA1-1070	6100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977600	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-4C1CAJ	3456995	AA-3001-24	05-FEB-25

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

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

3.1 National Institute of Metrology (Thailand).

3.2 National Institute of Scientific and Technological Resources (NIST).

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
93.8 (93.8dB)	93.5	0.3	+0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
86.5

2.2 The microphone of the sound level meter was replaced by external signal input device.

Frequency Weighting	Weighting (dB)
A-weight	13.1
C-weight	19.0
Flat	24.6

3. Acoustical signal tests of frequency weightings

Micro free-field acoustic response at a level of 84 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.7	0.7	0.7	+1.3
1000	0.3	0.3	0.3	+1.0
8000	-0.6	-0.5	-0.5	+3.0

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.1	+2.0
125	0.0	0.1	0.0	+1.3
250	0.0	0.1	0.0	+1.3
500	0.1	0.1	0.0	+1.3
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.1	0.0	+2.0
4000	0.0	0.1	0.0	+3.0
8000	0.0	0.1	0.1	+3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Imp	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.1	0.1	+0.3

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	+1.3
116.0	116.0	0.0	+1.3
115.0	115.0	0.0	+1.3
114.0	114.0	0.0	+1.3
113.0	113.0	0.0	+1.3
112.0	112.0	0.0	+1.3
111.0	111.0	0.0	+1.3
110.0	110.0	0.0	+1.3
109.0	109.0	0.0	+1.3
108.0	108.0	0.0	+1.3
107.0	107.0	0.0	+1.3
106.0	106.0	0.0	+1.3
105.0	105.0	0.0	+1.3
104.0	104.0	0.0	+1.3
103.0	103.0	0.0	+1.3
102.0	102.0	0.0	+1.3
101.0	101.0	0.0	+1.3
100.0	100.0	0.0	+1.3
99.0	99.0	0.0	+1.3
98.0	98.0	0.0	+1.3
97.0	97.0	0.0	+1.3
96.0	96.0	0.0	+1.3
95.0	95.0	0.0	+1.3
94.0	94.0	0.0	+1.3
93.0	93.0	0.0	+1.3
92.0	92.0	0.0	+1.3
91.0	91.0	0.0	+1.3
90.0	90.0	0.0	+1.3
89.0	89.0	0.0	+1.3
88.0	88.0	0.0	+1.3
87.0	87.0	0.0	+1.3
86.0	86.0	0.0	+1.3
85.0	85.0	0.0	+1.3
84.0	84.0	0.0	+1.3
83.0	83.0	0.0	+1.3
82.0	82.0	0.0	+1.3
81.0	81.0	0.0	+1.3
80.0	80.0	0.0	+1.3
79.0	79.0	0.0	+1.3
78.0	78.0	0.0	+1.3
77.0	77.0	0.0	+1.3
76.0	76.0	0.0	+1.3
75.0	75.0	0.0	+1.3

Cert. No. : ACL24401
 Job No. : YCBAAC0045
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18. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Leq (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	+3.0
One	133.4	133.4	0.0	+3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	+2.0
Positive half cycle	135.4	135.4	-0.3	+2.0
Negative half cycle	135.4	135.4	-0.3	+2.0

11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	89.6	+1.5
Negative one-half cycle	89.5	+1.5

12. High level stability

Frequency Weighting	SLM Display at Initial (dB)	SLM Display at Final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	+0.2

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2
 or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

T. Petch

Cert. No. : ACL24401
 Job No. : YCBAAC0045
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Calibration Certificate

Equipment : SOUND LEVEL METER
 Manufacturer : RUPN
 Model : NL-42 / Microphone UC-52 / Preamp/Gain NH-24
 Serial No. : 0057545 / 17062 / 17290
 ID No. : BKC F50874

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
 104 PHATTANAKAN 40, PHATTANAKAN ROAD,
 KHUANG PHATTANAKAN, KHET SIAM LUANG,
 BANGKOK, 10530 THAILAND.

Location :
 Ambient Temperature : (23.0 ± 3) °C
 Pressure : (101.2 ± 3) kPa
 Relative Humidity : (50.0 ± 20) %

Received Date : 07 JANUARY 2023
 Calibration Date : 21-23 JANUARY 2023
 Date of Issue : 24 JANUARY 2023

Calibrated by : Kiatkanya Pichapong

Approved by :

T. Petch
 (Thakul Petchu)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
 other than in full, except with the prior written approval of the head of Calibration Laboratory

Cert. No. : ACL25867
 Job No. : YCBAAC0058
 Page : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC 61672-1 (2013) Standard for sound level meter (SLM).
 The SLM had been to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instrument.

For test results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	J2210A	MY49017076	EP-0009-24	05-FEB-25
Windows Generator	33511B	MY21202742	EP-0007-24	05-FEB-25
Digital Multimeter	33461A	MY5220104	TEL-BP-140587	15-FEB-25
Digital Multimeter	33461A	MY5220076	TEL-BP-140587	15-FEB-25
Digital Multimeter	34461A	MY6002473	DL-LBP-220582	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	TF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34360495	AA-1001-24	05-FEB-25

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

3. This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard.

3.1 National Institute of Metrology (Thailand).

3.2 Thailand Institute of Scientific and Technological Research (TISTR).

T. Petch

Cert. No. : ACL25867
 Job No. : YCBAAC0058
 Page : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	±0.5
2. Self-generated noise	0.2	±0.5
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	±0.6
1000 Hz	0.3	±0.6
8000 Hz	0.3	±0.7
4. Electrical signal tests of frequency weightings		
Flat 10 Hz to 4 kHz	0.3	±0.6
Flat 4 kHz to 10 kHz	0.3	±0.7
Flat 10 kHz to 20 kHz	0.3	±0.8
5. Frequency and time stability	0.2	±0.2
6. Long-term stability	0.1	±0.3
7. Level linearity on the reference level range	0.2	±0.3
8. Level linearity including the level range extend	0.2	±0.3
9. Time based response	0.2	±0.3
10. Peak C sound level	0.2	±0.3
11. Overload indication	0.2	±0.25
12. High level stability	0.1	±0.1

T. Petch

Cert. No. : ACL25867
 Job No. : YCBAAC0058
 Page : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.6	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Imp	94.0	94.0	0.0	±0.1

6. Long-term stability

Frequency Weighting	SLM Display at Initial (dB)	SLM Display at Final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.3

T. Petch

Cert. No. : ACL25867
 Job No. : YCBAAC0058
 Page : 6 of 8

8. Level linearity including the level range extend

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.0

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.1	0.1	±1.0

9. Time based response

Time Weighting	Time based duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	2	8	117.0	117.0	0.0	±0.2, ±0.5
Slow	200	800	134.0	134.0	0.0	±1.0
SEL	0.25	1	99.0	98.9	-0.1	±1.5, ±0.8
	2	5	100.0	100.0	0.0	±1.0, ±2.5
	200	800	128.0	128.1	0.1	±1.0

T. Petch

Cert. No. : ACL25867
 Job No. : YCBAAC0058
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T. Petch

Cert. No. : ACL25967
Job No. : VCMAC0058
Pages : 8 of 8

18. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Leqmk (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	+3.0
One	133.4	133.3	-0.1	+3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	+2.0
Positive half cycle	133.4	133.2	-0.2	+2.0
Negative half cycle	133.4	133.2	-0.2	+2.0

11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	0.1	+1.5
Negative one-half cycle	-0.1	+1.5

12. High level stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	+0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$
or any value following calculation providing a level of confidence of approximately 95 %

End of Calibration Certificate

T. Petch

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Pre-amplifier N11-24
Serial No. : 00372940 / 142140 / 233509
ID No. : B.E.C. J50215

Conditions As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
180 PHATHANASAKI RD. PHATHANASAKI ROAD,
KHWAENG PHATHANASAKI, KHEE SUAN LUANG,
BANGKOK, THAILAND

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 07 JANUARY 2025
Calibration Date : 21 - 23 JANUARY 2025
Date of Issue : 24 JANUARY 2025

Calibrated by : Nattakorn Pongpattana

Approved by :

REVIEW BY : *Nattakorn Pongpattana*
APPROVED BY : *Nattakorn Pongpattana*
NEXT CAL DATE : 21/01/28

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
other than in full, except with the prior written approval of the head of Calibration Laboratory

Cert. No. : ACL25968
Pages : 1 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-1 (2013) Standard for sound level meter (SLM).
The SLM has been to Acoustical and Electrical signal level of frequency weighting with Type 1; chamber and Reference
Standard Instruments.
For more results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY64017078	EP-0009 24	05 FEB 25
Waveform Generator	33511B	MY52302742	EP-0007 24	05 FEB 25
Digital Multimeter	33461A	MY53320104	EP-0012 24	13 FEB 25
Digital Multimeter	34461A	MY53220076	DEL-0012 24	13 FEB 25
Programmable Attenuator	34461A	MY64001073	EP-0008 24	13 FEB 25
Condenser Microphone	34461A	62100114	11-0008-24	05 FEB 25
Measuring Amplifier	4150	297900	AA-1000-24	12 FEB 25
Measuring Amplifier	NA-42KAI	54560655	AA-1000-24	06 FEB 25

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

3. This certificate is suitable for the operational system of unit maintained as :
1. National Institute of Metrology (Thailand)
 2. Thailand Institute of Scientific and Technological Research (TISTR)

Cert. No. : ACL25968
Job No. : VCMAC0058
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
1000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
Free 15 Hz to 4 kHz	0.3	0.6
Free 4 kHz to 10 kHz	0.3	0.7
Free > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level accuracy including the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C sound level	0.2	0.3
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

T. Petch

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
119.9 (F1.94)	91.9	0.0	+0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.8

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting Value (dB)
A-weight	15.4
C-weight	21.7
Flat	27.2

3. Acoustical signal tests of frequency weightings

Mean free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
125	0.3	0.3	0.3	+1.5
1000	0.2	0.2	0.2	+1.0
1000	-0.1	-0.1	-0.1	+1.0

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4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
63	0.0	0.0	0.0	+2.0
125	0.0	0.0	0.0	+1.5
250	0.0	0.0	0.0	+1.5
500	0.0	0.0	-0.1	+1.5
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.0	0.0	+2.0
4000	0.0	0.0	0.0	+3.0
8000	0.0	-0.1	0.1	+3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.3
Slow	94.0	94.0	0.0	+0.3
Imp	94.0	94.0	0.0	+0.3

6. Long-term stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.3

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7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	+1.1
136.0	136.0	0.0	+1.1
135.0	135.0	0.0	+1.1
134.0	134.0	0.0	+1.1
133.0	132.9	-0.1	+1.1
132.0	131.9	-0.1	+1.1
131.0	130.9	-0.1	+1.1
130.0	129.8	-0.2	+1.1
129.0	129.0	0.0	+1.1
128.0	128.0	0.0	+1.1
127.0	127.0	0.0	+1.1
126.0	126.0	0.0	+1.1
125.0	125.0	0.0	+1.1
124.0	124.0	0.0	+1.1
123.0	123.0	0.0	+1.1
122.0	122.0	0.0	+1.1
121.0	121.0	0.0	+1.1
120.0	120.0	0.0	+1.1
119.0	119.0	0.0	+1.1
118.0	118.0	0.0	+1.1
117.0	117.0	0.0	+1.1
116.0	116.0	0.0	+1.1
115.0	115.0	0.0	+1.1
114.0	114.0	0.0	+1.1
113.0	113.0	0.0	+1.1
112.0	112.0	0.0	+1.1
111.0	111.0	0.0	+1.1
110.0	110.0	0.0	+1.1
109.0	109.0	0.0	+1.1
108.0	108.0	0.0	+1.1
107.0	107.0	0.0	+1.1
106.0	106.0	0.0	+1.1
105.0	105.0	0.0	+1.1
104.0	104.0	0.0	+1.1
103.0	103.0	0.0	+1.1
102.0	102.0	0.0	+1.1
101.0	101.0	0.0	+1.1
100.0	100.0	0.0	+1.1
99.0	99.0	0.0	+1.1
98.0	98.0	0.0	+1.1
97.0	97.0	0.0	+1.1
96.0	96.0	0.0	+1.1
95.0	95.0	0.0	+1.1
94.0	94.0	0.0	+1.1
93.0	93.0	0.0	+1.1
92.0	92.0	0.0	+1.1
91.0	91.0	0.0	+1.1
90.0	90.0	0.0	+1.1
89.0	89.0	0.0	+1.1
88.0	88.0	0.0	+1.1
87.0	87.0	0.0	+1.1
86.0	86.0	0.0	+1.1
85.0	85.0	0.0	+1.1
84.0	84.0	0.0	+1.1
83.0	83.0	0.0	+1.1
82.0	82.0	0.0	+1.1
81.0	81.0	0.0	+1.1
80.0	80.0	0.0	+1.1
79.0	79.0	0.0	+1.1
78.0	78.0	0.0	+1.1
77.0	77.0	0.0	+1.1
76.0	76.0	0.0	+1.1
75.0	75.0	0.0	+1.1
74.0	74.0	0.0	+1.1
73.0	73.0	0.0	+1.1
72.0	72.0	0.0	+1.1
71.0	71.0	0.0	+1.1
70.0	70.0	0.0	+1.1
69.0	69.0	0.0	+1.1
68.0	68.0	0.0	+1.1
67.0	67.0	0.0	+1.1
66.0	66.0	0.0	+1.1
65.0	65.0	0.0	+1.1
64.0	64.0	0.0	+1.1
63.0	63.0	0.0	+1.1
62.0	62.0	0.0	+1.1
61.0	61.0	0.0	+1.1
60.0	60.0	0.0	+1.1
59.0	59.0	0.0	+1.1
58.0	58.0	0.0	+1.1
57.0	57.0	0.0	+1.1
56.0	56.0	0.0	+1.1
55.0	55.0	0.0	+1.1
54.0	54.0	0.0	+1.1
53.0	53.0	0.0	+1.1
52.0	52.0	0.0	+1.1
51.0	51.0	0.0	+1.1
50.0	50.0	0.0	+1.1
49.0	49.0	0.0	+1.1
48.0	48.0	0.0	+1.1
47.0	47.0	0.0	+1.1
46.0	46.0	0.0	+1.1
45.0	45.0	0.0	+1.1
44.0	44.0	0.0	+1.1
43.0	43.0	0.0	+1.1
42.0	42.0	0.0	+1.1
41.0	41.0	0.0	+1.1
40.0	40.0	0.0	+1.1
39.0	39.0	0.0	+1.1
38.0	38.0	0.0	+1.1
37.0	37.0	0.0	+1.1
36.0	36.0	0.0	+1.1
35.0	35.0	0.0	+1.1
34.0	34.0	0.0	+1.1
33.0	33.0	0.0	+1.1
32.0	32.0	0.0	+1.1
31.0	31.0	0.0	+1.1
30.0	30.0	0.0	+1.1
29.0	29.0	0.0	+1.1
28.0	28.0	0.0	+1.1
27.0	27.0	0.0	+1.1
26.0	26.0	0.0	+1.1
25.0	25.0	0.0	+1.1
24.0	24.0	0.0	+1.1
23.0	23.0	0.0	+1.1
22.0	22.0	0.0	+1.1
21.0	21.0	0.0	+1.1
20.0	20.0	0.0	+1.1
19.0	19.0	0.0	+1.1
18.0	18.0	0.0	+1.1
17.0	17.0	0.0	+1.1
16.0	16.0	0.0	+1.1
15.0	15.0	0.0	+1.1
14.0	14.0	0.0	+1.1
13.0	13.0	0.0	+1.1
12.0	12.0	0.0	+1.1
11.0	11.0	0.0	+1.1
10.0	10.0	0.0	+1.1
9.0	9.0	0.0	+1.1
8.0	8.0	0.0	+1.1
7.0	7.0	0.0	+1.1
6.0	6.0	0.0	+1.1
5.0	5.0	0.0	+1.1
4.0	4.0	0.0	+1.1
3.0	3.0	0.0	+1.1
2.0	2.0	0.0	+1.1
1.0	1.0	0.0	+1.1
0.0	0.0	0.0	+1.1

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8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	+1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.1



Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Pre-amplifier NH-34
Serial No. : 0057263 / 17901 / 72901
ID No. : BKK_F50874

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHUANG PHATTANAKAN, KHET SIAM LUANG,
BANGKOK, 10250 THAILAND

Location :
Ambient Temperature : (23.0 ± 1) °C
Pressure : (101.3 ± 0.3) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date : 06 DECEMBER 2024
Calibration Date : 13-16 DECEMBER 2024
Date of Issue : 16 DECEMBER 2024

REVIEW BY : *[Signature]*
APPROVED BY : *[Signature]*
NEXT CAL DATE : 13/12/25

Calibrated by : Natikorn Porpanan

Approved by : *[Signature]*
(Thailand Precheck)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
other than in full, except with the prior written approval of the head of Calibration Laboratory

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on REC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM has been tested to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference
Standard Instruments.

For test results of each item were made by observation of each Instruments display and also with SLM display.

Condition of this result of calibration :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	3310A	MY48017016	13-0009-24	05-FEB-25
Waveform Generator	3301B	MY52202742	13-0007-24	05-FEB-25
Digital Multimeter	33461A	MY5220104	13-0007-24	05-FEB-25
Digital Multimeter	33461A	MY5220076	13-0007-24	05-FEB-25
Digital Multimeter	34461A	MY6002473	13-0007-24	05-FEB-25
Progressive Attenuator	MAT-1070	02100114	13-0008-24	05-FEB-25
Condenser Microphone	4180	2977605	AA-1901-24	13-FEB-25
Microphone Amplifier	NA-2KAI	34560495	AA-3001-24	05-FEB-25

5. This result of calibration was based on accuracy as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit established at :
3.1 National Institute of Metrology (Thailand).
3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No. : ACL24482
Job No. : YCMAC0845
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	±0.4
2. Self-generated noise	0.2	±0.4
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	±0.6
1000 Hz	0.3	±0.6
8000 Hz	0.3	±0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	±0.6
For > 4 kHz to 10 kHz	0.3	±0.7
For > 10 kHz to 20 kHz	0.3	±1.0
5. Frequency and tone weightings at 1 kHz	0.2	±0.2
6. Long-term stability	0.1	±0.4
7. Level linearity on the reference level range	0.2	±0.3
8. Level linearity including the level range extend	0.2	±0.3
9. Tone burst response	0.2	±0.3
10. Peak C-weight level	0.2	±0.3
11. Overload indication	0.2	±0.3
12. High level stability	0.1	±0.1

Cert. No. : ACL24482
Job No. : YCMAC0845
Pages : 3 of 8



Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.0 (20 Pa)	93.9	0.9	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
74.6

2.2 The specification of the sound level meter was replaced by electrical sound input device

Frequency Weighting	Weighting (dB)
A-weight	12.0
C-weight	18.1
Flat	25.9

3. Acoustical signal tests of frequency weightings

Near free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limit (dB)
125	0.4	0.1	0.4	±0.5
1000	0.3	0.3	0.3	±0.9
8000	0.3	0.4	0.4	±0.9

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limit (dB)
80	0.0	0.1	0.0	±0.2
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±3.0

5. Frequency and tone weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Tone weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
Flat	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Fast	94.0	94.0	0.0	±0.1

6. Long-term stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at end (dB)	Deviation Value (dB)	Acceptance Limit (dB)
A-weight	94.0	94.0	0.0	±0.3

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.1	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.1	0.1	±1.1
69.0	69.1	0.1	±1.1
64.0	64.0	0.0	±1.1
59.0	59.1	0.1	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.1	0.1	±1.1
29.0	29.1	0.1	±1.1
24.0	24.1	0.1	±1.1
19.0	19.1	0.1	±1.1
14.0	14.1	0.1	±1.1
9.0	9.1	0.1	±1.1
4.0	4.1	0.1	±1.1



Cert. No. : ACL24482
Job No. : YCMAC0845
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Cert. No. : ACL24482
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10. Peak C-weight level

Number of cycle at test signal	Anticipated Value (dB)	Measured Value, Peak (dB)	Deviation Value (dB)	Acceptance Limit (dB)
One	133.4	133.4	0.0	±0.6

Number of cycle at test signal	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
Continuous	133.0	133.1	+0.1	±2.0
Positive half cycle	133.4	133.4	+0.1	±2.0
Negative half cycle	133.4	133.1	-0.3	±2.0

11. Overload indication

Measured value (dB)	Deviation Value (dB)	Acceptance Limit (dB)
Positive near half cycle	89.5	±0.6
Negative near half cycle	89.5	±0.6

12. High level stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at end (dB)	Deviation Value (dB)	Acceptance Limit (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2
or any value following calibration providing a level of confidence of approximately 95 %

End of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Pre-amplifier NH-34
Serial No. : 0057263 / 17901 / 72901
ID No. : BKK_F50879

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHUANG PHATTANAKAN, KHET SIAM LUANG,
BANGKOK, 10250 THAILAND

Location :
Ambient Temperature : (23.0 ± 1) °C
Pressure : (101.3 ± 0.3) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date : 06 DECEMBER 2024
Calibration Date : 13-16 DECEMBER 2024
Date of Issue : 16 DECEMBER 2024

Calibrated by : Natikorn Porpanan

Approved by : *[Signature]*
(Thailand Precheck)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
other than in full, except with the prior written approval of the head of Calibration Laboratory

Cert. No. : ACL24403
Job No. : VCMAC0045
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC 61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instrument.

For test results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33210A	MY40017076	EP-0009-24	05 FEB 25
Waveform Generator	33511B	MY52302742	EP-0007-24	05 FEB 25
Digital Multimeter	34461A	MY53220104	133-BP-210267	15 FEB 25
Digital Multimeter	34461A	MY53220076	133-BP-200267	15 FEB 25
Digital Multimeter	34461A	MY60042373	133-BP-220267	15 FEB 25
Programmable Attenuator	MAT 1070	42100114	EP-0008-24	01 FEB 25
Condenser Microphone	4180	297760	AA-1001-24	12 FEB 25
Measuring Amplifier	NA-42KAI	34560495	AA-1001-24	05 FEB 25

2. This result of calibration is not found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit measured at :

1. National Institute of Metrology (Thailand)
2. Thailand Institute of Scientific and Technological Research (TISTR)

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weighting		
1000 Hz	0.3	0.6
1000 Hz	0.3	0.6
1000 Hz	0.3	0.7
4. Electrical signal tests of frequency weighting		
For 10 Hz to 4 kHz	0.3	0.6
For 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Level - time stability	0.1	0.1
7. Level accuracy on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Time level response	0.2	0.3
10. Peak C-weight level	0.2	0.3
11. Overload indication	0.2	0.3
12. High level stability	0.1	0.1

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	93.9	0.0	±0.1

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
13.6

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting (dB)	Weighting (dB)
A-weight	9.9
C-weight	16.4
Flat	22.1

3. Acoustical signal tests of frequency weightings

Mean free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limit
125	0.4	0.5	0.5	±1.5
1000	0.7	0.7	0.5	±1.0
1800	-0.9	-0.8	-0.7	±1.0

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Job No. : VCMAC0045
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
43	0.0	0.0	0.0	±2.0
125	0.0	0.1	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Long	94.0	94.0	0.0	±0.1

6. Level - time stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.1

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.2
135.0	135.0	0.0	±1.3
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
29.0	29.0	0.0	±1.1
24.0	24.0	0.0	±1.1
19.0	19.0	0.0	±1.1
14.0	14.0	0.0	±1.1
9.0	9.0	0.0	±1.1
4.0	4.0	0.0	±1.1

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.1	0.1	±1.1

9. Time level response

Time Weighting	Tone burst duration, 1s (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 : -5.0
	2	8	117.0	117.0	0.0	1.0 : -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 : -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 : -5.0
SEL	2	8	108.0	108.0	0.0	1.0 : -2.5
	200	800	128.0	128.0	0.0	±1.0

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Cert. No. : ACL24403
Job No. : VCMAC0045
Pages : 2 of 8

16. Peak C-weight level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, 1 peak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.4	133.0	-0.4	±1.0
Positive half cycle	133.4	133.4	0.0	±1.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	135.4	135.3	-0.1	±1.0
Negative half cycle	135.4	135.2	-0.2	±2.0

11. Overload indication

Measured value (dB)		Deviant Value (dB)	Acceptance Limits (dB)
Positive half cycle	Negative half cycle		
135.5	135.6	0.3	± 1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.1

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-02 / Microphone UC S2 / Preamplifier NH 24
Serial No. : 00572661 / 179301 / 77902
ID No. : BNC / J93080

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40, PHATTANAKAN ROAD,
KHAENG PHATTANAKAN, KHAENG PHATTANAKAN,
BANGKOK, 10250 THAILAND

Location : -
Ambient Temperature : (23.0 ± 1) °C
Pressure : (101.3 ± 0.3) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date : 06 DEC 2024
Calibration Date : 13-14 DECEMBER 2024
Date of Issue : 18 DEC 2024

Calibrated by : Nuchakorn Pongpoom

Approved by :

T. Petch
(Thailand Institute of Scientific and Technological Research)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC 61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For test results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33210A	MY40017076	EP-0009-24	05 FEB 25
Waveform Generator	33511B	MY52302742	EP-0007-24	05 FEB 25
Digital Multimeter	34461A	MY53220104	133-BP-210267	15 FEB 25
Digital Multimeter	34461A	MY53220076	133-BP-200267	15 FEB 25
Digital Multimeter	34461A	MY60042373	133-BP-220267	15 FEB 25
Programmable Attenuator	MAT 1070	42100114	EP-0008-24	05 FEB 25
Condenser Microphone	4180	297760	AA-1001-24	12 FEB 25
Measuring Amplifier	NA-42KAI	34560495	AA-1001-24	05 FEB 25

2. This result of calibration is not found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit measured at :

1. National Institute of Metrology (Thailand)
2. Thailand Institute of Scientific and Technological Research (TISTR)

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CALIBRATION LABORATORY

455/45/1 Sathorn Road, Bangrak, Bangkok 10710 Thailand
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Cert. No. : ACL24284
Job No. : VC67AC0149
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Result of calibration:

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
91.9 (13.34)	91.9	0.0	±0.3

2. Self-generated noise

2.1 Normal use

Measured Value (dB)
15.1

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting	Weighting (dB)
A-weight	10.8
C-weight	17.2
Flat	25.3

3. Acoustical signal tests of frequency weightings

More free field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)
125	0.0
1000	-0.1
5000	-0.9

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4. Electrical signal tests of frequency weightings

Weighting network response with reference to 1 kHz

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)
125	0.0
250	0.0
500	0.0
1000	0.0
2000	0.0
4000	0.0
8000	0.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.6	94.6	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.6	94.6	0.0	±0.2
Slow	94.0	94.0	0.0	±0.1
Imp	94.0	94.0	0.0	±0.1

6. Long-term stability

Frequency Weighting	SLM Display at 1st (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.3

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7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
130.0	130.0	0.0	±1.1
129.0	129.0	0.0	±1.1
128.0	128.0	0.0	±1.1
127.0	127.0	0.0	±1.1
126.0	126.0	0.0	±1.1
125.0	125.0	0.0	±1.1
124.0	124.0	0.0	±1.1
123.0	123.0	0.0	±1.1
122.0	122.0	0.0	±1.1
121.0	121.0	0.0	±1.1
120.0	120.0	0.0	±1.1
119.0	119.0	0.0	±1.1
118.0	118.0	0.0	±1.1
117.0	117.0	0.0	±1.1
116.0	116.0	0.0	±1.1
115.0	115.0	0.0	±1.1
114.0	114.0	0.0	±1.1
113.0	113.0	0.0	±1.1
112.0	112.0	0.0	±1.1
111.0	111.0	0.0	±1.1
110.0	110.0	0.0	±1.1
109.0	109.0	0.0	±1.1
108.0	108.0	0.0	±1.1
107.0	107.0	0.0	±1.1
106.0	106.0	0.0	±1.1
105.0	105.0	0.0	±1.1
104.0	104.0	0.0	±1.1
103.0	103.0	0.0	±1.1
102.0	102.0	0.0	±1.1
101.0	101.0	0.0	±1.1
100.0	100.0	0.0	±1.1
99.0	99.0	0.0	±1.1
98.0	98.0	0.0	±1.1
97.0	97.0	0.0	±1.1
96.0	96.0	0.0	±1.1
95.0	95.0	0.0	±1.1
94.0	94.0	0.0	±1.1
93.0	93.0	0.0	±1.1
92.0	92.0	0.0	±1.1
91.0	91.0	0.0	±1.1
90.0	90.0	0.0	±1.1
89.0	89.0	0.0	±1.1
88.0	88.0	0.0	±1.1
87.0	87.0	0.0	±1.1
86.0	86.0	0.0	±1.1
85.0	85.0	0.0	±1.1
84.0	84.0	0.0	±1.1
83.0	83.0	0.0	±1.1
82.0	82.0	0.0	±1.1
81.0	81.0	0.0	±1.1
80.0	80.0	0.0	±1.1
79.0	79.0	0.0	±1.1
78.0	78.0	0.0	±1.1
77.0	77.0	0.0	±1.1
76.0	76.0	0.0	±1.1
75.0	75.0	0.0	±1.1
74.0	74.0	0.0	±1.1
73.0	73.0	0.0	±1.1
72.0	72.0	0.0	±1.1
71.0	71.0	0.0	±1.1
70.0	70.0	0.0	±1.1
69.0	69.0	0.0	±1.1
68.0	68.0	0.0	±1.1
67.0	67.0	0.0	±1.1
66.0	66.0	0.0	±1.1
65.0	65.0	0.0	±1.1
64.0	64.0	0.0	±1.1
63.0	63.0	0.0	±1.1
62.0	62.0	0.0	±1.1
61.0	61.0	0.0	±1.1
60.0	60.0	0.0	±1.1
59.0	59.0	0.0	±1.1
58.0	58.0	0.0	±1.1
57.0	57.0	0.0	±1.1
56.0	56.0	0.0	±1.1
55.0	55.0	0.0	±1.1
54.0	54.0	0.0	±1.1
53.0	53.0	0.0	±1.1
52.0	52.0	0.0	±1.1
51.0	51.0	0.0	±1.1
50.0	50.0	0.0	±1.1
49.0	49.0	0.0	±1.1
48.0	48.0	0.0	±1.1
47.0	47.0	0.0	±1.1
46.0	46.0	0.0	±1.1
45.0	45.0	0.0	±1.1
44.0	44.0	0.0	±1.1
43.0	43.0	0.0	±1.1
42.0	42.0	0.0	±1.1
41.0	41.0	0.0	±1.1
40.0	40.0	0.0	±1.1
39.0	39.0	0.0	±1.1
38.0	38.0	0.0	±1.1
37.0	37.0	0.0	±1.1
36.0	36.0	0.0	±1.1
35.0	35.0	0.0	±1.1
34.0	34.0	0.0	±1.1
33.0	33.0	0.0	±1.1
32.0	32.0	0.0	±1.1
31.0	31.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.0	0.0	±1.1
24.0	24.0	0.0	±1.1
23.0	23.0	0.0	±1.1
22.0	22.0	0.0	±1.1
21.0	21.0	0.0	±1.1
20.0	20.0	0.0	±1.1
19.0	19.0	0.0	±1.1
18.0	18.0	0.0	±1.1
17.0	17.0	0.0	±1.1
16.0	16.0	0.0	±1.1
15.0	15.0	0.0	±1.1
14.0	14.0	0.0	±1.1
13.0	13.0	0.0	±1.1
12.0	12.0	0.0	±1.1
11.0	11.0	0.0	±1.1
10.0	10.0	0.0	±1.1
9.0	9.0	0.0	±1.1
8.0	8.0	0.0	±1.1
7.0	7.0	0.0	±1.1
6.0	6.0	0.0	±1.1
5.0	5.0	0.0	±1.1
4.0	4.0	0.0	±1.1
3.0	3.0	0.0	±1.1
2.0	2.0	0.0	±1.1
1.0	1.0	0.0	±1.1
0.0	0.0	0.0	±1.1

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8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	84.3	84.3	0.0	±0.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	70.0	70.0	0.0	±0.1

9. Time interval response

Tone	Frequency (Hz)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Flat	125	1	108.0	108.0	0.0	±0.5
	2	8	117.0	117.0	0.0	±0.5
Slow	200	800	124.6	124.6	0.0	±1.0
	2	8	108.0	108.0	0.0	±0.5
SCL	200	800	127.6	127.6	0.0	±1.0
	2	8	99.0	99.0	0.0	±0.5
	200	800	108.0	108.0	0.0	±0.5
	2	8	126.4	126.4	0.0	±1.0

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10. Peak C sound level

Number of cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±0.6
One	136.4	136.4	0.0	±0.6

Number of cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.1	0.1	±0.6
Positive half cycle	135.4	135.2	-0.2	±0.6
Negative half cycle	135.4	135.2	-0.2	±0.6

11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	99.6	±0.1
Negative one-half cycle	99.6	±0.1

12. High level stability

Frequency Weighting	SLM Display at 1st (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	133.0	133.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2 or any value following calculation, given using a level of confidence of approximately 95 %.

End of Calibration Certificate

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Job No. : VC67AC0149
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Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Pre-amplifier NB 34
Serial No. : 0057154 / 17943 / 72904
ID No. : RKE_P50994

Condition As Found : GOOD

Customer : AIS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATHANAKAN 40, PHATHANAKAN ROAD,
KUPANG PHATHANAKAN, KUPANG SOAN ESTATE,
BANGKOK, 10256 THAILAND.

Location :
Ambient Temperature : (23.0 ± 1) °C
Pressure : (101.3 ± 1) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 01 NOVEMBER 2024
Calibration Date : 12 NOVEMBER 2024
Date of Issue : 13 NOVEMBER 2024

Calibrated by : Nathakorn Prompanit

Approved by : T. Petch (Thakorn Petchai)

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 Job No. : YC8KAC0027
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easily including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
150	94.0	94.0	0.0	± 1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
110	29.0	29.0	0.0	± 1.1

Time interval	Unobserved	Observed	Unobserved	Observed	Unobserved
---------------	------------	----------	------------	----------	------------

Test case duration, Th	Cycle	Value Value (dB)	Value Value (dB)	Deviation Value (dB)	Accuracy Accuracy (dB)
0.25	1	100.0	100.0	-0.1	1.5 - 5.0
2	8	117.0	117.0	0.0	1.0 - 2.5
200	100	133.0	133.0	0.0	<1.0
2	8	100.0	100.0	0.0	1.5 - 5.0
200	100	122.6	122.6	0.0	<1.0
0.25	1	99.0	99.0	-0.1	1.5 - 5.0
2	8	100.0	100.0	0.0	1.0 - 2.5
200	800	126.0	126.0	0.0	<1.0

0.0	41.0
0.1	43.0

2	6	108.0	108.0	0.0	1.0; 2.5
200	800	128.0	128.0	0.0	11.0

T. Lett

Crrt. No. : ACL24345
 Job No. : VC68AC007
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Calibration Procedure : CP-AC-01

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC 52 / Pre-amplifier N01-24
Serial No. : 0037159 / 14042 / 33171
ID No. : BKK F30995

Calibration Method :

Customer:	ALS LABORATORY GROUP (THAILAND) CO., LTD 101 PHATTANAKAN 46, PHATTANAKAN ROAD KHUANG PHATTANAKAN, KHUET SUAN LUANG BANGKOK, 10250 THAILAND.		
Location:			
Ambient Temperature:	(23.0 ± 0.3)	°C	REVIEW BY : _____ APPROVED BY : _____ NEXT CAL DATE : _____
Pressure:	(101.3 ± 0.3)	kPa	
Relative Humidity:	(50.0 ± 0.0)	%	
Received Date :	01 NOVEMBER 2024		
Calibration Date :	12 NOVEMBER 2024		
Date of Issue :	13 NOVEMBER 2024		

Condition of this result of calibration :

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33210A	MY40110776	IF-0009-24	05-10-20
Waveform Generator	33511B	MY53330342	EF-0072-24	05-10-20
Dual trace meter	34461A	34461A	FL-1-14-20052	03-10-20
Digital Multimeter	34461A	MY53220776	FL2LP-2005267	05-11-23
Digital Multimeter	34461A	MY60022473	FL2LP-22-0267	15-07-20
Programmable Attenuator	MAX-102	6210514	IF-0019-24	05-10-20
Computer Microphone	418	2577990	AA-1001-24	05-10-20
Reference Amplifier	NA-42KA1	35465495	AA-1001-24	05-10-20

Calibrated by : Nathakorn Pichayaporn

Approved by: T. Petchu.
(Thanakul Petchurai)

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T. Peter

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Job No. : VC68AC0027
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4. Electrical signal tests of frequency weighting

Local signal tests of frequency weightings

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Level (dB)
93.9 (95.94)	93.9	0.0	95.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.7

2.2 The microphone of the sound level meter was replaced by electrical signal

Frequency Weighting A-weight C-weight Flat	Weighting (dB)
A-weight	14.8
C-weight	20.9
Flat	26.4

3. Acoustical signal tests of frequency weighting

Mean free-field sound response at a level of 14 dB

Frequency (Hz)	Deviation from reference frequency weighting response at 14 dB			Acceptance Level
	Flat	C-weight	A-weight	
125	0.2	0.3	0.3	+1
1000	0.1	0.1	0.1	+1
8000	2.4	2.3	2.5	+1

4. Electrical signal tests of frequency weighting

local signal tests of frequency weightings

Weighting network response with relative to 1 kHz					
Frequency (Hz)	Deviation from reference frequency weighting response curve (dB)				Acceptance Limits
	Flat	C-weight	A-weight	Acceptance	
63	-0.1	-0.1	-0.1	-12.3	
125	-0.1	0.0	-0.1	-13.0	
250	0.0	0.0	0.1	-11.5	
500	0.0	0.0	-0.1	-9.5	
1000	0.0	0.0	0.0	-11.0	
2000	0.0	0.0	0.0	-7.0	
4000	0.0	0.0	0.0	-3.0	
8000	0.0	0.0	-0.1	-5.0	

Accuracy and time weighting at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Auto-valued	Measured	Deviated	Acceptance
	Value (dB)	Value (dB)	Value (dB)	Limits (dB)
A-weighting	94.0	94.0	0.0	-0.2
C-weighting	94.0	94.0	0.0	-0.2
Flat	94.0	94.0	0.0	-0.2

1/2 Time weighting at 1 kHz

Frequency Weighting	Auto-valued	Measured	Deviated	Acceptance
	Value (dB)	Value (dB)	Value (dB)	Limits (dB)
Flat	94.0	94.0	0.0	-0.1
1/2	94.0	94.0	0.0	-0.1
1/2	94.0	94.0	0.0	-0.1

term stability

Frequency Weighting	S.M. Display	S.M. Display	Deviated	Acceptance
	Value (dB)	Real (dB)	Value (dB)	Limits (dB)
A-weighting	94.0	94.0	0.0	-0.1

7. *Later*

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7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
137.0	137.0	0.0	+1.3
136.0	136.0	0.0	+1.3
135.0	135.0	0.0	+1.3
134.0	134.0	0.0	+1.3
133.0	132.9	-0.1	+1.3
132.0	131.9	-0.1	+1.3
131.0	130.9	-0.1	+1.3
129.0	129.0	0.0	+1.3
128.0	128.0	0.0	+1.3
119.0	119.0	0.0	+1.3
114.0	114.0	0.0	+1.3
109.0	109.0	0.0	+1.3
104.0	104.0	0.0	+1.3
99.0	99.0	0.0	+1.3
94.0	94.0	0.0	+1.3
89.0	89.0	0.0	+1.3
84.0	84.0	0.0	+1.3
79.0	79.0	0.0	+1.3
74.0	74.0	0.0	+1.3
69.0	69.0	0.0	+1.3
64.0	64.0	0.0	+1.3
59.0	59.0	0.0	+1.3
54.0	54.0	0.0	+1.3
49.0	49.0	0.0	+1.3
44.0	44.0	0.0	+1.3
39.0	39.0	0.0	+1.3
34.0	34.0	0.0	+1.3
30.0	30.1	0.1	+1.3
29.0	29.1	0.1	+1.3
28.0	28.0	0.0	+1.3
27.0	27.1	0.1	+1.3
26.0	26.3	0.3	+1.3
25.0	25.1	0.1	+1.3

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
130	94.0	94.0	0.0	+1.3

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
130	29.0	29.1	0.1	+1.3

9. Time burst response

Time	Test burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
Washing	0.25	1	100.0	107.9	+7.9	1.5, +1.0
Fast	2	8	112.0	117.0	+5.0	1.0, -2.5
	200	800	134.0	134.0	0.0	+1.0
Slow	2	8	108.0	108.0	0.0	1.5, +1.0
	200	800	127.0	127.0	0.0	+1.0
SEL	0.25	1	99.0	99.0	0.0	1.5, -3.0
	2	8	108.0	108.0	0.0	1.0, -2.5
	200	800	128.0	128.0	0.0	+1.0

10. Peak C-weight level

Number of cycle test signal	Anticipated Value (dB)	Measured Value, 1 cycle (dB)	Deviated Value (dB)	Acceptance Limit (dB)
Continuous	130.0	132.0	+2.0	+3.0
One	133.4	133.4	0.0	+3.0

Number of cycle test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
Continuous	133.0	133.0	0.0	+3.0
Positive half cycle	135.4	135.4	0.0	+3.0
Negative half cycle	135.4	135.4	0.0	+3.0

11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limit (dB)
Positive one-half cycle	0.0	+1.5
Negative one-half cycle	0.0	+1.5

12. High level stability

Frequency	SLM Display at initial	SLM Display at final	Deviated Value (dB)	Acceptance Limit (dB)
A-weight	137.0	137.0	0.0	+0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation providing a level of confidence of approximately 95 %

End of Calibration Certificate

Cert. No.: ACC24877
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Calibration Certificate

Equipment: SOUND CALIBRATOR
Manufacturer: RION
Model: NC-74
Serial No.: 3417818
ID No.: RCK_F5001

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATHANAKAN 40 PHATHANAKAN ROAD,
KIWAENG PHATHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location: ()
Ambient Temperature: (23.0 ± 3) °C
Pressure: (101.3 ± 2) kPa
Relative Humidity: (50.0 ± 20) %

Received Date: 06 DECEMBER 2024
Calibration Date: 16 DECEMBER 2024
Date of Issue: 17 DECEMBER 2024

Calibrated by: Nishakorn Pongpavan

Approved by: T. Petch (Thasak Petchu)

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Calibration Procedure: CP-AC-03

Calibration Method:

This equipment was calibrated by follow on IEC 61672-2:2003 Standard.

The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration:

1. Reference Standard Instruments:

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33511B	MY3202742	EP-0007-24	05-FEB-25
Digital Multimeter	33461A	MY3220104	FEL-BP 21/0167	13-FEB-25
Digital Multimeter	33461A	MY3220076	FEL-BP 20/0167	15-FEB-25
Digital Multimeter	33461A	MY3002473	FEL-BP 22/0167	15-FEB-25
Programmable Attenuator	MAT-1070	6210014	EP-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	3450495	AA-1001-24	05-FEB-25
Audio Analyzer	AV9-3300A	V34036665	EP-0009-24	09-FEB-25

2. The result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is transferable to the operational system of use maintained on:

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No.: ACC24877
Job No.: VCMAC0845
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Result of Calibration:

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Acceptance Limit (dB)
94	95.97	+0.03	0.16	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (Hz)	Uncertainty (%)	Acceptance Limit (%)
1000	1001.7	+0.2	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Acceptance Limit (%)
1.83	0.05	3.0

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation providing a level of confidence of approximately 95 %

End of Calibration Certificate

Cert. No.: ACL25088
Page: 1 of 3

Calibration Certificate

Equipment: SOUND LEVEL METER
Manufacturer: RION
Model: 33-05 / Microphone UC-01 / Pre-amplifier S01-24
Serial No.: 0102261 / 18C-09 / 483169
ID No.: RCK_F50030

Condition As Found: GOOD

Customer: ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATHANAKAN 40 PHATHANAKAN ROAD,
KIWAENG PHATHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location: ()
Ambient Temperature: (23.0 ± 3) °C
Pressure: (101.3 ± 2) kPa
Relative Humidity: (50.0 ± 20) %

Received Date: 14 JANUARY 2025
Calibration Date: 27 JANUARY 2025
Date of Issue: 30 JANUARY 2025

Calibrated by: Nishakorn Pongpavan

Approved by: T. Petch (Thasak Petchu)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Calibration Procedure: CP-AC-01

Calibration Method:

This equipment was calibrated by follow on IEC 61672-2:2003 Standard (in sound level meter (SLM)).

The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with A-weighting chamber and Reference Standard instrument.

For test results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration:

1. Reference Standard Instruments:

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33210A	MY 48017076	EP-0006-24	05-FEB-25
Waveform Generator	33511B	MY3202742	EP-0007-24	05-FEB-25
Digital Multimeter	33461A	MY3220104	FEL-BP 21/0167	13-FEB-25
Digital Multimeter	33461A	MY3220076	FEL-BP 20/0167	15-FEB-25
Digital Multimeter	33461A	MY3002473	FEL-BP 22/0167	15-FEB-25
Programmable Attenuator	MAT-1070	6210014	EP-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	3450495	AA-1001-24	05-FEB-25

2. The result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is transferable to the operational system of use maintained on:

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No.: ACL25088
Job No.: VCMAC0863
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Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For 4 kHz to 19 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C-weight level	0.2	0.3
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No.: ACL25088
Job No.: VCMAC0863
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Cert. No. : ACL25888
Job No. : VCMAC0963
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Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.9 (±1.5)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
15.6

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A-weight	11.2
C-weight	17.4
Flat	23.2

3. Acoustical signal tests of frequency weightings

Main free-field acoustic response at a level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.2	0.2	0.2	±1.5
1000	0.1	0.1	0.1	±1.0
8000	0.3	0.3	0.3	±1.0

Cert. No. : ACL25888
Job No. : VCMAC0963
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4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	0.0	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Imp	94.0	94.0	0.0	±0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.3

Cert. No. : ACL25888
Job No. : VCMAC0963
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7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.2
139.0	139.0	0.0	±1.4
141.0	141.0	0.0	±1.3
143.0	143.0	0.0	±1.1
145.0	145.0	0.0	±1.1
147.0	147.0	0.0	±1.1
149.0	149.0	0.0	±1.1
151.0	151.0	0.0	±1.1
153.0	153.0	0.0	±1.1
155.0	155.0	0.0	±1.1
157.0	157.0	0.0	±1.1
159.0	159.0	0.0	±1.1
161.0	161.0	0.0	±1.1
163.0	163.0	0.0	±1.1
165.0	165.0	0.0	±1.1
167.0	167.0	0.0	±1.1
169.0	169.0	0.0	±1.1
171.0	171.0	0.0	±1.1
173.0	173.0	0.0	±1.1
175.0	175.0	0.0	±1.1
177.0	177.0	0.0	±1.1
179.0	179.0	0.0	±1.1
181.0	181.0	0.0	±1.1
183.0	183.0	0.0	±1.1
185.0	185.0	0.0	±1.1
187.0	187.0	0.0	±1.1
189.0	189.0	0.0	±1.1
191.0	191.0	0.0	±1.1
193.0	193.0	0.0	±1.1
195.0	195.0	0.0	±1.1
197.0	197.0	0.0	±1.1
199.0	199.0	0.0	±1.1
201.0	201.0	0.0	±1.1
203.0	203.0	0.0	±1.1
205.0	205.0	0.0	±1.1
207.0	207.0	0.0	±1.1
209.0	209.0	0.0	±1.1
211.0	211.0	0.0	±1.1
213.0	213.0	0.0	±1.1
215.0	215.0	0.0	±1.1
217.0	217.0	0.0	±1.1
219.0	219.0	0.0	±1.1
221.0	221.0	0.0	±1.1
223.0	223.0	0.0	±1.1
225.0	225.0	0.0	±1.1
227.0	227.0	0.0	±1.1
229.0	229.0	0.0	±1.1
231.0	231.0	0.0	±1.1
233.0	233.0	0.0	±1.1
235.0	235.0	0.0	±1.1
237.0	237.0	0.0	±1.1
239.0	239.0	0.0	±1.1
241.0	241.0	0.0	±1.1
243.0	243.0	0.0	±1.1
245.0	245.0	0.0	±1.1
247.0	247.0	0.0	±1.1
249.0	249.0	0.0	±1.1
251.0	251.0	0.0	±1.1
253.0	253.0	0.0	±1.1
255.0	255.0	0.0	±1.1
257.0	257.0	0.0	±1.1
259.0	259.0	0.0	±1.1
261.0	261.0	0.0	±1.1
263.0	263.0	0.0	±1.1
265.0	265.0	0.0	±1.1
267.0	267.0	0.0	±1.1
269.0	269.0	0.0	±1.1
271.0	271.0	0.0	±1.1
273.0	273.0	0.0	±1.1
275.0	275.0	0.0	±1.1
277.0	277.0	0.0	±1.1
279.0	279.0	0.0	±1.1
281.0	281.0	0.0	±1.1
283.0	283.0	0.0	±1.1
285.0	285.0	0.0	±1.1
287.0	287.0	0.0	±1.1
289.0	289.0	0.0	±1.1
291.0	291.0	0.0	±1.1
293.0	293.0	0.0	±1.1
295.0	295.0	0.0	±1.1
297.0	297.0	0.0	±1.1
299.0	299.0	0.0	±1.1
301.0	301.0	0.0	±1.1
303.0	303.0	0.0	±1.1
305.0	305.0	0.0	±1.1
307.0	307.0	0.0	±1.1
309.0	309.0	0.0	±1.1
311.0	311.0	0.0	±1.1
313.0	313.0	0.0	±1.1
315.0	315.0	0.0	±1.1
317.0	317.0	0.0	±1.1
319.0	319.0	0.0	±1.1
321.0	321.0	0.0	±1.1
323.0	323.0	0.0	±1.1
325.0	325.0	0.0	±1.1
327.0	327.0	0.0	±1.1
329.0	329.0	0.0	±1.1
331.0	331.0	0.0	±1.1
333.0	333.0	0.0	±1.1
335.0	335.0	0.0	±1.1
337.0	337.0	0.0	±1.1
339.0	339.0	0.0	±1.1
341.0	341.0	0.0	±1.1
343.0	343.0	0.0	±1.1
345.0	345.0	0.0	±1.1
347.0	347.0	0.0	±1.1
349.0	349.0	0.0	±1.1
351.0	351.0	0.0	±1.1
353.0	353.0	0.0	±1.1
355.0	355.0	0.0	±1.1
357.0	357.0	0.0	±1.1
359.0	359.0	0.0	±1.1
361.0	361.0	0.0	±1.1
363.0	363.0	0.0	±1.1
365.0	365.0	0.0	±1.1
367.0	367.0	0.0	±1.1
369.0	369.0	0.0	±1.1
371.0	371.0	0.0	±1.1
373.0	373.0	0.0	±1.1
375.0	375.0	0.0	±1.1
377.0	377.0	0.0	±1.1
379.0	379.0	0.0	±1.1
381.0	381.0	0.0	±1.1
383.0	383.0	0.0	±1.1
385.0	385.0	0.0	±1.1
387.0	387.0	0.0	±1.1
389.0	389.0	0.0	±1.1
391.0	391.0	0.0	±1.1
393.0	393.0	0.0	±1.1
395.0	395.0	0.0	±1.1
397.0	397.0	0.0	±1.1
399.0	399.0	0.0	±1.1
401.0	401.0	0.0	±1.1
403.0	403.0	0.0	±1.1
405.0	405.0	0.0	±1.1
407.0	407.0	0.0	±1.1
409.0	409.0	0.0	±1.1
411.0	411.0	0.0	±1.1
413.0	413.0	0.0	±1.1
415.0	415.0	0.0	±1.1
417.0	417.0	0.0	±1.1
419.0	419.0	0.0	±1.1
421.0	421.0	0.0	±1.1
423.0	423.0	0.0	±1.1
425.0	425.0	0.0	±1.1
427.0	427.0	0.0	±1.1
429.0	429.0	0.0	±1.1
431.0	431.0	0.0	±1.1
433.0	433.0	0.0	±1.1
435.0	435.0	0.0	±1.1
437.0	437.0	0.0	±1.1
439.0	439.0	0.0	±1.1
441.0	441.0	0.0	±1.1
443.0	443.0	0.0	±1.1
445.0	445.0	0.0	±1.1
447.0	447.0	0.0	±1.1
449.0	449.0	0.0	±1.1
451.0	451.0	0.0	±1.1
453.0	453.0	0.0	±1.1
455.0	455.0	0.0	±1.1
457.0	457.0	0.0	±1.1
459.0	459.0	0.0	±1.1
461.0	461.0	0.0	±1.1
463.0	463.0	0.0	±1.1
465.0	465.0	0.0	±1.1
467.0	467.0	0.0	±1.1
469.0	469.0	0.0	±1.1
471.0	471.0	0.0	±1.1
473.0	473.0	0.0	±1.1
475.0	475.0	0.0	±1.1
477.0	477.0	0.0	±1.1
479.0	479.0	0.0	±1.1
481.0	481.0	0.0	±1.1
483.0	483.0	0.0	±1.1
485.0	485.0	0.0	±1.1
487.0	487.0	0.0	±1.1
489.0	489.0	0.0	±1.1
491.0	491.0	0.0	±1.1
493.0	493.0	0.0	±1.1
495.0	495.0	0.0	±1.1
497.0	497.0	0.0	±1.1
499.0	499.0	0.0	±1.1
501.0	501.0	0.0	±1.1
503.0	503.0	0.0	±1.1
505.0	505.0	0.0	±1.1
507.0	507.0	0.0	±1.1
509.0	509.0	0.0	±1.1
511.0	511.0	0.0	±1.1
513.0	513.0	0.0	±1.1
515.0	515.0	0.0	±1.1
517.0	517.0	0.0	±1.1
519.0	519.0	0.0	±1.1
521.0	521.0	0.0	±1.1
523.0	523.0	0.0	±1.1
525.0	525.0	0.0	±1.1
527.0	527.0	0.0	±1.1
529.0	529.0	0.0	±1.1
531.0	531.0	0.0	±1.1
533.0	533.0	0.0	±1.1
535.0	535.0	0.0	±1.1
537.0	537.0	0.0	±1.1
539.0	539.0	0.0	±1.1
541.0	541.0	0.0	±1.1
543.0	543.0	0.0	±1.1
545.0	545.0	0.0	±1.1
547.0	547.0	0.0	±1.1
549.0	549.0	0.0	±1.1
551.0	551.0	0.0	±1.1
553.0	553.0	0.0	±1.1
555.0	555.0	0.0	±1.1
557.0	557.0	0.0	±1.1
559.0	559.0	0.0	±1.1
561.0	561.0	0.0	±1.1
563.0	563.0	0.0	±1.1
565.0	565.0	0.0	±1.1
567.0	567.0	0.0	±1.1
569.0	569.0	0.0	±1.1
571.0	571.0	0.0	±1.1
573.0	573.0	0.0	±1.1
575.0	575.0	0.0	±1.1
577.0	577.0	0.0	±1.1
579.0	579.0	0.0	±1.1
581.0	581.0	0.0	±1.1
583.0	583.0	0.0	±1.1
585.0	585.0	0.0	±1.1
587.0	587.0	0.0	±1.1
589.0	589.0	0.0	±1.1
591.0	591.0	0.0	±1.1
593.0	593.0	0.0	±1.1
595.0	595.0	0.0	±1.1
597.0	597.0	0.0	±1.1
599.0	599.0	0.0	±1.1
601.0	601.0	0.0	±1.1
603.0	603.0	0.0	±1.1
605.0	605.0	0.0	±1.1
607.0	607.0	0.0	±1.1
609.0	609.0	0.0	±1.1
611.0	611.0	0.0	±1.1
613.0	613.0	0.0	±1.1

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4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	-0.1	+2.0
125	-0.1	-0.1	-0.1	+1.5
250	0.0	0.0	-0.1	+1.5
500	0.0	0.0	-0.1	+1.5
1000	0.0	0.1	0.0	+1.0
2000	0.0	0.0	0.0	+2.0
4000	0.0	0.0	0.0	+3.0
8000	0.0	0.0	0.1	+3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Accepted Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Accepted Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Long	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.3

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	+1.1
116.0	116.0	0.0	+1.1
115.0	115.0	0.0	+1.1
114.0	114.0	0.0	+1.1
113.0	113.0	-0.1	+1.1
112.0	112.0	0.0	+1.1
111.0	111.0	0.0	+1.1
110.0	110.0	0.0	+1.1
109.0	109.0	0.0	+1.1
108.0	108.0	0.0	+1.1
107.0	107.0	0.0	+1.1
106.0	106.0	0.0	+1.1
105.0	105.0	0.0	+1.1
104.0	104.0	0.0	+1.1
103.0	103.0	0.0	+1.1
102.0	102.0	0.0	+1.1
101.0	101.0	0.0	+1.1
100.0	100.0	0.0	+1.1
99.0	99.0	0.0	+1.1
98.0	98.0	0.0	+1.1
97.0	97.0	0.0	+1.1
96.0	96.0	0.0	+1.1
95.0	95.0	0.0	+1.1
94.0	94.0	0.0	+1.1
93.0	93.0	0.0	+1.1
92.0	92.0	0.0	+1.1
91.0	91.0	0.0	+1.1
90.0	90.0	0.0	+1.1
89.0	89.0	0.0	+1.1
88.0	88.0	0.0	+1.1
87.0	87.0	0.0	+1.1
86.0	86.0	0.0	+1.1
85.0	85.0	0.0	+1.1
84.0	84.0	0.0	+1.1
83.0	83.0	0.0	+1.1
82.0	82.0	0.0	+1.1
81.0	81.0	0.0	+1.1
80.0	80.0	0.0	+1.1
79.0	79.0	0.0	+1.1
78.0	78.0	0.0	+1.1
77.0	77.0	0.0	+1.1
76.0	76.0	0.0	+1.1
75.0	75.0	0.0	+1.1

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	+1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	28.8	-0.2	+1.1

9. Tone burst response

Time Weighting	Tone burst duration, T _B (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.8	-0.1	1.5; -5.0
	2	8	117.0	117.0	0.0	1.0; -2.5
	200	800	134.0	134.0	0.0	+1.0
Slow	0.25	1	108.0	108.0	0.0	1.5; -5.0
	2	8	117.0	117.0	0.0	+1.0
	200	800	134.0	134.0	0.0	+1.0
E.C.	0.25	1	99.0	98.9	-0.1	1.5; -5.0
	2	8	108.0	108.0	0.0	1.0; -2.5
	200	800	134.0	134.0	0.0	+1.0

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16. Peak-C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	+3.0
One	135.4	135.2	-0.2	+5.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	135.0	135.0	0.0	+2.0
Positive half cycle	135.4	135.1	-0.3	+2.0
Negative half cycle	135.4	135.2	-0.2	+2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	+1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	+0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2 or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : SR-42 / Microphone UC-53 / Pre-amplifier NH-24
Serial No. : 0005317 / 137734 / 30099
ID No. : BKK 150107

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAENG PHATTHANAKAN, KHET SIAN LIANG,
BANGKOK, 10750 THAILAND.

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 1) kPa
Relative Humidity : (50.0 ± 10) %

Received Date : 04 OCTOBER 2024
Calibration Date : 21-22 OCTOBER 2024
Date of Issue : 20 OCTOBER 2024

Calibrated by : Natchana Pongpetch

Approved by : T. Petch (Thasul Petchu)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory

Calibration Procedure : CP-MC41

Calibration Method :
This equipment was calibrated by follow on IEC 61672-3 (2013) Standard for sound level meter (SLM)
The SLM had test to Acoustical and Electrical signal test of frequency weighting with Acoustic chamber and Reference Standard Instruments.
For test result of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33210A	MY48017076	EF-0009-24	05 FEB-25
Waveform Generator	33311D	MY53202742	EF-0007-24	05 FEB-25
Digital Multimeter	33461A	MY53202104	EF-0007-24	13 FEB-25
Digital Multimeter	33461A	MY53202076	EF-0007-24	13 FEB-25
Digital Multimeter	34461A	MY60024273	EF-0007-24	13 FEB-25
Programmable Attenuator	MAF-1070	43100114	EF-0008-24	05 FEB-25
Condenser Microphone	4400	2977904	AA-1001-24	12 FEB-25
Measuring Amplifier	NA-40KAJ	34560495	AA-1001-24	09 FEB-25

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

3. This certificate is traceable to the international system of unit measured as :

1. National Institute of Metrology (Thailand).
2. Thailand Institute of Scientific and Technological Research (TISTR).

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Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.8
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For 4 kHz to 10 kHz	0.3	0.7
For 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.3	0.3
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Tone burst response	0.2	0.3
10. Peak-C sound level	0.2	0.3
11. Overload indication	0.2	0.25
12. High level stability	0.3	0.1

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
93.9-93.94	93.9	0.0	-0.5

2. Self-generated noise

2.1 Noise test

Measured Value (dB)
16.8

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A-weight	13.1
C-weight	19.1
Flat	25.0

3. Acoustical signal tests of frequency weightings

Mean free-field acoustic response at a level of 84 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	0.6	0.6	+3.3
1000	0.1	0.1	0.1	+2.0
8000	1.0	0.9	0.9	+3.0

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	-0.1	-0.1	+2.0
125	0.0	0.0	-0.1	+1.5
250	0.0	0.0	-0.1	+1.5
500	0.0	0.0	-0.1	+1.5
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.0	0.0	+2.0
4000	0.0	0.0	0.0	+3.0
8000	0.0	0.1	0.1	+3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Long	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.3

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7. Level Uncertainty on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	+1.1
136.0	136.0	0.0	+1.1
135.0	135.0	0.0	+1.1
134.0	134.0	0.0	+1.1
133.0	133.0	0.0	+1.1
132.0	132.0	0.0	+1.1
131.0	131.0	0.0	+1.1
130.0	130.0	0.0	+1.1
129.0	129.0	0.0	+1.1
128.0	128.0	0.0	+1.1
127.0	127.0	0.0	+1.1
126.0	126.0	0.0	+1.1
125.0	125.0	0.0	+1.1
124.0	124.0	0.0	+1.1
123.0	123.0	0.0	+1.1
122.0	122.0	0.0	+1.1
121.0	121.0	0.0	+1.1
120.0	120.0	0.0	+1.1
119.0	119.0	0.0	+1.1
118.0	118.0	0.0	+1.1
117.0	117.0	0.0	+1.1
116.0	116.0	0.0	+1.1
115.0	115.0	0.0	+1.1
114.0	114.0	0.0	+1.1
113.0	113.0	0.0	+1.1
112.0	112.0	0.0	+1.1
111.0	111.0	0.0	+1.1
110.0	110.0	0.0	+1.1
109.0	109.0	0.0	+1.1
108.0	108.0	0.0	+1.1
107.0	107.0	0.0	+1.1
106.0	106.0	0.0	+1.1
105.0	105.0	0.0	+1.1
104.0	104.0	0.0	+1.1
103.0	103.0	0.0	+1.1
102.0	102.0	0.0	+1.1
101.0	101.0	0.0	+1.1
100.0	100.0	0.0	+1.1
99.0	99.0	0.0	+1.1
98.0	98.0	0.0	+1.1
97.0	97.0	0.0	+1.1
96.0	96.0	0.0	+1.1
95.0	95.0	0.0	+1.1
94.0	94.0	0.0	+1.1
93.0	93.0	0.0	+1.1
92.0	92.0	0.0	+1.1
91.0	91.0	0.0	+1.1
90.0	90.0	0.0	+1.1
89.0	89.0	0.0	+1.1
88.0	88.0	0.0	+1.1
87.0	87.0	0.0	+1.1
86.0	86.0	0.0	+1.1
85.0	85.0	0.0	+1.1
84.0	84.0	0.0	+1.1
83.0	83.0	0.0	+1.1
82.0	82.0	0.0	+1.1
81.0	81.0	0.0	+1.1
80.0	80.0	0.0	+1.1
79.0	79.0	0.0	+1.1
78.0	78.0	0.0	+1.1
77.0	77.0	0.0	+1.1
76.0	76.0	0.0	+1.1
75.0	75.0	0.0	+1.1
74.0	74.0	0.0	+1.1
73.0	73.0	0.0	+1.1
72.0	72.0	0.0	+1.1
71.0	71.0	0.0	+1.1
70.0	70.0	0.0	+1.1
69.0	69.0	0.0	+1.1
68.0	68.0	0.0	+1.1
67.0	67.0	0.0	+1.1
66.0	66.0	0.0	+1.1
65.0	65.0	0.0	+1.1
64.0	64.0	0.0	+1.1
63.0	63.0	0.0	+1.1
62.0	62.0	0.0	+1.1
61.0	61.0	0.0	+1.1
60.0	60.0	0.0	+1.1
59.0	59.0	0.0	+1.1
58.0	58.0	0.0	+1.1
57.0	57.0	0.0	+1.1
56.0	56.0	0.0	+1.1
55.0	55.0	0.0	+1.1
54.0	54.0	0.0	+1.1
53.0	53.0	0.0	+1.1
52.0	52.0	0.0	+1.1
51.0	51.0	0.0	+1.1
50.0	50.0	0.0	+1.1
49.0	49.0	0.0	+1.1
48.0	48.0	0.0	+1.1
47.0	47.0	0.0	+1.1
46.0	46.0	0.0	+1.1
45.0	45.0	0.0	+1.1
44.0	44.0	0.0	+1.1
43.0	43.0	0.0	+1.1
42.0	42.0	0.0	+1.1
41.0	41.0	0.0	+1.1
40.0	40.0	0.0	+1.1
39.0	39.0	0.0	+1.1
38.0	38.0	0.0	+1.1
37.0	37.0	0.0	+1.1
36.0	36.0	0.0	+1.1
35.0	35.0	0.0	+1.1
34.0	34.0	0.0	+1.1
33.0	33.0	0.0	+1.1
32.0	32.0	0.0	+1.1
31.0	31.0	0.0	+1.1
30.0	30.0	0.0	+1.1
29.0	29.0	0.0	+1.1
28.0	28.0	0.0	+1.1
27.0	27.0	0.0	+1.1
26.0	26.0	0.0	+1.1
25.0	25.0	0.0	+1.1
24.0	24.0	0.0	+1.1
23.0	23.0	0.0	+1.1
22.0	22.0	0.0	+1.1
21.0	21.0	0.0	+1.1
20.0	20.0	0.0	+1.1
19.0	19.0	0.0	+1.1
18.0	18.0	0.0	+1.1
17.0	17.0	0.0	+1.1
16.0	16.0	0.0	+1.1
15.0	15.0	0.0	+1.1
14.0	14.0	0.0	+1.1
13.0	13.0	0.0	+1.1
12.0	12.0	0.0	+1.1
11.0	11.0	0.0	+1.1
10.0	10.0	0.0	+1.1
9.0	9.0	0.0	+1.1
8.0	8.0	0.0	+1.1
7.0	7.0	0.0	+1.1
6.0	6.0	0.0	+1.1
5.0	5.0	0.0	+1.1
4.0	4.0	0.0	+1.1
3.0	3.0	0.0	+1.1
2.0	2.0	0.0	+1.1
1.0	1.0	0.0	+1.1
0.0	0.0	0.0	+1.1

T. Petch

8. Level Uncertainty including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	+1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	+1.1

9. Time burst response

Time Weighting	Time burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	-1.5, -0.6
	2	1	117.0	117.0	0.0	1.0, -2.0
	200	800	134.0	134.0	0.0	+1.0
Slow	2	1	108.0	108.0	0.0	-1.5, -0.6
	200	800	127.6	127.6	0.0	+1.0
	0.25	1	99.0	99.0	-0.1	-1.5, -0.6
SEI	2	1	108.0	108.0	0.0	1.0, -2.5
	200	800	129.3	129.0	-0.3	+1.0

T. Petch

10. Peak C sound level

Number of cycle to test total	Anticipated Value (dB)	Measured Value, Leq (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	+1.0
One	133.4	133.4	0.0	+1.0

Number of cycle to test total	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.2	0.2	+2.0
Positive half cycle	135.4	135.3	-0.1	+2.0
Negative half cycle	135.4	135.3	-0.1	+2.0

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle		
89.5	89.5	0.0	+1.0

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at End (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	+0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2 or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

T. Petch

Cert. No. : ACL25092
Page : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Make/Model : RION
Modell : NL-42 / Microphone UC-52 / Pre-amplifier NH-24
Serial No. : 00854318 / 175176 / 83721
ID No. : BCK, FS0108

Condition As Found : GOOD
Customer : AIS LABORATORY GROUP (THAILAND) CO., LTD.
104 PIATTHANAKAN 40 PIATTHANAKAN ROAD,
KIWAENG PIATTHANAKAN, KHEE SUAN LUANG,
BANGKOK, (10250 THAILAND)

Location :
Ambient Temperature : (23.0 ± 3) °C
Pressure : (1013 ± 1) hPa
Relative Humidity : (50.0 ± 20) %

Received Date : 14 JANUARY 2025
Calibration Date : 27-29 JANUARY 2025
Date of Issue : 30 JANUARY 2025

REVIEW BY : *Thammarin P.*
APPROVED BY : *[Signature]*
NEXT CAL DATE : 27/01/26

Calibrated by : Nithakorn Phipphasorn

Approved by : *T. Petch*
(Thammarin Phipphasorn)

This certificate is created in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Cert. No. : ACL25092
Job No. : YC68AC0063
Page : 2 of 8

Calibration Procedure : CP-AC-04

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had been in Acoustical and Electrical signal type of frequency weighting with Automatic calibration and Reference Standard Instruments.
For test results of each items were made by observation of each instrument display and also with SLM's display

Condition of this result of calibration :

1. Reference Standard Instruments

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33318A	MY43017076	EF-0009-24	05-FEB-25
Waveform Generator	33311B	MY52302742	EF-0007-24	05-FEB-25
Digital Multimeter	33961A	MY53220104	FEL-RIP-210257	13-FEB-25
Digital Multimeter	33461A	MY53220076	1EL-RIP-220167	15-FEB-25
Digital Multimeter	34461A	MY66021275	1EL-RIP-220167	15-FEB-25
Programmable Attenuator	MAF-1075	E2100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	JA-1001-24	12-FEB-25
Measuring Amplifier	NA-42CAL	34560495	NA-1001-24	05-FEB-25

2. This result of calibration was found accurate is shown on date and place of calibration for this calibrated item only.

3. This certificate is primarily for the general use of system of test measurement in :

1. National Institute of Metrology (Thailand).
2. Thailand Institute of Scientific and Technological Research (TISTR).

T. Petch

Cert. No. : ACL25092
Job No. : YC68AC0063
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
93.0 (93.0)	93.9	0.9	+0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
14.8

2.2 The microphone of the sound level meter was replaced by electrical signal equal device.

Frequency Weighting	W _{eq} (dB)
A-weight	11.6
C-weight	17.9
Z	23.9

3. Acoustical signal type of frequency weighting

Mean free-field acoustic response at a level of 84 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.0	0.0	+1.1
1000	0.0	0.0	0.0	+1.1
10000	2.3	2.3	2.3	+1.0

T. Petch

Cert. No. : ACL25092
Job No. : YC68AC0063
Page : 5 of 8

4. Electrical signal type of frequency weighting

Weighting network response with reference to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
63	0.0	0.0	0.1	+2.0
125	0.0	0.1	0.2	+1.5
250	0.0	0.0	0.0	+1.5
500	0.0	0.1	0.0	+1.5
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.1	0.0	+1.0
4000	0.0	0.0	0.0	+1.0
8000	0.0	0.1	0.0	+1.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Z	94.0	94.0	0.0	+0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1</

Cert. No.: ACL24379
Job No.: YCMA0002
Pages: 1 of 6

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Legals (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	+3.0
One	136.4	135.5	-0.9	+3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	+2.0
Positive half cycle	135.4	135.1	-0.3	+2.0
Negative half cycle	135.4	135.1	-0.3	+2.0

11. Overall indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	0.0	+1.5
Negative one-half cycle	0.0	+1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.9	137.0	-0.9	+0.5

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2
or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

T. Petch

Cert. No.: ACL24379
Job No.: YCMA0002
Pages: 1 of 6

Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
325 Hz	0.3	0.6
1000 Hz	0.3	0.6
5000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 10 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 10 kHz	0.3	0.7
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long - term stability	0.1	0.1
7. Level stability on the reference level range	0.2	0.3
8. Level stability including the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C sound level	0.2	0.35
11. Overall indication	0.2	0.25
12. High level stability	0.1	0.1

T. Petch

Cert. No.: ACL24379
Job No.: YCMA0002
Pages: 1 of 6

7. Level stability on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	+1.1
138.0	138.0	0.0	+1.1
139.0	139.0	0.0	+1.1
140.0	140.0	0.0	+1.1
141.0	141.0	0.0	+1.1
142.0	142.0	0.0	+1.1
143.0	143.0	0.0	+1.1
144.0	144.0	0.0	+1.1
145.0	145.0	0.0	+1.1
146.0	146.0	0.0	+1.1
147.0	147.0	0.0	+1.1
148.0	148.0	0.0	+1.1
149.0	149.0	0.0	+1.1
150.0	150.0	0.0	+1.1
151.0	151.0	0.0	+1.1
152.0	152.0	0.0	+1.1
153.0	153.0	0.0	+1.1
154.0	154.0	0.0	+1.1
155.0	155.0	0.0	+1.1
156.0	156.0	0.0	+1.1
157.0	157.0	0.0	+1.1
158.0	158.0	0.0	+1.1
159.0	159.0	0.0	+1.1
160.0	160.0	0.0	+1.1
161.0	161.0	0.0	+1.1
162.0	162.0	0.0	+1.1
163.0	163.0	0.0	+1.1
164.0	164.0	0.0	+1.1
165.0	165.0	0.0	+1.1
166.0	166.0	0.0	+1.1
167.0	167.0	0.0	+1.1
168.0	168.0	0.0	+1.1
169.0	169.0	0.0	+1.1
170.0	170.0	0.0	+1.1
171.0	171.0	0.0	+1.1
172.0	172.0	0.0	+1.1
173.0	173.0	0.0	+1.1
174.0	174.0	0.0	+1.1
175.0	175.0	0.0	+1.1
176.0	176.0	0.0	+1.1
177.0	177.0	0.0	+1.1
178.0	178.0	0.0	+1.1
179.0	179.0	0.0	+1.1
180.0	180.0	0.0	+1.1
181.0	181.0	0.0	+1.1
182.0	182.0	0.0	+1.1
183.0	183.0	0.0	+1.1
184.0	184.0	0.0	+1.1
185.0	185.0	0.0	+1.1
186.0	186.0	0.0	+1.1
187.0	187.0	0.0	+1.1
188.0	188.0	0.0	+1.1
189.0	189.0	0.0	+1.1
190.0	190.0	0.0	+1.1
191.0	191.0	0.0	+1.1
192.0	192.0	0.0	+1.1
193.0	193.0	0.0	+1.1
194.0	194.0	0.0	+1.1
195.0	195.0	0.0	+1.1
196.0	196.0	0.0	+1.1
197.0	197.0	0.0	+1.1
198.0	198.0	0.0	+1.1
199.0	199.0	0.0	+1.1
200.0	200.0	0.0	+1.1
201.0	201.0	0.0	+1.1
202.0	202.0	0.0	+1.1
203.0	203.0	0.0	+1.1
204.0	204.0	0.0	+1.1
205.0	205.0	0.0	+1.1
206.0	206.0	0.0	+1.1
207.0	207.0	0.0	+1.1
208.0	208.0	0.0	+1.1
209.0	209.0	0.0	+1.1
210.0	210.0	0.0	+1.1
211.0	211.0	0.0	+1.1
212.0	212.0	0.0	+1.1
213.0	213.0	0.0	+1.1
214.0	214.0	0.0	+1.1
215.0	215.0	0.0	+1.1
216.0	216.0	0.0	+1.1
217.0	217.0	0.0	+1.1
218.0	218.0	0.0	+1.1
219.0	219.0	0.0	+1.1
220.0	220.0	0.0	+1.1
221.0	221.0	0.0	+1.1
222.0	222.0	0.0	+1.1
223.0	223.0	0.0	+1.1
224.0	224.0	0.0	+1.1
225.0	225.0	0.0	+1.1
226.0	226.0	0.0	+1.1
227.0	227.0	0.0	+1.1
228.0	228.0	0.0	+1.1
229.0	229.0	0.0	+1.1
230.0	230.0	0.0	+1.1
231.0	231.0	0.0	+1.1
232.0	232.0	0.0	+1.1
233.0	233.0	0.0	+1.1
234.0	234.0	0.0	+1.1
235.0	235.0	0.0	+1.1
236.0	236.0	0.0	+1.1
237.0	237.0	0.0	+1.1
238.0	238.0	0.0	+1.1
239.0	239.0	0.0	+1.1
240.0	240.0	0.0	+1.1
241.0	241.0	0.0	+1.1
242.0	242.0	0.0	+1.1
243.0	243.0	0.0	+1.1
244.0	244.0	0.0	+1.1
245.0	245.0	0.0	+1.1
246.0	246.0	0.0	+1.1
247.0	247.0	0.0	+1.1
248.0	248.0	0.0	+1.1
249.0	249.0	0.0	+1.1
250.0	250.0	0.0	+1.1
251.0	251.0	0.0	+1.1
252.0	252.0	0.0	+1.1
253.0	253.0	0.0	+1.1
254.0	254.0	0.0	+1.1
255.0	255.0	0.0	+1.1
256.0	256.0	0.0	+1.1
257.0	257.0	0.0	+1.1
258.0	258.0	0.0	+1.1
259.0	259.0	0.0	+1.1
260.0	260.0	0.0	+1.1
261.0	261.0	0.0	+1.1
262.0	262.0	0.0	+1.1
263.0	263.0	0.0	+1.1
264.0	264.0	0.0	+1.1
265.0	265.0	0.0	+1.1
266.0	266.0	0.0	+1.1
267.0	267.0	0.0	+1.1
268.0	268.0	0.0	+1.1
269.0	269.0	0.0	+1.1
270.0	270.0	0.0	+1.1
271.0	271.0	0.0	+1.1
272.0	272.0	0.0	+1.1
273.0	273.0	0.0	+1.1
274.0	274.0	0.0	+1.1
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277.0	277.0	0.0	+1.1
278.0	278.0	0.0	+1.1
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280.0	280.0	0.0	+1.1
281.0	281.0	0.0	+1.1
282.0	282.0	0.0	+1.1
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287.0	287.0	0.0	+1.1
288.0	288.0	0.0	+1.1
289.0	289.0	0.0	+1.1
290.0	290.0	0.0	+1.1
291.0	291.0	0.0	+1.1
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293.0	293.0	0.0	+1.1
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296.0	296.0	0.0	+1.1
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298.0	298.0	0.0	+1.1
299.0	299.0	0.0	+1.1
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307.0	307.0	0.0	+1.1
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317.0	317.0	0.0	+1.1
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319.0	319.0	0.0	+1.1
320.0	320.0	0.0	+1.1
321.0	321.0	0.0	+1.1
322.0	322.0	0.0	+1.1
323.0	323.0	0.0	+1.1
324.0	324.0	0.0	+1.1
325.0	325.0	0.0	+1.1
326.0	326.0	0.0	+1.1
327.0	327.0	0.0	+1.1
328.0	328.0	0.0	+1.1
329.0	329.0	0.0	+1.1
330.0	330.0	0.0	+1.1
331.0	331.0	0.0	+1.1
332.0	332.0	0.0	+1.1
333.0	333.0	0.0	+1.1
334.0	334.0	0.0	+1.1
335.0	335.0	0.0	+1.1
336.0	336.0	0.0	+1.1
337.0	337.0	0.0	+1.1
338.0	338.0	0.0	+1.1
339.0	339.0	0.0	+1.1
340.0	340.0	0.0	+1.1
341.0	341.0	0.0	+1.1
342.0	342.0	0.0	+1.1
343.0	343.0	0.0	+1.1
344.0	344.0	0.0	+1.1
345.0	345.0	0.0	+1.1
346.0	346.0	0.0	+1.1
347.0	347.0	0.0	+1.1
348.0	348.0	0.0	+1.1
349.0	349.0	0.0	+1.1
350.0	350.0	0.0	+1.1
351.0	351.0	0.0	+1.1
352.0	352.0	0.0	+1.1
353.0	353.0	0.0	+1.1
354.0	354.0	0.0	+1.1
355.0	355.0	0.0	+1.1
356.0	356.0	0.0	+1.1
357.0	357.0	0.0	+1.1

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preampifier NH-24
Serial No. : 01122547 / 14152 / 22594
ID No. : BKC_P50014

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40 PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND

Location :
Ambient Temperature : (23.0 ± 3.3) °C
Pressure : (101.3 ± 3.3) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date : 04 OCTOBER 2024
Calibration Date : 21-22 OCTOBER 2024
Date of Issue : 24 OCTOBER 2024

REVIEW BY : *T. Petch*
APPROVED BY : *T. Petch*
NEXT CAL DATE : 21/10/25

Calibrated by : Natchanon Pongpanan

Approved by : *T. Petch*
(Thanakul Petchuan)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory

Calibration Procedure : (CPAC-6)

Calibration Method :
This equipment was calibrated by follow on (IEC 61672-3:2013) Standard for sound level meter (SLM).
The SLM had been to Acoustical and Electrical signal line of frequency weighting with Acoustic chamber and Reference Standard Instruments.
Five test results of each item were used by observation of each instrument display and also with SLM's display.

Condition of Data from calibration :

Instrument	Model	Serial No.	Cert. No.	Exp. Date
Waveform Generator	33110	MY5202742	EP-0007-24	05-11-25
Waveform Generator	33110	MY5202742	EP-0007-24	05-11-25
Digital Multimeter	33461A	MY5202094	IEZ-101-24	13-FEB-25
Digital Multimeter	33461A	MY5202094	IEZ-101-24	13-FEB-25
Digital Multimeter	33461A	MY5202094	IEZ-101-24	13-FEB-25
Programmable Acoustics	MAT 1070	02100114	EP-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KX	34960995	AA-3001-24	05-FEB-25

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

3. This certificate is issued to the institutional system and is contained in:
- 3.1 National Institute of Metrology (Thailand)
 - 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal line of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.2	0.6
8000 Hz	0.3	0.7
4. Electrical signal line of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For 4 kHz to 10 kHz	0.3	0.7
For 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C-weight level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL24338
Job No. : VCBAC0005
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Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.9)	93.9	0.0	±0.3

2. Self-generated noise

2.1 National test

Measured Value (dB)
17.3

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Weighting (dB)
A-weight	12.6
C-weight	17.3
Flat	23.4

3. Acoustical signal line of frequency weightings

Mean line field acoustic response at level of 94 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
125	0.7	0.8	0.8	±1.5
1000	0.0	0.0	0.0	±1.0
8000	-2.3	-2.2	-2.2	±1.6

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Job No. : VCBAC0005
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4. Electrical signal line of frequency weightings

Weighting network response with reference to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
63	0.0	0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.1	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.1	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±3.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Imp	94.0	94.0	0.0	±0.1

6. Long-term stability

Frequency Weighting	SLM Display at Initial (dB)	SLM Display at Final (dB)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.5

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8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.1	±1.1

9. Time burst response

Time Weighting	Time burst duration, T _b (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Fast	6.25	1	108.0	107.9	-0.1	±1.5, ±0.9
	2	8	117.0	117.0	0.0	±0.2, ±2.5
	200	100	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	±1.5, ±0.9
	200	100	127.0	127.0	0.0	±1.0
	0.25	1	95.0	95.0	0.0	±1.5, ±0.9
SL	2	8	108.0	108.0	0.0	±1.5, ±0.9
	200	100	128.0	128.0	0.0	±1.0

Cert. No. : ACL24338
Job No. : VCBAC0005
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10. Peak C-weight level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Leq (dB)	Deviation Value (dB)	Acceptance Limits (dB)
One	135.0	133.3	-1.7	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.1	0.1	±2.0
Positive half cycle	133.4	133.2	-0.2	±2.0
Negative half cycle	133.4	133.2	-0.2	±2.0

11. Overload indication

Measured value (dB)	Deviation Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	0.0	±1.5
Negative one-half cycle	0.0	±1.5

12. High level stability

Frequency Weighting	SLM Display at Initial (dB)	SLM Display at Final (dB)	Deviation Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2 or any value following guidelines providing a level of confidence of approximately 95%

End of Calibration Certificate

Cert. No. : ACL25089
Page : 1 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Preampifier NH-24
Serial No. : 00658239 / 137780 / 61091
ID No. : BKC_P50006

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTANAKAN 40 PHATTANAKAN ROAD,
KHWAENG PHATTANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND

Location :
Ambient Temperature : (23.0 ± 3.3) °C
Pressure : (101.3 ± 3.3) kPa
Relative Humidity : (50.0 ± 2.0) %

Received Date : 14 JANUARY 2025
Calibration Date : 27-29 JANUARY 2025
Date of Issue : 30 JANUARY 2025

REVIEW BY : *T. Petch*
APPROVED BY : *T. Petch*
NEXT CAL DATE : 27/01/26

Calibrated by : Natchanon Pongpanan

Approved by : *T. Petch*
(Thanakul Petchuan)

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Cert. No. : ACL25889
Job No. : VCMAC0063
Pages : 2 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For test results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017016	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY53202742	TF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 210267	15-FEB-25
Digital Multimeter	34461A	MY53220276	131-207-20267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 220267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. The result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

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

- 1.1 National Institute of Metrology (Thailand).
- 1.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No. : ACL25889
Job No. : VCMAC0063
Pages : 3 of 8

Summary of Measurement Result

Parameter	Uncertainty (dB)	Maximum permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.3	N/A
2. Self generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
500 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For 4 kHz to 10 kHz	0.3	0.7
For 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.3
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity including the level range control	0.3	0.3
9. Tone burst response	0.2	0.3
10. Time constant	0.2	0.25
11. Overload condition	0.2	0.25
12. High level stability	0.1	0.1

Cert. No. : ACL25889
Job No. : VCMAC0063
Page : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.94)	93.9	0.0	+0.3

2. Self-generated noise

2.1 Noise test

Measured Value (dB)
17.1

2.2 The microphone of the sound level meter was replaced by electrical signal replacement

Frequency Weightings	Weighting (dB)
A-weight	12.6
C-weight	18.8
Flat	24.7

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 94 dB

Frequency (1/s)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.5	-0.5	0.5	±1.5
1000	0.2	0.2	0.2	±1.0
8000	-0.1	-0.1	-0.1	±1.0

Cert. No. : ACL25889
Job No. : VCMAC0063
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits (dB)
83	0.0	0.0	0.0	+2.0
125	0.0	0.0	0.0	+1.5
250	0.0	0.0	-0.1	+1.5
500	0.0	0.0	0.0	+1.5
1000	0.0	0.0	0.0	+1.0
2000	0.0	0.0	0.0	+2.0
4000	0.0	0.0	0.0	+3.0
8000	0.0	0.1	0.1	+5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.2
C-weight	94.0	94.0	0.0	+0.2
Flat	94.0	94.0	0.0	+0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	+0.1
Slow	94.0	94.0	0.0	+0.1
Len	94.0	94.0	0.0	+0.1

6. Long-term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	+0.3

Cert. No. : ACL25889
Job No. : VCMAC0063
Pages : 6 of 8

10. Peak C-weight level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Repeat (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	135.0	135.0	0.0	+1.0
One	133.4	133.4	-0.0	+1.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.1	0.1	+2.0
Positive half cycle	133.4	133.3	-0.1	+2.0
Negative half cycle	133.4	133.3	-0.1	+2.0

11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive over half cycle	0.0	+1.5
Negative over half cycle	0.0	+1.5

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	+0.3

The reported uncertainty is based on a standard uncertainty calculated by average factor 1 or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

And 40/2 Sathorn Road, Bangkok, Thailand 10120 (Thailand)
Tel: +66 (0)2-62211111 Email: sithiporn@thaisithiporn.comCert. No. : ACL25889
Pages : 7 of 8

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42 / Microphone UC-52 / Pre-amplifier N10-24
Serial No. : 0006240 / 172151 / 141715
ID No. : BSK-FS0097

Condition As Found : GOOD

Customer : AIS LABORATORY GROUP (THAILAND) CO., LTD.
108 PHATHANAKARAN, PHATHANAKARAN ROAD,
KIYAWAD PHATHANAKARAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :
Ambient Temperature : (21.0 ± 1) °C
Pressure : 1013.3 ± 1 hPa
Relative Humidity : (59.0 ± 2.0) %

Received Date : 14 JANUARY 2025
Calibration Date : 27-29 JANUARY 2025
Date of Issue : 30 JANUARY 2025

Calibrated by :

Nakdarn Pitsanpong

Approved by :

T. Pitsanpong
(Thailand Pitsanpong)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than on full, except with the prior written approval of the head of Calibration Laboratory

Cert. No. : ACL25889
Job No. : VCMAC0063
Pages : 8 of 8

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Acoustic chamber and Reference Standard Instruments.

For test results of each item were made by observation of each instrument display and also with SLM's display

Condition of this result of calibration :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017016	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY53202742	TF-0007-24	05-FEB-25
Digital Multimeter	33461A	MY53220104	EEL-BP 210267	15-FEB-25
Digital Multimeter	34461A	MY53220276	EEL-BP 200267	15-FEB-25
Digital Multimeter	34461A	MY60024273	EEL-BP 220267	15-FEB-25
Programmable Attenuator	MAT-1070	62100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-1001-24	12-FEB-25
Measuring Amplifier	NA-42KAI	34560495	AA-3001-24	05-FEB-25

2. The result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

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

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Cert. No. : ACL25996
Job No. : VCMAC0863
Pages : 3 of 8

Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 4 kHz	0.3	0.6
For > 4 kHz to 10 kHz	0.3	0.7
For > 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level linearity on the reference level range	0.2	0.3
8. Level linearity outside the level range control	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C-weight level	0.2	0.35
11. Overload indication	0.2	0.25
12. High level stability	0.1	0.1

T. Petch

Cert. No. : ACL25996
Job No. : VCMAC0863
Page : 4 of 8

Result of calibration:

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limits (dB)
93.9 (31.94)	93.9	0.0	±0.3

2. Self-generated noise

Measured Value (dB)
15.1

3.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weightings	Weighting (dB)
A-weight	12.6
C-weight	13.3
Flat	24.0

3. Acoustical signal tests of frequency weightings

Mean free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)			
	Flat	C-weight	A-weight	Acceptance Limits
125	0.4	0.4	0.4	± 1.5
1000	0.6	0.0	0.0	± 1.0
8000	0.0	0.0	0.0	± 1.0

T. Petch

Cert. No. : ACL25996
Job No. : VCMAC0863
Pages : 5 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	±1.1
136.0	136.0	0.0	±1.3
135.0	135.0	0.0	±1.3
134.0	134.0	0.0	±1.3
133.0	133.0	0.0	±1.3
132.0	132.0	0.0	±1.3
131.0	131.0	0.0	±1.3
129.0	129.0	0.0	±1.3
128.0	128.0	0.0	±1.3
127.0	127.0	0.1	±1.3
125.0	125.0	0.0	±1.3
124.0	124.0	0.0	±1.3
123.0	123.0	0.1	±1.3
122.0	122.0	0.0	±1.3
121.0	121.0	0.1	±1.3
120.0	120.0	0.0	±1.3
119.0	119.0	0.1	±1.3
118.0	118.0	0.0	±1.3
117.0	117.0	0.0	±1.3
116.0	116.0	0.0	±1.3
115.0	115.0	0.0	±1.3
114.0	114.0	0.0	±1.3
113.0	113.0	0.0	±1.3
112.0	112.0	0.0	±1.3
111.0	111.0	0.0	±1.3
110.0	110.0	0.0	±1.3
109.0	109.0	0.0	±1.3
108.0	108.0	0.0	±1.3
107.0	107.0	0.0	±1.3
106.0	106.0	0.0	±1.3
105.0	105.0	0.0	±1.3
104.0	104.0	0.0	±1.3
103.0	103.0	0.0	±1.3
102.0	102.0	0.0	±1.3
101.0	101.0	0.0	±1.3
100.0	100.0	0.0	±1.3
99.0	99.0	0.0	±1.3
98.0	98.0	0.0	±1.3
97.0	97.0	0.0	±1.3
96.0	96.0	0.0	±1.3
95.0	95.0	0.0	±1.3
94.0	94.0	0.0	±1.3
93.0	93.0	0.0	±1.3
92.0	92.0	0.0	±1.3
91.0	91.0	0.0	±1.3
90.0	90.0	0.0	±1.3
89.0	89.0	0.0	±1.3
88.0	88.0	0.0	±1.3
87.0	87.0	0.0	±1.3
86.0	86.0	0.0	±1.3
85.0	85.0	0.0	±1.3
84.0	84.0	0.0	±1.3
83.0	83.0	0.0	±1.3
82.0	82.0	0.0	±1.3
81.0	81.0	0.0	±1.3
80.0	80.0	0.0	±1.3
79.0	79.0	0.0	±1.3
78.0	78.0	0.0	±1.3
77.0	77.0	0.0	±1.3
76.0	76.0	0.0	±1.3
75.0	75.0	0.0	±1.3

T. Petch

Cert. No. : ACL25996
Job No. : VCMAC0863
Pages : 7 of 8

8. Level linearity (including the level range control)

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.3

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.3

9. Time burst response

Time Weighting	Time burst duration, 2s (Final)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	108.0	0.0	±1.5, ±2.0
	2	8	117.0	117.0	0.0	±1.6, ±2.5
	200	320	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	±1.5, ±1.0
	200	320	127.6	127.6	0.0	±1.0
	0.25	1	99.0	99.0	0.0	±1.5, ±1.0
SEL	2	8	108.0	108.0	0.0	±1.0, ±2.5
	200	320	128.0	128.0	0.0	±1.0

T. Petch

401/011/010/011 Road, Bangna-Prachinburi Highway, Bangna, Samut Prakan
Tel: 02-010-1101/012/013/014/015/016/017/018/019/020/021/022/023/024/025/026/027/028/029/030/031/032/033/034/035/036/037/038/039/040/041/042/043/044/045/046/047/048/049/050/051/052/053/054/055/056/057/058/059/060/061/062/063/064/065/066/067/068/069/070/071/072/073/074/075/076/077/078/079/080/081/082/083/084/085/086/087/088/089/090/091/092/093/094/095/096/097/098/099/100/101/102/103/104/105/106/107/108/109/110/111/112/113/114/115/116/117/118/119/120/121/122/123/124/125/126/127/128/129/130/131/132/133/134/135/136/137/138/139/140/141/142/143/144/145/146/147/148/149/150/151/152/153/154/155/156/157/158/159/160/161/162/163/164/165/166/167/168/169/170/171/172/173/174/175/176/177/178/179/180/181/182/183/184/185/186/187/188/189/190/191/192/193/194/195/196/197/198/199/200/201/202/203/204/205/206/207/208/209/210/211/212/213/214/215/216/217/218/219/220/221/222/223/224/225/226/227/228/229/230/231/232/233/234/235/236/237/238/239/240/241/242/243/244/245/246/247/248/249/250/251/252/253/254/255/256/257/258/259/260/261/262/263/264/265/266/267/268/269/270/271/272/273/274/275/276/277/278/279/280/281/282/283/284/285/286/287/288/289/290/291/292/293/294/295/296/297/298/299/300/301/302/303/304/305/306/307/308/309/310/311/312/313/314/315/316/317/318/319/320/321/322/323/324/325/326/327/328/329/330/331/332/333/334/335/336/337/338/339/340/341/342/343/344/345/346/347/348/349/350/351/352/353/354/355/356/357/358/359/360/361/362/363/364/365/366/367/368/369/370/371/372/373/374/375/376/377/378/379/380/381/382/383/384/385/386/387/388/389/390/391/392/393/394/395/396/397/398/399/400/401/402/403/404/405/406/407/408/409/410/411/412/413/414/415/416/417/418/419/420/421/422/423/424/425/426/427/428/429/430/431/432/433/434/435/436/437/438/439/440/441/442/443/444/445/446/447/448/449/450/451/452/453/454/455/456/457/458/459/460/461/462/463/464/465/466/467/468/469/470/471/472/473/474/475/476/477/478/479/480/481/482/483/484/485/486/487/488/489/490/491/492/493/494/495/496/497/498/499/500/501/502/503/504/505/506/507/508/509/510/511/512/513/514/515/516/517/518/519/520/521/522/523/524/525/526/527/528/529/530/531/532/533/534/535/536/537/538/539/540/541/542/543/544/545/546/547/548/549/550/551/552/553/554/555/556/557/558/559/560/561/562/563/564/565/566/567/568/569/570/571/572/573/574/575/576/577/578/579/580/581/582/583/584/585/586/587/588/589/590/591/592/593/594/595/596/597/598/599/600/601/602/603/604/605/606/607/608/609/610/611/612/613/614/615/616/617/618/619/620/621/622/623/624/625/626/627/628/629/630/631/632/633/634/635/636/637/638/639/640/641/642/643/644/645/646/647/648/649/650/651/652/653/654/655/656/657/658/659/660/661/662/663/664/665/666/667/668/669/670/671/672/673/674/675/676/677/678/679/680/681/682/683/684/685/686/687/688/689/690/691/692/693/694/695/696/697/698/699/700/701/702/703/704/705/706/707/708/709/710/711/712/713/714/715/716/717/718/719/720/721/722/723/724/725/726/727/728/729/730/731/732/733/734/735/736/737/738/739/740/741/742/743/744/745/746/747/748/749/750/751/752/753/754/755/756/757/758/759/760/761/762/763/764/765/766/767/768/769/770/771/772/773/774/775/776/777/778/779/780/781/782/783/784/785/786/787/788/789/790/791/792/793/794/795/796/797/798/799/800/801/802/803/804/805/806/807/808/809/810/811/812/813/814/815/816/817/818/819/820/821/822/823/824/825/826/827/828/829/830/831/832/833/834/835/836/837/838/839/840/841/842/843/844/845/846/847/848/849/850/851/852/853/854/855/856/857/858/859/860/861/862/863/864/865/866/867/868/869/870/871/872/873/874/875/876/877/878/879/880/881/882/883/884/885/886/887/888/889/890/891/892/893/894/895/896/897/898/899/900/901/902/903/904/905/906/907/908/909/910/911/912/913/914/915/916/917/918/919/920/921/922/923/924/925/926/927/928/929/930/931/932/933/934/935/936/937/938/939/940/941/942/943/944/945/946/947/948/949/950/951/952/953/954/955/956/957/958/959/960/961/962/963/964/965/966/967/968/969/970/971/972/973/974/975/976/977/978/979/980/981/982/983/984/985/986/987/988/989/990/991/992/993/994/995/996/997/998/999/1000/1001/1002/1003/1004/1005/1006/1007/1008/1009/1010/1011/1012/1013/1014/1015/1016/1017/1018/1019/1020/1021/1022/1023/1024/1025/1026/1027/1028/1029/1030/1031/1032/1033/1034/1035/1036/1037/1038/1039/1040/1041/1042/1043/1044/1045/1046/1047/1048/1049/1050/1051/1052/1053/1054/1055/1056/1057/1058/1059/1060/1061/1062/1063/1064/1065/1066/1067/1068/1069/1070/1071/1072/1073/1074/1075/1076/1077/1078/1079/1080/1081/1082/1083/1084/1085/1086/1087/1088/1089/1090/1091/1092/1093/1094/1095/1096/1097/1098/1099/1100/1101/1102/1103/1104/1105/1106/1107/1108/1109/1110/1111/1112/1113/1114/1115/1116/1117/1118/1119/1120/1121/1122/1123/1124/1125/1126/1127/1128/1129/1130/1131/1132/1133/1134/1135/1136/1137/1138/1139/1140/1141/1142/1143/1144/1145/1146/1147/1148/1149/1150/1151/1152/1153/1154/1155/1156/1157/1158/1159/1160/1161/1162/1163/1164/1165/1166/1167/1168/1169/1170/1171/1172/1173/1174/1175/1176/1177/1178/1179/1180/1181/1182/1183/1184/1185/1186/1187/1188/1189/1190/1191/1192/1193/1194/1195/1196/1197/1198/1199/1200/1201/1202/1203/1204/1205/1206/1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Result of calibration:

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
93.9 (10.94)	93.9	0.0	±0.3

2. Self-generated noise

Measured Value (dB)
15.4

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting (dB)	Weighting (dB)
A-weight	11.5
C-weight	17.5
Flat	23.6

3. Acoustical signal tests of frequency weighting

Mean free field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from reference frequency weighting response curve (dB)	Acceptance Limits (dB)
125	0.2	±1.5
1000	0.1	±1.5
6300	0.7	±5.0

4. Electrical signal tests of frequency weighting

Weighting network impedance with tolerance of ±1 dB

Frequency (Hz)	Flat	C-weight	A-weight	Acceptance Limits
125	0.0	0.0	0.0	±2.0
250	0.0	0.0	0.0	±2.0
500	0.0	0.0	0.0	±2.0
1000	0.0	0.0	0.0	±2.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±2.0
8000	0.0	0.1	0.1	±3.0

5. Frequency and time weighting at 1 kHz

5.1 Frequency weighting at 1 kHz

Frequency Weighting (dB)	Assumed Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.5
C-weight	94.0	94.0	0.0	±0.5
Flat	94.0	94.0	0.0	±0.5

5.2 Time weighting at 1 kHz

Frequency Weighting (dB)	Assumed Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.5
Slow	94.0	94.0	0.0	±0.5
Imp	94.0	94.0	0.0	±0.5

6. Long-term stability

Frequency Weighting (dB)	SLM Display at final (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.5

7. Level linearity on the reference level range

Assumed Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
117.0	117.0	0.0	±1.5
116.0	116.0	0.0	±1.5
115.0	115.0	0.0	±1.5
114.0	114.0	0.0	±1.5
113.0	113.0	0.0	±1.5
112.0	112.0	0.0	±1.5
111.0	111.0	0.0	±1.5
110.0	110.0	0.0	±1.5
109.0	109.0	0.0	±1.5
108.0	108.0	0.0	±1.5
107.0	107.0	0.0	±1.5
106.0	106.0	0.0	±1.5
105.0	105.0	0.0	±1.5
104.0	104.0	0.0	±1.5
103.0	103.0	0.0	±1.5
102.0	102.0	0.0	±1.5
101.0	101.0	0.0	±1.5
100.0	100.0	0.0	±1.5
99.0	99.0	0.0	±1.5
98.0	98.0	0.0	±1.5
97.0	97.0	0.0	±1.5
96.0	96.0	0.0	±1.5
95.0	95.0	0.0	±1.5
94.0	94.0	0.0	±1.5
93.0	93.0	0.0	±1.5
92.0	92.0	0.0	±1.5
91.0	91.0	0.0	±1.5
90.0	90.0	0.0	±1.5
89.0	89.0	0.0	±1.5
88.0	88.0	0.0	±1.5
87.0	87.0	0.0	±1.5
86.0	86.0	0.0	±1.5
85.0	85.0	0.0	±1.5
84.0	84.0	0.0	±1.5
83.0	83.0	0.0	±1.5
82.0	82.0	0.0	±1.5
81.0	81.0	0.0	±1.5
80.0	80.0	0.0	±1.5
79.0	79.0	0.0	±1.5
78.0	78.0	0.0	±1.5
77.0	77.0	0.0	±1.5
76.0	76.0	0.0	±1.5
75.0	75.0	0.0	±1.5
74.0	74.0	0.0	±1.5
73.0	73.0	0.0	±1.5
72.0	72.0	0.0	±1.5
71.0	71.0	0.0	±1.5
70.0	70.0	0.0	±1.5
69.0	69.0	0.0	±1.5
68.0	68.0	0.0	±1.5
67.0	67.0	0.0	±1.5
66.0	66.0	0.0	±1.5
65.0	65.0	0.0	±1.5
64.0	64.0	0.0	±1.5
63.0	63.0	0.0	±1.5
62.0	62.0	0.0	±1.5
61.0	61.0	0.0	±1.5
60.0	60.0	0.0	±1.5
59.0	59.0	0.0	±1.5
58.0	58.0	0.0	±1.5
57.0	57.0	0.0	±1.5
56.0	56.0	0.0	±1.5
55.0	55.0	0.0	±1.5
54.0	54.0	0.0	±1.5
53.0	53.0	0.0	±1.5
52.0	52.0	0.0	±1.5
51.0	51.0	0.0	±1.5
50.0	50.0	0.0	±1.5
49.0	49.0	0.0	±1.5
48.0	48.0	0.0	±1.5
47.0	47.0	0.0	±1.5
46.0	46.0	0.0	±1.5
45.0	45.0	0.0	±1.5
44.0	44.0	0.0	±1.5
43.0	43.0	0.0	±1.5
42.0	42.0	0.0	±1.5
41.0	41.0	0.0	±1.5
40.0	40.0	0.0	±1.5
39.0	39.0	0.0	±1.5
38.0	38.0	0.0	±1.5
37.0	37.0	0.0	±1.5
36.0	36.0	0.0	±1.5
35.0	35.0	0.0	±1.5
34.0	34.0	0.0	±1.5
33.0	33.0	0.0	±1.5
32.0	32.0	0.0	±1.5
31.0	31.0	0.0	±1.5
30.0	30.0	0.0	±1.5
29.0	29.0	0.0	±1.5
28.0	28.0	0.0	±1.5
27.0	27.0	0.0	±1.5
26.0	26.0	0.0	±1.5
25.0	25.0	0.0	±1.5
24.0	24.0	0.0	±1.5
23.0	23.0	0.0	±1.5
22.0	22.0	0.0	±1.5
21.0	21.0	0.0	±1.5
20.0	20.0	0.0	±1.5
19.0	19.0	0.0	±1.5
18.0	18.0	0.0	±1.5
17.0	17.0	0.0	±1.5
16.0	16.0	0.0	±1.5
15.0	15.0	0.0	±1.5
14.0	14.0	0.0	±1.5
13.0	13.0	0.0	±1.5
12.0	12.0	0.0	±1.5
11.0	11.0	0.0	±1.5
10.0	10.0	0.0	±1.5
9.0	9.0	0.0	±1.5
8.0	8.0	0.0	±1.5
7.0	7.0	0.0	±1.5
6.0	6.0	0.0	±1.5
5.0	5.0	0.0	±1.5
4.0	4.0	0.0	±1.5
3.0	3.0	0.0	±1.5
2.0	2.0	0.0	±1.5
1.0	1.0	0.0	±1.5
0.0	0.0	0.0	±1.5

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8. Level linearity including the level range control

Range	Assumed Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.5

Range	Assumed Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.5

9. Tone burst response

Time Weighting	Test tone duration, t ₀ (ms)	Cycle	Assumed Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.5	-0.5	±1.5
	2	4	117.0	117.0	0.0	±1.5
	200	400	134.0	134.0	0.0	±1.5
Slow	2	8	108.0	108.0	0.0	±1.5
	200	400	127.0	127.0	0.0	±1.5
	0.25	1	99.0	99.0	0.0	±1.5
SEL	2	8	108.0	108.0	0.0	±1.5
	200	400	126.0	126.0	0.0	±1.5

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor k = 2
or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

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Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by follow on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had been used in Acoustical and Electrical signal tests of frequency weighting with Acoustical chamber and Reference Standard Instruments.
For test results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	TF-0009-24	05-FEB-25
Waveform Generator	33511B	MY33202742	TF-0007-24	05-FEB-25
Digital Multimeter	34461A	MY3320104	TEL-RP-2140587	15-FEB-25
Digital Multimeter	34461A	MY3320076	TEL-RP-204067	15-FEB-25
Digital Multimeter	34461A	MY6020473	TEL-RP-224267	15-FEB-25
Programmable Attenuator	MAT-1030	62100114	AA-0006-24	05-FEB-25
Condenser Microphone	4180	2077960	AA-0011-24	12-FEB-25
Measuring Amplifier	NA-42KA	34504495	AA-0011-24	05-FEB-25

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

3. This certificate is traceable to the International system of unit maintained at :

1. National Institute of Metrology (Thailand).
2. Thailand Institute of Scientific and Technological Research (TISTR).

Summary of Measurement Result :

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty at measurement (dB)
1. Absolute sensitivity	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weighting	0.3	0.6
125 Hz	0.3	0.6
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weighting	0.3	0.6
For 10 Hz to 4 kHz	0.3	0.6
For 4 kHz to 19 kHz	0.3	0.7
For 10 kHz to 20 kHz	0.3	0.8
5. Frequency and time weighting at 1 kHz	0.2	0.2
A-weight	0.1	0.1
C-weight	0.2	0.2
6. Level linearity on the reference level range	0.2	0.3
7. Level linearity including the level range control	0.2	0.3
8. Tone burst response	0.2	0.3
9. Peak C sound level	0.2	0.31
10. Overload indication	0.2	0.23
11. High level stability	0.1	0.1

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
93.9 (10.94)	93.9	0.0	±0.3

2. Self-generated noise

Measured Value (dB)
14.8

2.2 The microphone of the sound level meter was replaced by electrical signal input device

Frequency Weighting (dB)	Weighting (dB)
A-weight	9.9
C-weight	15.9
Flat	22.0

3. Acoustical signal tests of frequency weighting

Mean free-field acoustic response at a level of 94 dB

Frequency (Hz)	Deviation from reference frequency weighting response curve (dB)	Acceptance Limits (dB)
125	0.2	±1.5
1000	0.1	±1.5
6300	0.7	±5.0

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz.)	Deviation from various frequency weighting response curve (dB)			
	Filt	C-weight	A-weight	Acceptance Limits
63	-0.1	-0.1	0.0	±2.0
125	0.0	0.0	0.0	±1.5
250	0.0	0.0	0.0	±1.5
500	0.0	0.0	0.0	±1.5
1000	0.0	0.0	0.0	±1.0
2000	0.0	0.0	0.0	±2.0
4000	0.0	0.0	0.0	±3.0
8000	0.0	0.1	0.1	±2.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.2
C-weight	94.0	94.0	0.0	±0.2
Flat	94.0	94.0	0.0	±0.2

5.2 Time weightings at 1 kHz

Frequency Weighting	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	94.0	0.0	±0.1
Slow	94.0	94.0	0.0	±0.1
Long	94.0	94.0	0.0	±0.1

6. Long-term stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	94.0	94.0	0.0	±0.3

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Exptl (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	130.0	130.0	0.0	±5.0
One	133.4	133.4	0.0	±5.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	±2.0
Positive half cycle	133.4	133.2	-0.2	±2.0
Negative half cycle	133.4	133.2	-0.2	±2.0

11. Overload indication

Measured value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	-0.5	±1.5
Negative one-half cycle	-0.5	±1.5

12. High level stability

Frequency Weighting	SLM Display at start (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A-weight	137.0	137.0	0.0	±0.3

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

End of Calibration Certificate

Summary of Measurement Result:

Parameter	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute uncertainty	0.2	N/A
2. Self-generated noise	0.2	N/A
3. Acoustical signal tests of frequency weightings		
125 Hz	0.3	0.8
1000 Hz	0.3	0.6
8000 Hz	0.3	0.7
4. Electrical signal tests of frequency weightings		
For 10 Hz to 8 kHz	0.3	0.6
For 8 kHz to 10 kHz	0.3	0.7
For 10 kHz to 20 kHz	0.3	1.0
5. Frequency and time weightings at 1 kHz	0.2	0.2
6. Long-term stability	0.1	0.1
7. Level Uncertainty on the reference level range	0.2	0.3
8. Level Uncertainty including the level range covered	0.2	0.3
9. Time burst response	0.2	0.3
10. Peak C sound level	0.2	0.3
11. Overload indication	0.2	0.3
12. High level stability	0.1	0.1

7. Level Uncertainty on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
130.0	130.0	0.0	±1.1
129.0	129.0	0.0	±1.1
128.0	128.0	0.0	±1.1
127.0	127.0	0.0	±1.1
126.0	126.0	0.0	±1.1
125.0	125.0	0.0	±1.1
124.0	124.0	0.0	±1.1
123.0	123.0	0.0	±1.1
122.0	122.0	0.0	±1.1
121.0	121.0	0.0	±1.1
120.0	120.0	0.0	±1.1
119.0	119.0	0.0	±1.1
118.0	118.0	0.0	±1.1
117.0	117.0	0.0	±1.1
116.0	116.0	0.0	±1.1
115.0	115.0	0.0	±1.1
114.0	114.0	0.0	±1.1
113.0	113.0	0.0	±1.1
112.0	112.0	0.0	±1.1
111.0	111.0	0.0	±1.1
110.0	110.0	0.0	±1.1
109.0	109.0	0.0	±1.1
108.0	108.0	0.0	±1.1
107.0	107.0	0.0	±1.1
106.0	106.0	0.0	±1.1
105.0	105.0	0.0	±1.1
104.0	104.0	0.0	±1.1
103.0	103.0	0.0	±1.1
102.0	102.0	0.0	±1.1
101.0	101.0	0.0	±1.1
100.0	100.0	0.0	±1.1
99.0	99.0	0.0	±1.1
98.0	98.0	0.0	±1.1
97.0	97.0	0.0	±1.1
96.0	96.0	0.0	±1.1
95.0	95.0	0.0	±1.1
94.0	94.0	0.0	±1.1
93.0	93.0	0.0	±1.1
92.0	92.0	0.0	±1.1
91.0	91.0	0.0	±1.1
90.0	90.0	0.0	±1.1
89.0	89.0	0.0	±1.1
88.0	88.0	0.0	±1.1
87.0	87.0	0.0	±1.1
86.0	86.0	0.0	±1.1
85.0	85.0	0.0	±1.1
84.0	84.0	0.0	±1.1
83.0	83.0	0.0	±1.1
82.0	82.0	0.0	±1.1
81.0	81.0	0.0	±1.1
80.0	80.0	0.0	±1.1
79.0	79.0	0.0	±1.1
78.0	78.0	0.0	±1.1
77.0	77.0	0.0	±1.1
76.0	76.0	0.0	±1.1
75.0	75.0	0.0	±1.1
74.0	74.0	0.0	±1.1
73.0	73.0	0.0	±1.1
72.0	72.0	0.0	±1.1
71.0	71.0	0.0	±1.1
70.0	70.0	0.0	±1.1
69.0	69.0	0.0	±1.1
68.0	68.0	0.0	±1.1
67.0	67.0	0.0	±1.1
66.0	66.0	0.0	±1.1
65.0	65.0	0.0	±1.1
64.0	64.0	0.0	±1.1
63.0	63.0	0.0	±1.1
62.0	62.0	0.0	±1.1
61.0	61.0	0.0	±1.1
60.0	60.0	0.0	±1.1
59.0	59.0	0.0	±1.1
58.0	58.0	0.0	±1.1
57.0	57.0	0.0	±1.1
56.0	56.0	0.0	±1.1
55.0	55.0	0.0	±1.1
54.0	54.0	0.0	±1.1
53.0	53.0	0.0	±1.1
52.0	52.0	0.0	±1.1
51.0	51.0	0.0	±1.1
50.0	50.0	0.0	±1.1
49.0	49.0	0.0	±1.1
48.0	48.0	0.0	±1.1
47.0	47.0	0.0	±1.1
46.0	46.0	0.0	±1.1
45.0	45.0	0.0	±1.1
44.0	44.0	0.0	±1.1
43.0	43.0	0.0	±1.1
42.0	42.0	0.0	±1.1
41.0	41.0	0.0	±1.1
40.0	40.0	0.0	±1.1
39.0	39.0	0.0	±1.1
38.0	38.0	0.0	±1.1
37.0	37.0	0.0	±1.1
36.0	36.0	0.0	±1.1
35.0	35.0	0.0	±1.1
34.0	34.0	0.0	±1.1
33.0	33.0	0.0	±1.1
32.0	32.0	0.0	±1.1
31.0	31.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.0	0.0	±1.1
28.0	28.0	0.0	±1.1
27.0	27.0	0.0	±1.1
26.0	26.0	0.0	±1.1
25.0	25.0	0.0	±1.1
24.0	24.0	0.0	±1.1
23.0	23.0	0.0	±1.1
22.0	22.0	0.0	±1.1
21.0	21.0	0.0	±1.1
20.0	20.0	0.0	±1.1
19.0	19.0	0.0	±1.1
18.0	18.0	0.0	±1.1
17.0	17.0	0.0	±1.1
16.0	16.0	0.0	±1.1
15.0	15.0	0.0	±1.1
14.0	14.0	0.0	±1.1
13.0	13.0	0.0	±1.1
12.0	12.0	0.0	±1.1
11.0	11.0	0.0	±1.1
10.0	10.0	0.0	±1.1
9.0	9.0	0.0	±1.1
8.0	8.0	0.0	±1.1
7.0	7.0	0.0	±1.1
6.0	6.0	0.0	±1.1
5.0	5.0	0.0	±1.1
4.0	4.0	0.0	±1.1
3.0	3.0	0.0	±1.1
2.0	2.0	0.0	±1.1
1.0	1.0	0.0	±1.1
0.0	0.0	0.0	±1.1

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : EON
Model : NL-42 / Microphone UC-52 / Preamp der H91-24
Serial No. : 00207143 / 145046 / 181208
ID No. : BEK FS0998

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
194 PHATTHANAKAN RD, PHATTHANAKAN ROAD,
KUTWAENG PHATTHANAKAN, KHUET SAN LUANG,
BANGKOK, 10150 THAILAND.

Location :
Ambient Temperature : (23.0 ± 1) °C
Pressure : (1013.1 ± 1) hPa
Relative Humidity : (50.0 ± 7.0) %

Received Date : 05 NOVEMBER 2024
Calibration Date : 14-18 NOVEMBER 2024
Date of Issue : 18 NOVEMBER 2024

Calibrated by : Nithakorn Pichasri

Approved by : T. Pichasri
(Thasak Pichasri)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced
other than in full, except with the prior written approval of the head of Calibration Laboratory.

8. Level Uncertainty including the level range covered

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	94.0	94.0	0.0	±1.1

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
130	29.0	29.0	0.0	±1.1

9. Time burst response

Time Weighting	Time burst duration, Ts (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.3, 0.9
	2	8	117.0	117.0	0.0	1.0, -2.5
	200	500	134.0	134.0	0.0	±0.0
Slow	2	8	108.0	108.0	0.0	1.3, 0.9
	200	500	134.0	134.0	0.0	±0.0
	2	8	108.0	108.0	0.0	1.3, 0.9
SPL	0.25	1	99.0	98.9	-0.1	1.3, 0.9
	2	8	108.0	108.0	0.0	1.0, 2.5
	200	500	134.0	134.0	0.0	±0.0

Calibration Procedure : CP-AC-01

Calibration Method:

The equipment was calibrated by follow up IEC 61672-3 (2013) Standard for sound level meter (SLM).
The SLM had been at Associated and National metrology tests of frequency weighting with Acoustic chamber and Reference
Standard Instruments.
For tests results of each item were made by observation of each instrument display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	83710A	MY48017076	EF-0009-24	05-FEB-25
Waveform Generator	33511B	MY52802742	EF-0007-24	05-FEB-25
Digital Multimeter	33441A	MY53220194	FEEL-0012-24	13-EUN-25
Digital Multimeter	33441A	MY53220076	FEEL-0012-24	13-EUN-25
Digital Multimeter	33441A	MY53220076	FEEL-0012-24	13-EUN-25
Programmable Attenuator	MA1-1870	02100114	EF-0008-24	05-FEB-25
Condenser Microphone	4180	2977900	AA-001-24	12-FEB-25
Measuring Amplifier	NA-426A1	34560495	AA-001-24	09-FEB-25

Service Information:

Problem Description:
[Blank]
Service Period:
[Blank]
Equipment ID: [Blank]
Equipment No: [Blank]

Service Overview Code:
[Blank]
Service Code: [Blank]
Technician Code: [Blank]

Reported Issue:
[Blank]
Travel Hours:
[Blank]
Customer Field Service Representative Name:
[Blank]
Customer Name:
[Blank]
Customer Address:
[Blank]

ALB Laboratory Group (Thailand) Co., Ltd.
154 Phrasarad Road, Phrasarad, Bangkok 10110
T +66 2 760 1000 F +66 2 760 1100

Certificate of Calibration

Certificate No.: C-123024-001-170025

Air Sampling Pump Detail

Equipment name: Personal Air Sampling Pump
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00100
Serial No.: 2010010004
Calibration Date: 12-May-25
Next calibration date: 12-Aug-25

Reference Standard Low Flow Meter

Equipment name: Air Flow Meter
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00114
Serial No.: 151114
Calibration Date: 8-Sep-24
Due Date: 8-Sep-25

Reference Standard High Flow Meter

Equipment name: Air Flow Meter
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00119
Serial No.: 130020
Calibration Date: 8-Sep-24
Due Date: 8-Sep-25

Calibration Data

Air Sampling Pump setting (mL/min)	Reference Std. Flow Reading (mL/min)			Avg. (mL/min)	% Error acceptance	Acceptable range (mL/min)	Evaluation (Pass/Fail)
	1	2	3				
Low Flow							
20	20.3	20.4	20.2	20.3	0%	19 - 21	Passed
50	49.8	50.1	50.7	50.2	0%	48 - 52	Passed
100	100.8	100.5	100.0	100.4	0%	99 - 101	Passed
200	200.3	201.9	201.5	201.2	0%	199 - 202	Passed
High Flow							
500	506.3	502.1	504.9	504.4	0%	495 - 515	Passed
1000	1002.0	1002.9	1002.1	1002.0	0%	970 - 1030	Passed
1500	1500.1	1499.4	1501.2	1500.2	0%	1460 - 1540	Passed
2000	2000.1	2004.5	2002.8	2002.5	0%	1940 - 2060	Passed
2500	2500.3	2495.9	2492.3	2496.1	0%	2425 - 2575	Passed

END OF REPORT

Calibrated By: [Signature]
(Mr. Jassada Kongkarnthai)
NQA Field Services Specialist (2)

Approved By: [Signature]
(Mr. Witsorn Promrak)
Field Services Supervisor

Issue date: 13-May-25

ALB Laboratory Group (Thailand) Co., Ltd.
154 Phrasarad Road, Phrasarad, Bangkok 10110
T +66 2 760 1000 F +66 2 760 1100

Certificate of Calibration

Certificate No.: C-123024-001-170025

Air Sampling Pump Detail

Equipment name: Personal Air Sampling Pump
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00100
Serial No.: 2010010004
Calibration Date: 12-May-25
Next calibration date: 12-Aug-25

Reference Standard Low Flow Meter

Equipment name: Air Flow Meter
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00114
Serial No.: 151114
Calibration Date: 8-Sep-24
Due Date: 8-Sep-25

Reference Standard High Flow Meter

Equipment name: Air Flow Meter
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00119
Serial No.: 130020
Calibration Date: 8-Sep-24
Due Date: 8-Sep-25

Calibration Data

Air Sampling Pump setting (mL/min)	Reference Std. Flow Reading (mL/min)			Avg. (mL/min)	% Error acceptance	Acceptable range (mL/min)	Evaluation (Pass/Fail)
	1	2	3				
Low Flow							
20	20.2	20.5	20.1	20.3	0%	19 - 21	Passed
50	49.8	50.3	50.2	50.4	0%	48 - 52	Passed
100	100.8	101.4	101.1	101.2	0%	99 - 101	Passed
200	201.2	201.0	202.8	201.6	0%	199 - 203	Passed
High Flow							
500	504.4	504.3	504.2	504.3	0%	495 - 515	Passed
1000	1000.8	1000.2	1002.5	1001.2	0%	970 - 1030	Passed
1500	1500.1	1500.4	1502.8	1501.1	0%	1460 - 1540	Passed
2000	2000.1	2004.5	2002.8	2002.5	0%	1940 - 2060	Passed
2500	2500.3	2495.9	2492.3	2496.1	0%	2425 - 2575	Passed

END OF REPORT

Calibrated By: [Signature]
(Mr. Jassada Kongkarnthai)
NQA Field Services Specialist (2)

Approved By: [Signature]
(Mr. Witsorn Promrak)
Field Services Supervisor

Issue date: 13-May-25

ALB Laboratory Group (Thailand) Co., Ltd.
154 Phrasarad Road, Phrasarad, Bangkok 10110
T +66 2 760 1000 F +66 2 760 1100

Certificate of Calibration

Certificate No.: C-123024-001-170025

Air Sampling Pump Detail

Equipment name: Personal Air Sampling Pump
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00100
Serial No.: 2010010004
Calibration Date: 12-May-25
Next calibration date: 12-Aug-25

Reference Standard Low Flow Meter

Equipment name: Air Flow Meter
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00114
Serial No.: 151114
Calibration Date: 8-Sep-24
Due Date: 8-Sep-25

Reference Standard High Flow Meter

Equipment name: Air Flow Meter
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00119
Serial No.: 130020
Calibration Date: 8-Sep-24
Due Date: 8-Sep-25

Calibration Data

Air Sampling Pump setting (mL/min)	Reference Std. Flow Reading (mL/min)			Avg. (mL/min)	% Error acceptance	Acceptable range (mL/min)	Evaluation (Pass/Fail)
	1	2	3				
Low Flow							
20	20.3	20.5	20.1	20.3	0%	19 - 21	Passed
50	49.8	50.3	50.2	50.4	0%	48 - 52	Passed
100	100.8	100.5	100.0	100.4	0%	99 - 101	Passed
200	200.3	201.9	201.5	201.2	0%	199 - 202	Passed
High Flow							
500	506.3	502.1	504.9	504.4	0%	495 - 515	Passed
1000	1006.1	1006.5	1010.7	1007.8	0%	970 - 1030	Passed
1500	1500.1	1504.5	1502.8	1502.5	0%	1460 - 1540	Passed
2000	2000.3	2000.9	2000.8	2000.7	0%	1940 - 2060	Passed
2500	2500.3	2502.4	2500.8	2501.2	0%	2425 - 2575	Passed

END OF REPORT

Calibrated By: [Signature]
(Mr. Jassada Kongkarnthai)
NQA Field Services Specialist (2)

Approved By: [Signature]
(Mr. Witsorn Promrak)
Field Services Supervisor

Issue date: 13-May-25

ALB Laboratory Group (Thailand) Co., Ltd.
154 Phrasarad Road, Phrasarad, Bangkok 10110
T +66 2 760 1000 F +66 2 760 1100

Certificate of Calibration

Certificate No.: C-123024-001-170025

Air Sampling Pump Detail

Equipment name: Personal Air Sampling Pump
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00100
Serial No.: 2010010004
Calibration Date: 12-May-25
Next calibration date: 12-Aug-25

Reference Standard Low Flow Meter

Equipment name: Air Flow Meter
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00114
Serial No.: 151114
Calibration Date: 8-Sep-24
Due Date: 8-Sep-25

Reference Standard High Flow Meter

Equipment name: Air Flow Meter
Brand: [Blank]
Model Type: [Blank]
Equipment ID: BNC_F00119
Serial No.: 130020
Calibration Date: 8-Sep-24
Due Date: 8-Sep-25

Calibration Data

Air Sampling Pump setting (mL/min)	Reference Std. Flow Reading (mL/min)			Avg. (mL/min)	% Error acceptance	Acceptable range (mL/min)	Evaluation (Pass/Fail)
	1	2	3				
Low Flow							
20	20.8	20.8	20.7	20.8	0%	19 - 21	Passed
50	49.8	49.5	50.2	49.8	0%	48 - 52	Passed
100	100.5	100.4	100.8	100.6	0%	99 - 101	Passed
200	201.2	200.9	200.4	200.8	0%	199 - 202	Passed
High Flow							
500	505.9	505.8	499.2	502.2	0%	495 - 515	Passed
1000	1002.1	1001.2	1001.8	1001.6	0%	970 - 1030	Passed
1500	1503.7	1503.9	1503.9	1503.8	0%	1460 - 1540	Passed
2000	2000.3	2000.9	2000.8	2000.7	0%	1940 - 2060	Passed
2500	2500.3	2500.9	2499.4	2500.9	0%	2425 - 2575	Passed

END OF REPORT

Calibrated By: [Signature]
(Mr. Jassada Kongkarnthai)
NQA Field Services Specialist (2)

Approved By: [Signature]
(Mr. Witsorn Promrak)
Field Services Supervisor

Issue date: 13-May-25

ALB Laboratory Group (Thailand) Co., Ltd.
154 Phrasarad Road, Phrasarad, Bangkok 10110
T +66 2 760 1000 F +66 2 760 1100

Certificate of Calibration

ICS-2100: Anion (ID#659)

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

ICS-2100 S/N: 15010977
AS-HV S/N: 5450A36659

For
ALS Laboratory Group (Thailand) Co., Ltd.

Operator Signature: [Signature]
(Mr. Nuchanai Lachbuan)

Date: Jan 12, 2024

Application Chemist

J NAC
NAC - TSP - 175.0025
CALIBRATION 6367

CERTIFICATE OF CALIBRATION

Certificate No.: C-123024-001-170025

MEASUREMENT ITEM
MEASUREMENT: [Blank]
SERIAL NUMBER: [Blank]
CUSTOMER: [Blank]

RECEIVED DATE
[Blank]

ENVIRONMENTAL CONDITIONS
Temperature: [Blank]
Humidity: [Blank]

QUALIFICATION OF RESULTS
[Blank]

Calibration Data

Measurement Depth (mm)	Standard Reading (mm)	U.S.C. Reading (mm)	Error (mm)	Acceptance (mm)
10	10.00	10.00	0.00	0.00
20	20.00	20.00	0.00	0.00
30	30.00	30.00	0.00	0.00
40	40.00	40.00	0.00	0.00
50	50.00	50.00	0.00	0.00

END OF REPORT

Calibrated By: [Signature]
(Mr. Jassada Kongkarnthai)
NQA Field Services Specialist (2)

Approved By: [Signature]
(Mr. Witsorn Promrak)
Field Services Supervisor

Issue date: 13-May-25

J NAC
NAC - TSP - 175.0025
CALIBRATION 6367

CERTIFICATE OF CALIBRATION

Certificate No.: C-123024-001-170025

MEASUREMENT ITEM
MEASUREMENT: [Blank]
SERIAL NUMBER: [Blank]
CUSTOMER: [Blank]

RECEIVED DATE
[Blank]

ENVIRONMENTAL CONDITIONS
Temperature: [Blank]
Humidity: [Blank]

QUALIFICATION OF RESULTS
[Blank]

Calibration Data

Measurement Depth (mm)	Standard Reading (mm)	U.S.C. Reading (mm)	Error (mm)	Acceptance (mm)
10	10.00	10.00	0.00	0.00
20	20.00	20.00	0.00	0.00
30	30.00	30.00	0.00	0.00
40	40.00	40.00	0.00	0.00
50	50.00	50.00	0.00	0.00

END OF REPORT

Calibrated By: [Signature]
(Mr. Jassada Kongkarnthai)
NQA Field Services Specialist (2)

Approved By: [Signature]
(Mr. Witsorn Promrak)
Field Services Supervisor

Issue date: 13-May-25

J NAC
NAC - TSP - 175.0025
CALIBRATION 6367

CERTIFICATE OF CALIBRATION

Certificate No.: C-123024-001-170025

MEASUREMENT ITEM
MEASUREMENT: [Blank]
SERIAL NUMBER: [Blank]
CUSTOMER: [Blank]

RECEIVED DATE
[Blank]

ENVIRONMENTAL CONDITIONS
Temperature: [Blank]
Humidity: [Blank]

QUALIFICATION OF RESULTS
[Blank]

Calibration Data

Measurement Depth (mm)	Standard Reading (mm)	U.S.C. Reading (mm)	Error (mm)	Acceptance (mm)
10	10.00	10.00	0.00	0.00
20	20.00	20.00	0.00	0.00
30	30.00	30.00	0.00	0.00
40	40.00	40.00	0.00	0.00
50	50.00	50.00	0.00	0.00

END OF REPORT

Calibrated By: [Signature]
(Mr. Jassada Kongkarnthai)
NQA Field Services Specialist (2)

Approved By: [Signature]
(Mr. Witsorn Promrak)
Field Services Supervisor

Issue date: 13-May-25

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

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BY WRITING FROM THE LABORATORY

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

Accredited Institution on Laboratory
SCITEC 102-007
NAC 100-03-2007
CAL/067937 (a)

Corporate Headquarters Ltd
11011, 11012, 11013, 11014
Tel: 03-591-11011
Fax: 03-591-11014
E-mail: info@nac.org.sg
Website: www.nac.org.sg
Unit 11011, 11012, 11013, 11014
11011, 11012, 11013, 11014

Accredited Calibration Laboratory
Calibration services and equipment

Calibration services Member

0204-01-02

CALIBRATION REPORT

Page 1 of 5 Pages

MEASUREMENT ITEM

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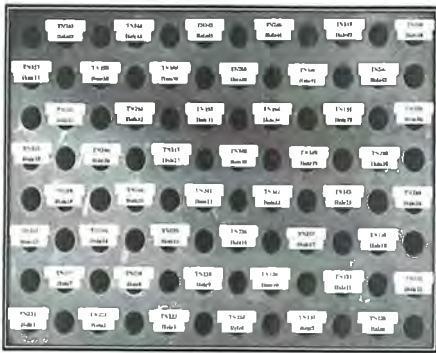
[illegible][illegible]



Certificate No. T250355

Page 3 of 6

Calibration Report



FRONT CONTROL

Approved By: *[Signature]*

FILE:13100000-17



Certificate No. T250355

Page 4 of 6

Calibration Report

Measurement Results		Average Standard Reading at each position (°C)									
Calibration Point		TN218	TN219	TN220	TN221	TN222	TN223	TN224	TN225	TN226	TN227
R1 Hole1-Hole6	Max	18.82	18.87	18.93	18.98	19.03	19.08	19.13	19.18	19.23	19.28
	Min	18.77	18.82	18.87	18.92	18.97	19.02	19.07	19.12	19.17	19.22
	Average	18.80	18.85	18.90	18.95	19.00	19.05	19.10	19.15	19.20	19.25
R2 Hole7-Hole12	Max	18.93	18.98	19.03	19.08	19.13	19.18	19.23	19.28	19.33	19.38
	Min	18.88	18.93	18.98	19.03	19.08	19.13	19.18	19.23	19.28	19.33
	Average	18.91	18.96	19.01	19.06	19.11	19.16	19.21	19.26	19.31	19.36
R3 Hole13-Hole18	Max	19.03	19.08	19.13	19.18	19.23	19.28	19.33	19.38	19.43	19.48
	Min	18.98	19.03	19.08	19.13	19.18	19.23	19.28	19.33	19.38	19.43
	Average	19.01	19.06	19.11	19.16	19.21	19.26	19.31	19.36	19.41	19.46
R4 Hole19-Hole24	Max	19.13	19.18	19.23	19.28	19.33	19.38	19.43	19.48	19.53	19.58
	Min	19.08	19.13	19.18	19.23	19.28	19.33	19.38	19.43	19.48	19.53
	Average	19.11	19.16	19.21	19.26	19.31	19.36	19.41	19.46	19.51	19.56
R5 Hole25-Hole30	Max	19.23	19.28	19.33	19.38	19.43	19.48	19.53	19.58	19.63	19.68
	Min	19.18	19.23	19.28	19.33	19.38	19.43	19.48	19.53	19.58	19.63
	Average	19.21	19.26	19.31	19.36	19.41	19.46	19.51	19.56	19.61	19.66
R6 Hole31-Hole36	Max	19.33	19.38	19.43	19.48	19.53	19.58	19.63	19.68	19.73	19.78
	Min	19.28	19.33	19.38	19.43	19.48	19.53	19.58	19.63	19.68	19.73
	Average	19.31	19.36	19.41	19.46	19.51	19.56	19.61	19.66	19.71	19.76
R7 Hole37-Hole42	Max	19.43	19.48	19.53	19.58	19.63	19.68	19.73	19.78	19.83	19.88
	Min	19.38	19.43	19.48	19.53	19.58	19.63	19.68	19.73	19.78	19.83
	Average	19.41	19.46	19.51	19.56	19.61	19.66	19.71	19.76	19.81	19.86
R8 Hole43-Hole48	Max	19.53	19.58	19.63	19.68	19.73	19.78	19.83	19.88	19.93	19.98
	Min	19.48	19.53	19.58	19.63	19.68	19.73	19.78	19.83	19.88	19.93
	Average	19.51	19.56	19.61	19.66	19.71	19.76	19.81	19.86	19.91	19.96

Approved By: *[Signature]*

FILE:13100000-17



Certificate No. T250355

Page 6 of 6

Calibration Report

HEATING BLOCK		Temperature Distribution	
Setting (°C)	Reading (°C)	Stability (°C)	Uniformity (°C)
	Min, Max, Average		
180.0	180.0, 180.0, 180.0	0.01	0.01
190.0	190.0, 190.0, 190.0	0.01	0.01

* The quoted uncertainty exclude ± uncertainty *

The calibration result apply only the above calibration item.

The result of test is based on average of three test results.

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

Approved By: *[Signature]*

FILE:13100000-17

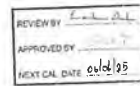


Certificate No. T23160

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cooling Room)
Manufacturer : KOLDFECH
Model : KM 320
Serial No. : TBN-1012061.05
Customer Code : BKK_EN0167
ID No. : T2463A3
Customer : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phantananakorn 40, Phantananakorn Rd., Klongsue Phantananakorn
Khai Suan Luang, Bangkok 10250
Customer Location : Laboratory
Date of Receipt : 29 November 2023
Calibrated By : Anipong Rengrai (Technician)
Approved By: *[Signature]* / B-onchai Suriyawang (Site Calibration Manager)
Date of Issue : 09 JAN 2024



The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its compliance to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.

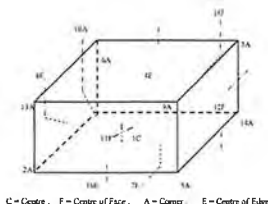
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Certificate No. T23160

Page 3 of 4

Calibration Report



C = Center, F = Centre of Face, A = Corner, E = Centre of Edge

1C = TN101	12F = TN172
2A = TN102	13A = TN173
3A = TN103	14A = TN174
4F = TN104	15F = TN175
5A = TN105	16A = TN176
6A = TN106	17F = TN177
7F = TN107	18A = TN178
8F = TN108	19A = TN179
9A = TN109	20A = TN180
10A = TN110	21F = TN181
11F = TN111	

Approved By: *[Signature]*

FILE:13100000-17



Certificate No. T23160

Page 4 of 4

Calibration Report

Measurement Results		Average Standard Reading at each position (°C)									
Calibration Point		TN101	TN102	TN103	TN104	TN105	TN106	TN107	TN108	TN109	TN110
1.0	Max	2.01	2.04	2.07	2.10	2.13	2.16	2.19	2.22	2.25	2.28
	Min	1.99	2.02	2.05	2.08	2.11	2.14	2.17	2.20	2.23	2.26
	Average	2.00	2.03	2.06	2.09	2.12	2.15	2.18	2.21	2.24	2.27
2.0	Max	2.31	2.34	2.37	2.40	2.43	2.46	2.49	2.52	2.55	2.58
	Min	2.29	2.32	2.35	2.38	2.41	2.44	2.47	2.50	2.53	2.56
	Average	2.30	2.33	2.36	2.39	2.42	2.45	2.48	2.51	2.54	2.57

The calibration result apply only the above calibration item.

The result of test is based on average of three test results.

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

Approved By: *[Signature]*

FILE:13100000-17



Certificate No. T23160

Page 5 of 6

Calibration Report

Measurement Results		Average Standard Reading at each position (°C)									
Calibration Point		TN218	TN219	TN220	TN221	TN222	TN223	TN224	TN225	TN226	TN227
R1 Hole1-Hole6	Max	18.82	18.87	18.93	18.98	19.03	19.08	19.13	19.18	19.23	19.28
	Min	18.77	18.82	18.87	18.92	18.97	19.02	19.07	19.12	19.17	19.22
	Average	18.80	18.85	18.90	18.95	19.00	19.05	19.10	19.15	19.20	19.25
R2 Hole7-Hole12	Max	18.93	18.98	19.03	19.08	19.13	19.18	19.23	19.28	19.33	19.38
	Min	18.88	18.93	18.98	19.03	19.08	19.13	19.18	19.23	19.28	19.33
	Average	18.91	18.96	19.01	19.06	19.11	19.16	19.21	19.26	19.31	19.36
R3 Hole13-Hole18	Max	19.03	19.08	19.13	19.18	19.23	19.28	19.33	19.38	19.43	19.48
	Min	18.98	19.03	19.08	19.13	19.18	19.23	19.28	19.33	19.38	19.43
	Average	19.01	19.06	19.11	19.16	19.21	19.26	19.31	19.36	19.41	19.46
R4 Hole19-Hole24	Max	19.13	19.18	19.23	19.28	19.33	19.38	19.43	19.48	19.53	19.58
	Min	19.08	19.13	19.18	19.23	19.28	19.33	19.38	19.43	19.48	19.53
	Average	19.11	19.16	19.21	19.26	19.31	19.36	19.41	19.46	19.51	19.56
R5 Hole25-Hole30	Max	19.23	19.28	19.33	19.38	19.43	19.48	19.53	19.58	19.63	19.68
	Min	19.18	19.23	19.28	19.33	19.38	19.43	19.48	19.53	19.58	19.63
	Average	19.21	19.26	19.31	19.36	19.41	19.46	19.51	19.56	19.61	19.66
R6 Hole31-Hole36	Max	19.33	19.38	19.43	19.48	19.53	19.58	19.63	19.68	19.73	19.78
	Min	19.28	19.33	19.38	19.43	19.48	19.53	19.58	19.63	19.68	19.73
	Average	19.31	19.36	19.41	19.46	19.51	19.56	19.61	19.66	19.71	19.76
R7 Hole37-Hole42	Max	19.43	19.48	19.53	19.58	19.63	19.68	19.73	19.78	19.83	19.88
	Min	19.38	19.43	19.48	19.53	19.58	19.63	19.68	19.73	19.78	19.83
	Average	19.41	19.46	19.51	19.56	19.61	19.66	19.71	19.76	19.81	19.86
R8 Hole43-Hole48	Max	19.53	19.58	19.63	19.68	19.73	19.78	19.83	19.88	19.93	19.98
	Min	19.48	19.53	19.58	19.63	19.68	19.73	19.78	19.83	19.88	19.93
	Average	19.51	19.56	19.61	19.66	19.71	19.76	19.81	19.86	19.91	19.96

Approved By: *[Signature]*

FILE:13100000-17



Certificate No. T23160

Page 2 of 4

Calibration Report

Equipment : Chamber (Cooling Room)
Date of Calibration : 6 December 2023
Environment : Temperature : 23.4-24.9 °C
Line Voltage : 221.4-230.2 V
Relative Humidity : 55-65 % RH

Condition of this result of calibration:

1. This equipment was calibrated by using 16 standard thermocouples type T and in chamber, the other one standard thermocouples type T use for ambient temperature measurement. The calibration was done in accordance to NIST-720 (based on ASTM E143-94 (Reapproved 2011) and AS2533-1996).

All data shown below were final values and the actual data from customer request. The temperature scale used was based on ITS-90.

2. Reference Standard Instruments

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN101-TN170	T230773	10 April 2024
TC	TYPE T	TN171-TN180	T230773	10 April 2024
DATA LOGGER	34970A	T249	T230773	10 April 2024

3. This certificate is traceable to: National Institute of Metrology (Thailand) through Metrology Center (NSC-TISI-TIS 17025 CALIBRATION 0244)

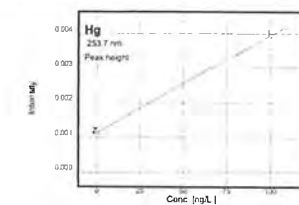
Serial No.: 701 739

Discussion

analytikjena
für (re)marketing und mehr

12/12/2024 11:37 Page 3/4

Calibration function 1		12/12/2024 13:31 Calibration (Peak height)
Abs=x1*x2+conc		
x1=0.001335 x2=0.000028		Recal. factor: —
Slope	0.00003 Abg/(ng/L)	R2-adjusted 1.0000
std	1.00000 ng/L	Charent. conc. 154.566 (ng/L),1%
Lower limit	0 ng/L	Upper limit
Detection limit		Detecr. limit 110. ng/L



Calibration settings		IG Noise factor	Off
Cals. meth.	Standard cals.	IG cal.	10%
No standards	1	Conversion fac	1/1000000
Type of standards		Standard prep	Preprogram
		Bkcal correct	
Output unit	10 ¹⁰	Recalc std no	
Calo stat.	Mean	Conversion fac	1000
		Mean cycles	
Stock sol 1		Bkcal cycles	1
Stock sol 2		Stock sol 2	
Stock sol 3		Stock sol 4	
Type of cal. curve	Linear	Intercept	calibrated
Weighted cal.	off	Grubbs stat	off
Check of cal. curve	no outlier test		
Sample statistics			
Stat. mode	Mean	Mean cycles	1
Conflct. level	95.4 %	Mean cycles	2

Measurements and events (sorted by time)							
IQ	W/Root Intensity / Abs / FBR 150 ng/mL PM 24052023				12/02/2024	11	8
IQ	Conc.	Abs	BS	SD	RSD-%	Int. type	Time
Cal-Zero		0.000002				P/Nt	13.19
		0.000029					13.19
		0.000096					13.22
	100 ng/L	0.001126		0.000064005	5.666		13.22
Cal-Six		0.000493				P/Nt	13.26
		0.000490					13.27
		0.000832					13.30
	100 ng/L	0.000950		0.00011525	2.402		13.26
Calibration	Calibration function: 01						13.31

No	Name	State	Ppt	Calc./ mg/L	Obs	SD	RSD%
1	Cal-Zen	(-)	75	0.00	H. 6.091129 A. 0.037754	8.000086 0.004330	7.666 11.03
2	Cal-Sta1	(-)	81	100.00	H. 0.053950 A. 0.075560	9.900113 0.004290	2.393 0.281

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & INSTITUTE CALIBRATION AND TESTING SERVICES
133-4 PATTANJANAKI ROAD S/OI M. SUKUMLIANG, SUKUMLIANG BANGKOK 10220
TEL 0-2717-3000-39 FAX 0-2717-3444

BR-18-03

BR-18-03
CALIBRATION TECHNOLOGY

Certificate of Calibration

Cert.No.: 25CH206

Page: 1 of 3

Equipment :
Manufacturer :
Model :
Serial No. :
ID No. :
Condition As-Received:

pt Meter
Mettler Toledo
SevenGo
BA63012470
BRK_LG0031
Used Item

Received Date :
Calibration Date :
Reference :
Submitted by :

14 February 2025
17 February 2025
2502-04780SC-1

AUS Laboratory Group (Thailand) Co.,Ltd.
104 Phraethungam 40, Phraethungam Rd.,
Khwaeng Phraethungam, Khet Suan Luang,
Bangkok 10250 Thailand


Ambient Temperature :
Relative Humidity :
Calibration Procedure :

(25 ± 2.5) °C
(50 ± 15) %
In - house method :
- CP-CIBs by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
- CP-CIBs by comparison with temperature standard

Calibrated by :

Watsalee Sittaman

Approved by :


Approved Signature

() Chakrit Wathanasurak
() Porpan Palpin
(✓) Sathien Meangrai
Issue Date :

18 February 2025

The Uncertainty are for comparative probability of approximately 95%

This certificate may not be reproduced other than in full, even with the prior written
Approval of the Institute of Corporate Services & Quality Management & Testing Services.

Page No. 29/03/2018		Page: 2 of 3			
<u>Certification of this calibration result</u>					
1. Reference Standard Instrument	Serial No.	Q3 No.	Exp. No.		
1) Document Process Number	54030049	13007118	242729		
2) IAT, Standard Thermometer	4982054	11092004	242737		
<p>- This Certification is traceable to SI through Technology Promotion Association (Thailand - Japan)</p> <p>- The measurement results are traceable to SI through Thera Health Centre (U.S.)</p> <p>- Deutsche Accreditedgesellschaft, Accredited No. D-184-11514-01 Ltd.</p> <p>- The measurement results are traceable to SI through CPA China Co., Ltd.</p> <p>ANQ-ASQ National Accredited Board, Accredited No. ANQ-1035</p>					
2. Certified Reference Materials					
<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. Date</u>		
pH 4.007	CPA China	1066665	18 Jan 2027		
pH 6.869	Chen Lengen GmbH	CD3209	29 Oct 2026		
pH 10.010	CPA China	1066665	18 Jan 2027		
3. This Certificate is valid only to the item calibrated on date and place of calibration.					
<u>Calibration Results</u>					
<u>Parameter: mV Measurement</u>					
Performing standard setup by Document Process Calibration at pH (4.7, 6.8)					
Unit Under Calibration	Nominal Value	Measured Voltage Input	Actual Reading	Uncertainty of Measurement	Coverage Factor
	pH	mV	mV	pH	#
pH Meter	4.00	177.48	177.400	0.068	2.00
1st: (BNC21X10)	7.00	0.00	0.720	0.068	2.00
	10.00	177.48	-178.100	0.068	2.00

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES
334 PATTANAJARN ROAD PH 16, SIAMLIANG SIAMLIANG BANGKOK 10550
TEL. 0-2715-9000 FAX. 0-2715-9004

Calibration Results					
Function : pH Measurement					
Performing three buffers standard curve by using buffer nominal pH (4,7,10)					
Units Under Calibration	Standard pH Buffer Solutions	Actual pH Reading	Actual mV Reading	Uncertainty of pH Measurement	Coverage factor
pH Electrode	4.007	4.01	121	0.0080	2.50
SN: 4281146	6.999	7.00	6	0.0065	2.00
	10.013	10.01	-170	0.0065	2.00
Function : Temperature Measurement					
(*) Without adjustment					
This equipment was connected with Temperature Probe:					
- Model :	PT-428146				
- Serial No. :	4281146				
Dimension of probe					
- Length :	120 mm.				
- Diameter :	12 mm.				
- Immersion Depth :	100 mm.				
Calibration Point [°C]	Standard Temperature [°C]	UUC* Temperature [°C]	Error	Uncertainty of measurement [°C]	Coverage factor
25.0	25.002	25.0	-0.002	0.13	2.00
45.0	44.999	45.0	0.001	0.13	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 %.

— *Journal of the American Medical Association*

Certificate of Testing	
Equipment:	DO Meter
Manufacturer:	YSB
Model:	1500
Serial No.:	18L105204
ID No.:	BAK-EM206
Received Date:	01 February 2024
Test Date:	02 February 2024
Reference:	2402-000608C-10
Submitted by:	
<div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> REVIEW BY: <i>Jinda K.</i> APPROVED BY: <i>Kant A.</i> NEXT CAL DATE: 02/08/25 </div>	
ALS Laboratory Group (Thailand) Co.,Ltd. 101 Phrasitham Road, Phrasitham Rd., Khwaeng Phrasitham, Khwaet Suan Luang, Bangkok 10250 Thailand	
Laboratory Condition:	Temperature (25 ± 5) °C Humidity (50 ± 20) %
Test Procedure:	In-house method : OF/GBS By Comparison Technique with Apple Modification Method
Tested by:	Wassak Sriethan
Approved by:	<i>Sathap</i> Approved Signatory
(✓) Sathap Meangmal () Warichon Lamngasitkul () Porpan Pajpan	
Issue Date:	7 February 2024

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

<u>Instruments</u>	<u>Serial No.</u>	<u>ID No.</u>	<u>Certificate No.</u>	<u>Due Date</u>
1. Burnite	+	130BU10	23CQ1172	22 Mar 2025
2. Reference	1124015382	140R/0006	23AMH18	20 Feb 2024

<u>Material</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Assay</u>
Sodium Thiosulfate pentahydrate	Merck	AM1763318	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 17A10004

Titration Method (Alzide Modification Method)	DO Meter Reading	Standard Deviation
(mg/L)	(mg/L)	(mg/L)
5.18	5.18	0.0055

This report was certified only for the instrument we tested. It is allowable to use for study
inland in use for advertising and referral purposes is prohibited. This report may not be reproduced
other in full without written approval of the laboratory.

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Certificate of Calibration

Cert. No.: 24LM15
Page: 1 of 2

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 6100
Serial No. : 161103204
ID No. : BKK_EN0205
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Location : TPA Chemistry Calibration Laboratory
Received Order : 01 February 2024
Calibrated Date : 02 February 2024
Ambient Temperature : (25 ± 10) °C
Relative Humidity : (55 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Watsorn Larngrasakul
Approved by :
() Panchappa Tameyasul
() Pongpan Pongpan
(✓) Sunk Pongpan
Issue Date : 7 February 2024

The Uncertainties are for a confidence probability of approximately 95%
This certificate may not be reproduced other than in full, without the prior written approval of the head of Corporate Services & Equipment Calibration and Testing Services.



Certificate No. T250356

Page 2 of 4

Calibration Report

Equipment : Chamber (Incubator)
Date of Calibration : 4 March 2025
Environment : Temperature : 24.5-24.7 °C
Line Voltage : 231.4-234.7 V
Relative Humidity : 55-65 %RH

- Condition of this result of calibration : 1. The system was calibrated by using 12 resistance thermometer detectors into the chamber, the other one resistance thermometer detector was for ambient temperature measurement. The calibration was done according to ISO-T20 (based on ASTM E125-04 (Repeatability 2019) and AS283-1984). All data shown below were final values and the initial data from customer request. The temperature scale used was based on ITS-90.
2. Reference Standard Instrument
- | Instrument | Instrument No. | Certificate No. | Due Date |
|-------------|----------------|-----------------|---------------|
| RTD | 100 ohm | 11-C1111-101 | 16 March 2025 |
| RTD | 100 ohm | 12-C1111-101 | 16 March 2025 |
| DATA LOGGER | 2497BA | T193 | 16 March 2025 |
3. This certificate is traceable to National Bureau of Metrology (Thailand) through Metrology Center (NIST-TSI TS 1035 CALIBRATION 6242)
4. Condition of calibration area: good
- Equipment Description
- | Time Constant | 2 Hour | 10 Min | Water Air | 20 °C |
|-----------------|---|------------------------------|------------------------------|------------------------------|
| Fresh Air Dryer | <input checked="" type="checkbox"/> Open | <input type="checkbox"/> Min | <input type="checkbox"/> Med | <input type="checkbox"/> Max |
| | <input type="checkbox"/> Close | | | |
| | <input checked="" type="checkbox"/> Not Available | | | |
5. Adjustment
- | (X) without adjustment | () after adjustment |
|--------------------------|----------------------|
| | |

Approved By:

PM 01/10/24 08:46



Certificate of Calibration

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

Equipment : Burette
Capacity : 50 mL
Serial No. :
ID No. : BKK_EN0173
Manufacturer : Wieg
Made in : Germany
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Ambient Temperature : (20 ± 2.5) °C
Relative Humidity : (50 ± 10) %
Barometric Pressure : 760 mmHg
Calibration Procedure : ASTM E 542 - 01
Calibrated by : Natcha Chanyakongkarn
Approved by :
() Unnaphat Hanschal
(✓) Natcha Chanyakongkarn
() Sangsriyong Wongsak
Issue Date : 27 February 2024

The Uncertainties are for a confidence probability of approximately 95%
This certificate may not be reproduced other than in full, without the prior written approval of the head of Corporate Services & Equipment Calibration and Testing Services.



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2402-00080SC-13
Certificate No.: 24LM15
Page: 2 of 2
Procedure Used : Calibration was conducted using in-house calibration procedure CP-0701 according to comparison with Industrial Platinum Resistance Thermometer (IPRT) into Temperature Bath.
The temperature scale used was based on ITS-90.
Condition of this result of calibration : 1. Reference standard instrument :
Instrument : Serial No. : Cert. No. : Traceability : Due Date :
1) Digital Thermometer : 2188003 : 231216 : TPA : 11 Oct 2024
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certificate is traceable to the International System of Unit.
Remark : TPA : Technology Promotion Association (Thailand - Japan)
Result of Calibration : () Without Adjustment
Function : Temperature measurement.
This instrument was connected with temperature sensor, SH: 17A100054
Calibration :

Point	Deviation	Standard	UUC*	Error	Uncertainty	Coverage
(°C)	(mV)	(°C)	(°C)	(°C)	(± °C)	%
20.0	0.0	20.003	19.92	-0.083	0.19	2.00

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

Point	Deviation	Standard	UUC*	Error	Uncertainty	Coverage
(°C)	(mV)	(°C)	(°C)	(°C)	(± °C)	%
20.0	0.0	20.003	19.92	-0.083	0.19	2.00

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

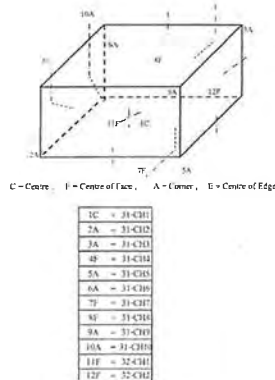
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Certificate No. T250356

Page 3 of 4

Calibration Report



Approved By:

PM 01/10/24 08:46



Certificate No. T250356

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Incubator)
Manufacturer : Memmert
Model : ICP 750
Serial No. : F819 0021
Customer Code : BKK_EN0304
ID No. : T9572A4
Customer : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Phatthanakan, Khet Suan Luang, Bangkok 10250
Customer Location : Wet Chemistry Lab 2
Date of Receipt : 26 February 2025
Calibrated By : Atthong Rongrat (Technician)
Approved By :
() Boonchai Surinwong (Site Calibration Manager)
Date of Issue : 17 MAR 2025

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology.

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Certificate No. T250356

Page 4 of 4

Calibration Report

Average Standard Reading at each position (°C)											
Calibration Point	11-CHE	11-CHC	11-CHD	11-CHB	11-CHH	11-CHT	11-CHW	11-CHV	11-CHS	11-CHL	11-CHR
20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0

Chamber (Incubator)		Temperature Distribution				
Temp (°C)	Reading (°C)	Average (°C)		Stability (°C)		Coverage Factor k
		Min	Max	Average	Stability	
20.0	20.0	20.0	20.0	0.01	0.02	0.01

The calibration result apply only to the above calibrated item.
The result of test was based on accuracy on item on date and place of test only.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k, which for a normal distribution, providing a level of confidence of approximately 95 %.

End of Certificate

Approved By:

PM 01/10/24 08:46



Certificate No. T242116

Page 1 of 4

Certificate of Calibration

Equipment : Hot Block
Manufacturer : Environmental Express
Model : B3000-240
Serial No. : 2021CODW148
Customer Code : BKK_EN0370
ID No. : T2940A5
Customer : ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khuang Phatthanakan, Khet Suan Luang, Bangkok 10250
Customer Location : Wet Chemistry Lab 2
Date of Receipt : 25 December 2024
Calibrated By : Atthong Rongrat (Technician)
Approved By :
() Boonchai Surinwong (Site Calibration Manager)
Date of Issue : 27 JAN 2025

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrology Center.

PM 01/10/24 08:46

Certificate No. T242116

Page 2 of 4

Calibration Report

Equipment : Hot Block
Date of Calibration : 2 January 2025
Environment : Temperature : 23.1-23.4 °C
Line Voltage : 222.1-227.3 V
Relative Humidity : 55-65 %RH

Condition of this result of calibration :

1. This equipment was calibrated by using 20 standard thermocouple type T into in chamber, the other one standard thermocouple type T for ambient temperature measurement. The calibration was done in according to WI-T20.
All data show below were final value and the initial data from customer request. The temperature scale used was based on ITS-90.

2. Reference Standard Instrument :

Instrument	Model	Instrument No.	Certificate No.	Due Date
TC	TYPE T	TN241-TN250	T24601	16 March 2025
TC	TYPE T	TN251-TN260	T24601	16 March 2025
TC	TYPE T	TN261-TN270	T24601	16 March 2025
TC	TYPE T	TN271-TN280	T24601	16 March 2025
TC	TYPE T	TN281-TN290	T24601	16 March 2025
TC	TYPE T	TN291-TN300	T24601	16 March 2025
DATA LOGGER		T193	T24601	16 March 2025

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC TIS 115 17025 CALIBRATION 0244)

4. Condition of calibrated item : good

Equipment Description :
Time Constant : 2 Hour 30 Minute AI 150 °C
Peak Air Damper : ☐ Open ☐ Mid ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :
() without adjustment (X) after adjustment

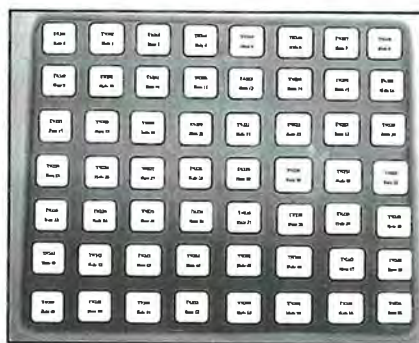
Approved By: *[Signature]*

FM-L13 1810-08-57

Certificate No. T242116

Page 3 of 4

Calibration Report



FRONT CONTROL

Approved By: *[Signature]*

FM-L13 1810-08-57

Certificate No. T242116

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Calibration Report

Measurement Results

Average Standard Reading at each position (°C)											
	TC1	TC2	TC3	TC4	TC5	TC6	TC7	TC8	TC9	TC10	TC11
CAL. POINT	150	175	200	225	250	275	300	325	350	375	400
150	149.75	149.72	149.68	149.64	149.59	149.54	149.49	149.44	149.39	149.34	149.29
Average	149.75	149.72	149.68	149.64	149.59	149.54	149.49	149.44	149.39	149.34	149.29
175	174.75	174.72	174.68	174.64	174.59	174.54	174.49	174.44	174.39	174.34	174.29
Average	174.75	174.72	174.68	174.64	174.59	174.54	174.49	174.44	174.39	174.34	174.29
200	199.75	199.72	199.68	199.64	199.59	199.54	199.49	199.44	199.39	199.34	199.29
Average	199.75	199.72	199.68	199.64	199.59	199.54	199.49	199.44	199.39	199.34	199.29
225	224.75	224.72	224.68	224.64	224.59	224.54	224.49	224.44	224.39	224.34	224.29
Average	224.75	224.72	224.68	224.64	224.59	224.54	224.49	224.44	224.39	224.34	224.29
250	249.75	249.72	249.68	249.64	249.59	249.54	249.49	249.44	249.39	249.34	249.29
Average	249.75	249.72	249.68	249.64	249.59	249.54	249.49	249.44	249.39	249.34	249.29
275	274.75	274.72	274.68	274.64	274.59	274.54	274.49	274.44	274.39	274.34	274.29
Average	274.75	274.72	274.68	274.64	274.59	274.54	274.49	274.44	274.39	274.34	274.29
300	299.75	299.72	299.68	299.64	299.59	299.54	299.49	299.44	299.39	299.34	299.29
Average	299.75	299.72	299.68	299.64	299.59	299.54	299.49	299.44	299.39	299.34	299.29
325	324.75	324.72	324.68	324.64	324.59	324.54	324.49	324.44	324.39	324.34	324.29
Average	324.75	324.72	324.68	324.64	324.59	324.54	324.49	324.44	324.39	324.34	324.29
350	349.75	349.72	349.68	349.64	349.59	349.54	349.49	349.44	349.39	349.34	349.29
Average	349.75	349.72	349.68	349.64	349.59	349.54	349.49	349.44	349.39	349.34	349.29
375	374.75	374.72	374.68	374.64	374.59	374.54	374.49	374.44	374.39	374.34	374.29
Average	374.75	374.72	374.68	374.64	374.59	374.54	374.49	374.44	374.39	374.34	374.29
400	399.75	399.72	399.68	399.64	399.59	399.54	399.49	399.44	399.39	399.34	399.29
Average	399.75	399.72	399.68	399.64	399.59	399.54	399.49	399.44	399.39	399.34	399.29
425	424.75	424.72	424.68	424.64	424.59	424.54	424.49	424.44	424.39	424.34	424.29
Average	424.75	424.72	424.68	424.64	424.59	424.54	424.49	424.44	424.39	424.34	424.29
450	449.75	449.72	449.68	449.64	449.59	449.54	449.49	449.44	449.39	449.34	449.29
Average	449.75	449.72	449.68	449.64	449.59	449.54	449.49	449.44	449.39	449.34	449.29
475	474.75	474.72	474.68	474.64	474.59	474.54	474.49	474.44	474.39	474.34	474.29
Average	474.75	474.72	474.68	474.64	474.59	474.54	474.49	474.44	474.39	474.34	474.29
500	499.75	499.72	499.68	499.64	499.59	499.54	499.49	499.44	499.39	499.34	499.29
Average	499.75	499.72	499.68	499.64	499.59	499.54	499.49	499.44	499.39	499.34	499.29
525	524.75	524.72	524.68	524.64	524.59	524.54	524.49	524.44	524.39	524.34	524.29
Average	524.75	524.72	524.68	524.64	524.59	524.54	524.49	524.44	524.39	524.34	524.29
550	549.75	549.72	549.68	549.64	549.59	549.54	549.49	549.44	549.39	549.34	549.29
Average	549.75	549.72	549.68	549.64	549.59	549.54	549.49	549.44	549.39	549.34	549.29
575	574.75	574.72	574.68	574.64	574.59	574.54	574.49	574.44	574.39	574.34	574.29
Average	574.75	574.72	574.68	574.64	574.59	574.54	574.49	574.44	574.39	574.34	574.29
600	599.75	599.72	599.68	599.64	599.59	599.54	599.49	599.44	599.39	599.34	599.29
Average	599.75	599.72	599.68	599.64	599.59	599.54	599.49	599.44	599.39	599.34	599.29
625	624.75	624.72	624.68	624.64	624.59	624.54	624.49	624.44	624.39	624.34	624.29
Average	624.75	624.72	624.68	624.64	624.59	624.54	624.49	624.44	624.39	624.34	624.29
650	649.75	649.72	649.68	649.64	649.59	649.54	649.49	649.44	649.39	649.34	649.29
Average	649.75	649.72	649.68	649.64	649.59	649.54	649.49	649.44	649.39	649.34	649.29
675	674.75	674.72	674.68	674.64	674.59	674.54	674.49	674.44	674.39	674.34	674.29
Average	674.75	674.72	674.68	674.64	674.59	674.54	674.49	674.44	674.39	674.34	674.29
700	699.75	699.72	699.68	699.64	699.59	699.54	699.49	699.44	699.39	699.34	699.29
Average	699.75	699.72	699.68	699.64	699.59	699.54	699.49	699.44	699.39	699.34	699.29
725	724.75	724.72	724.68	724.64	724.59	724.54	724.49	724.44	724.39	724.34	724.29
Average	724.75	724.72	724.68	724.64	724.59	724.54	724.49	724.44	724.39	724.34	724.29
750	749.75	749.72	749.68	749.64	749.59	749.54	749.49	749.44	749.39	749.34	749.29
Average	749.75	749.72	749.68	749.64	749.59	749.54	749.49	749.44	749.39	749.34	749.29
775	774.75	774.72	774.68	774.64	774.59	774.54	774.49	774.44	774.39	774.34	774.29
Average	774.75	774.72	774.68	774.64	774.59	774.54	774.49	774.44	774.39	774.34	774.29
800	799.75	799.72	799.68	799.64	799.59	799.54	799.49	799.44	799.39	799.34	799.29
Average	799.75	799.72	799.68	799.64	799.59	799.54	799.49	799.44	799.39	799.34	799.29
825	824.75	824.72	824.68	824.64	824.59	824.54	824.49	824.44	824.39	824.34	824.29
Average	824.75	824.72	824.68	824.64	824.59	824.54	824.49	824.44	824.39	824.34	824.29
850	849.75	849.72	849.68	849.64	849.59	849.54	849.49	849.44	849.39	849.34	849.29
Average	849.75	849.72	849.68	849.64	849.59	849.54	849.49	849.44	849.39	849.34	849.29
875	874.75	874.72	874.68	874.64	874.59	874.54	874.49	874.44	874.39	874.34	874.29
Average	874.75	874.72	874.68	874.64	874.59	874.54	874.49	874.44	874.39	874.34	874.29
900	899.75	899.72	899.68	899.64	899.59	899.54	899.49	899.44	899.39	899.34	899.29
Average	899.75	899.72	899.68	899.64	899.59	899.54	899.49	899.44	899.39	899.34	899.29
925	924.75	924.72	924.68	924.64	924.59	924.54	924.49	924.44	924.39	924.34	924.29
Average	924.75	924.72	924.68	924.64	924.59	924.54	924.49	924.44	924.39	924.34	924.29
950	949.75	949.72	949.68	949.64	949.59	949.54	949.49	949.44	949.39	949.34	949.29
Average	949.75	949.72	949.68	949.64	949.59	949.54	949.49	949.44	949.39	949.34	949.29
975	974.75	974.72	974.68	974.64	974.59	974.54	974.49	974.44	974.39	974.34	974.29
Average	974.75	974.72	974.68	974.64	974.59	974.54	974.49	974.44	974.39	974.34	974.29
1000	999.75	999.72	999.68	999.64	999.59	999.54	999.49	999.44	999.39	999.34	999.29
Average	999.75	999.72	999.68	999.64	999.59	999.54	999.49	999.44	999.39	999.34	999.29
1025	1024.75	1024.72	1024.68	1024.64	1024.59	1024.54	1024.49	1024.44	1024.39	1024.34	1024.29
Average	1024.75	1024.72	1024.68	1024.64	1024.59	1024.54	1024.49	1024.44	1024.39	1024.34	1024.29
1050	1049.75	1049.72	1049.68	1049.64	1049.59	1049.54	1049.49	1049.44	1049.39	1049.34	1049.29
Average	1049.75	1049.72	1049.68	1049.64	1049.59	1049.54	1049.49	1049.44	1049.39	1049.34	1049.29
1075	1074.75	1074.72	1074.68	1074.64	1074.59	1074.54	1074.49	1074.44	1074.39	1074.34	1074.29
Average	1074.75	1074.72	1074.68	1074.64	1074.59	1074.54	1074.49	1074.44	1074.39	1074.34	1074.29
1100	1099.75	1099.72	1099.68	1099.64	1099.59	1099.54	1099.49	1099.44	1099.39	1099.34	1099.29
Average	1099.75	1099.72	1099.68	1099.64	1099.59	1099.54	1099.49	1099.44	1099.39	1099.34	1099.29
1125	1124.75	1124.72	1124.68	1124.64	1124.59	1124.54	1124.49	1124.44	1124.39	1124.34	1124.29
Average	1124.75	1124.72	1124.68	1124.64	1124.59	1124.54	1124.49	1124.44	1124.39	1124.34	1124.29
1150	1149.75	1149.72	1149.68	1149.64	1149.59	1149.54	1149.49	1149.44	1149.39	1149.34	1149.29
Average	1149.75	1149.72	1149.68	1149.64	1149.59	1149.54	1149.49	1149.44	1149.39	1149.34	1149.29
1175	1174.75	1174.72	1174.68	1174.64	1174.59	1174.54	1174.49	1174.44	1174.39	1174.34	1174.29
Average	1174.75	1174.72	1174.68	1174.64	1174.59	1174.54	1174.49	1174.44	1174.39	1174.34	1174.29
1200	1199.75	1199.72	1199.68	1199.64	1199.59	1199.54	1199.49	1199.44	1199.39	1199.34	1199.29
Average	1199.75	1199.72	1199.68	1199.64	1199.59	1199.54	1199.49	1199.44	1199.39	1199.34	1199.29
1225	1224.75	1224.72	1224.68	1224.64	1224.59	1224.54	1224.49	1224.44	1224.39	1224.34	1224.29
Average	1224.75	1224.72	1224.68	1224.64	1224.59	1224.54	1224.49	1224.44	1224.39	1224.34	1224.29
1250	1249.75	1249.72	1249.68	1249.64	1249.59	1249.54	1249.49	1249.44	1249.39	1249.34	1249.29
Average	1249.75	1249.72	1249.68	1249.64	1249.59	1249.54	1249.49	1249.44	1249.39	1249.34	1249.29
1275	1274.75	1274.72	1274.68	1274.64	1						



Equipment: Water Bath
Condition As-Received: Used Item
Reference: 2410-07520C-4
Procedure Used: Calibration was conducted using In-house calibration procedure CP-0704 based on ASTM E715 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (PRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:

Instrument: Serial No. Cert. No. Traceable Due Date
1) Data Acquisition: MY57013111 24JA1115 TPA 13 Jul 2025

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

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

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

Result of Calibration: (*) Without Adjustment

Function of UUC: (*) Temperature Source

Heat transfer medium used: Water

	Environmental (°C)	AC Voltage Supply (V _{eff})
Beginning of Calibration	25	54
Finished of Calibration	25	57

Position	Ref. No.
1	4802098-001
2	4802098-002
3	4802098-003
4	4802098-004
5 (ref.)	4802098-005

Front



Equipment: Water Bath
Condition As-Received: Used Item
Reference: 2410-07520C-4
Result of Calibration: (*) Without Adjustment
Function of UUC: (*) Temperature Source

point (°C)	setting (°C)	Reading (°C)	Position					(± °C)
			1	2	3	4	5(ref.)	
85.0	85.0	85.0	85.133	85.212	85.150	84.953	85.096	0.22

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Coverage Factor
85.0	0.21	0.13	2

Average: The average of 30 values in each position.

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

Stability: One-Half of the greatest maximum difference of measured temperature at any one probe.

UUC: Unit Under Calibration

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

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

-000-



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
33/44 PATTANAKARN ROAD 5TH FLOOR, SUKHUMVIT, BANGKOK 10250
TEL: 0-2711-3000-25 FAX: 0-2711-5444



Certificate of Calibration

Cert. No.: 24CH1256
Page: 1 of 3

Equipment: pH Meter
Manufacturer: HANNA
Model: HI9142
Serial No.: 200100031163
ID No.: BNC_EH0342
Condition As-Received: Used Item
Received Date: 16 October 2024
Calibration Date: 17 October 2024
Reference: 2410-0608C-5
Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanasarn 40, Phatthanasarn Rd.,
Klongsarn Phatthanasarn, Khlong Suan Luang,
Bangkok 10250 Thailand

pH Meter

Model: HI9142

Serial No.: 200100031163

ID No.: BNC_EH0342

Condition As-Received: Used Item

Received Date: 16 October 2024

Calibration Date: 17 October 2024

Reference: 2410-0608C-5

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd.

104 Phatthanasarn 40, Phatthanasarn Rd.,

Klongsarn Phatthanasarn, Khlong Suan Luang,

Bangkok 10250 Thailand

Next Calibration: 17/10/25

Ambient Temperature: (25 ± 2.5) °C
Relative Humidity: (50 ± 10) %
Calibration Procedure: 1) Rinse electrode
- CP-015 by direct measurement with
certified reference material (CRM)
- CP-048 by comparison with temperature standard

Calibrated by: Watsorn Lengphakul

Approved by: Suthip

Approved Signature

() Unnophol Hanchai

() Porpan Palpin

(✓) Sathip Meangma

Issue Date: 21 October 2024

The Uncertainties are for a confidence probability of approximately 95%.

This certificate may not be reproduced, when it is not used with the prior written
Approval of the TPA of Corporate Services & Equipment Calibration and Testing Services.



Cert. No.: 24CH1256
Page: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument:

Instrument: Serial No. ID No. Cert. No. Due Date
1) Ref. Standard Thermometer: 2180803 13910044 241022 16 Sep 2025

- This Certificate is traceable to SI through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Material: The measurement results are traceable to SI through Hoch Lange GmbH Ltd.
Deutsche Kalibrierungsmittel, Accredited No. D-MRL-10158-01-01
The measurement results are traceable to SI through CPA chem Ltd.,
ANGLASQ National Accreditation Board, Accredited No. AN-1835

Buffer Solution: Manufacturer: Lot No. Exp. date
pH 4.008 CPA chem 1034203 27 Sep 2025
pH 6.869 Hach Lange GmbH 032145 28 Feb 2025
pH 10.010 CPA chem 1034205 27 Sep 2025

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

Calibration Results

Function: pH Measurement

Performing three buffer standard curves by using buffer nominal pH (4.7, 6.8, 10)

Unit Under Calibration: Standard pH Buffer Solution

Actual pH Reading: Actual pH Reading (mV): Uncertainty of Measurement (mV): Coverage factor

pH Electrode: 4.008 4.025 174.6 0.0044 2.00
S/N: 2347304202 5.880 7.014 1.4 0.0084 2.05
10.010 10.015 -172.8 0.0065 2.00

Remark: Can not connect the UUC because the plug does not match with the socket.



Cert. No.: 24CH1256
Page: 3 of 3

Calibration Results

Function: Temperature Measurement

(*) Without adjustment

This equipment is connected with Temperature Probe:

- Model: PNC281

- Serial No.: 2347304202

Dimension of probe:

- Length: 110 mm

- Diameter: 12 mm

- Immersion Depth: 90 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00

Remark: UUC = Unit Under Calibration

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

-000-



Cert. No.: 24CH1256
Page: 3 of 3

Test Report

Customer: ALS Laboratory Group (Thailand) Co., Ltd.

Equipment: Temperature Measurement

Operator: S. P. 241022 16 Sep 2025

Customer Serial No.: 2347304202

Date of test: 21/04/2025

Environment: temperature: 25.1 °C Humidity: 50.3 %RH

Remarks:

Calibration Results

Unit Under Calibration: Standard pH Buffer Solution

Actual pH Reading: Actual pH Reading (mV): Uncertainty of Measurement (mV): Coverage factor

pH Electrode: 4.008 4.025 174.6 0.0044 2.00
S/N: 2347304202 5.880 7.014 1.4 0.0084 2.05
10.010 10.015 -172.8 0.0065 2.00

Remark: Can not connect the UUC because the plug does not match with the socket.

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

-000-

Calibration Results

Function: Temperature Measurement

(*) Without adjustment

This equipment is connected with Temperature Probe:

- Model: PNC281

- Serial No.: 2347304202

Dimension of probe:

- Length: 110 mm

- Diameter: 12 mm

- Immersion Depth: 90 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00

Remark: UUC = Unit Under Calibration

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

-000-

Calibration Results

Function: Temperature Measurement

(*) Without adjustment

This equipment is connected with Temperature Probe:

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- Serial No.: 2347304202

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- Diameter: 12 mm

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25.0	25.002	25.0	-0.002	0.13	2.00

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-000-

Calibration Results

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(*) Without adjustment

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- Serial No.: 2347304202

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Calibration Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
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Remark: UUC = Unit Under Calibration

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-000-

Calibration Results

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(*) Without adjustment

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- Serial No.: 2347304202

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25.0	25.002	25.0	-0.002	0.13	2.00

Remark: UUC = Unit Under Calibration

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

-000-

Calibration Results

Function: Temperature Measurement

(*) Without adjustment

This equipment is connected with Temperature Probe:

- Model: PNC281

- Serial No.: 2347304202

Dimension of probe:

- Length: 110 mm

- Diameter: 12 mm

- Immersion Depth: 90 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00

Remark: UUC = Unit Under Calibration

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

-000-

Calibration Results

Function: Temperature Measurement

(*) Without adjustment

This equipment is connected with Temperature Probe:

- Model: PNC281

- Serial No.: 2347304202

Dimension of probe:

- Length: 110 mm

- Diameter: 12 mm

- Immersion Depth: 90 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00

Remark: UUC = Unit Under Calibration

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

-000-

Calibration Results

Function: Temperature Measurement

(*) Without adjustment

This equipment is connected with Temperature Probe:

- Model: PNC281

- Serial No.: 2347304202

Dimension of probe:

- Length: 110 mm

- Diameter: 12 mm

- Immersion Depth: 90 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00

Remark: UUC = Unit Under Calibration

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

-000-

Calibration Results

Function: Temperature Measurement

(*) Without adjustment

This equipment is connected with Temperature Probe:

- Model: PNC281

- Serial No.: 2347304202

Dimension of probe:

[illegible][illegible]

Instrument Details	
Purpose	
The sector describes the at hand system configuration	
Details	
System	
System ID	0001
Manufacturer	Agilent Technologies
Name	7890
Manufacturer's Model Number	Manual Injection
File	inject
Sequence	General
CPM (Hz)	50
Sample 1	
Manufacturer	Agilent Technologies
Type	Manual Injection
Usage	Sample Injection
Sample Volume (µL)	10
Sample 2	
Manufacturer	Agilent Technologies
Name	7890
Model Number	03420
Serial Number	04113111
Forward Bias	0.025
Own Type	Standard

AGILE: The principles stated are advisory of any and all materials, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agile IT Technologies shall not be held liable for any damages, direct or indirect, arising from or resulting from the use of any Agile IT Technology, regardless of the nature or type of the damage or loss, or the performance or use of the material.

Date: December 13, 2011 5:12 PM
 System ID: 12417
 Page 5 of 11

5 PWD by Asghar Tahir Tehrani

Aigian, G. & Ali, A. & Ali, A.

(Site Name: Aigian, G. & Ali, A. & Ali, A.)

(Site Name: Aigian, G. & Ali, A. & Ali, A.)

Print Date: December 19, 2023 11:47 AM

Drawn in: G. & Ali, A. & Ali, A.

GMA 2023 Form 1 (Rev. 1/19)

Date	Transmitter	Station	Type of Transmission	Optional Information
December 13, 2023 11:44 AM	Ham	Operator	Class 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751	
December 13, 2023 11:45 AM	Ham	Operator	Signal in house (1) - signal Intercom (1	

Date: December 13, 2018 12:48 PM
 System ID: CM7

[illegible]

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References

Abstract

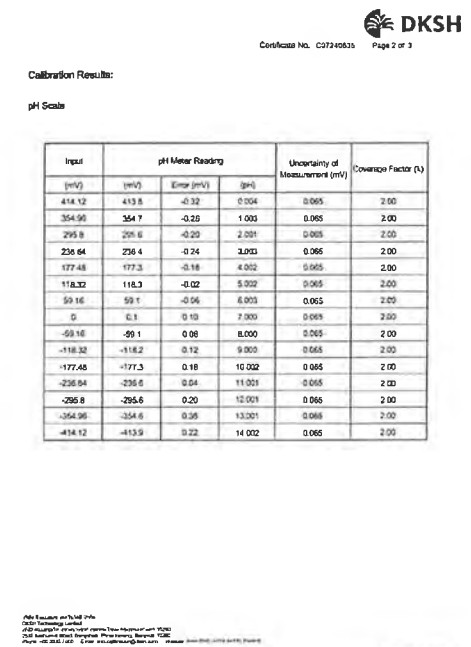
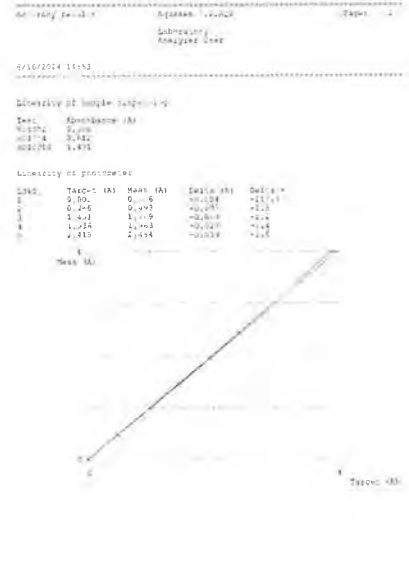
• **•**

Page 18/18Page 95/110

Last File: /var/lib/openssh/ssh-keygen				Version: 10.00.1
Export Generated by: C:\WINDOWS\ADMINISTRATOR				File: C:\WINDOWS\ADMINISTRATOR
All Transactions, All Files, All Transactions				
Time	Transaction Date	Activity	Type of Transaction	Current Information
October 25, 2004 11:45:15 AM	2004-10-25 11:45:15 AM	Qualification	Success	OK
October 26, 2004 11:45:15 AM	2004-10-26 11:45:15 AM	Processing	Success	None
October 26, 2004 11:45:15 AM	2004-10-26 11:45:15 AM	Processing	Success	Empty Database, Confirmed
October 26, 2004 11:45:15 AM	2004-10-26 11:45:15 AM	Processing	Success	Empty Database, Confirmed
October 26, 2004 11:45:15 AM	2004-10-26 11:45:15 AM	Processing	Success	Empty Database, Confirmed

Date: October 25, 2024 12:06:35 PM
System ID: GML

Page 19/19



DKSH
Certificate No. C07240035 Page 3 of 3

Practical slope and zero point*

The three-point calibration using three standard buffer solutions, pH 4.008, pH 6.866 and pH 9.997

- During calibration, display of pH meter can be adjusted to reading: pH 4.008, pH 6.866 and pH 9.997

The practical slope of the pH electrode: 58.55 (mV/pH) 58.87%

The zero point of the pH electrode: 6.55 (pH)

Sample Test Results

Standard Buffer Solution (pH)	Unit Under Calibration (pH)	Difference (pH)	Uncertainty of Measurement (pH)	Coverage Factor (x)
4.008	4.024	0.016	0.0070	2.03
6.866	6.866	0.003	0.0033	2.00
9.997	10.003	0.006	0.013	2.00

* Calibration Method "Not ISI Accredited" in this Certificate have been included for completeness.

The End of Certificate

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

หน้า: 14, หน้ารวม 7000 เลขที่ใบ: WD-0005577 หมายเลขเครื่อง: 1001328

วันที่สอบ: 26 Dec 2024

สถานที่: กรุงเทพมหานคร

Unit: ไมโคร

General

1. ตรวจสอบสายเคเบิล ☐ ☐

2. ตรวจสอบสาย (สายเคเบิล) สายเคเบิล ☐ ☐

3. สายเคเบิล - สายเคเบิล (On-Off Switch) ☐ ☐

4. สายเคเบิล (Keyboard) ☐ ☐

5. สายเคเบิล (Display, Screen Control) ☐ ☐

6. สายเคเบิล (Battery Backup) ☐ ☐

7. สายเคเบิล (Wireless Length Control) ☐ ☐

8. สายเคเบิล (Wireless Length Check) ☐ ☐

9. สายเคเบิล (UV < 3.000 hour) ☐ ☐

10. สายเคเบิล (Visible < 5.000 hour) ☐ ☐

11. สายเคเบิล (Cartridge Module) ☐ ☐

pH Meter and Conductivity Meter

12. สายเคเบิล (Electrode and Connection Cable) ☐ ☐

13. สายเคเบิล (Electrode (Lower KCl)) ☐ ☐

14. สายเคเบิล (Electrode (Dust Protection Hood)) ☐ ☐

15. สายเคเบิล (Stand) ☐ ☐

Turbidimeter

16. สายเคเบิล (No Sample) ☐ ☐

17. สายเคเบิล (Sample) ☐ ☐

Automatic Stirrer

18. สายเคเบิล (Stirrer) ☐ ☐

19. สายเคเบิล (Function Rinsing and Dosing) ☐ ☐

20. สายเคเบิล (Function Rinsing and Dosing) ☐ ☐

Person in charge: Mr. Pongpat Suetchartha Service Engineer

Delivering Growth - in Asia and Beyond

DKSH
Certificate of Calibration

Equipment: Digital Thermometer with Probe
Model: T9000
Serial No: 1001328
Manufacturer: SI Analytix
ID No: 1

Customer: ALS Laboratory Group (Thailand) Co., Ltd.
104 Soi Pattanakom 40, Pattanakom Rd.
Suan Luang, Bangkok 10250 Thailand

Environment Condition: Temperature 30 °C ± 10 °C
Humidity: 55 %RH ± 25 %RH
Voltage: 220 VAC ± 10 %

Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (Wet Chemistry Lab 2)
104 Soi Pattanakom 40, Pattanakom Rd.
Suan Luang, Bangkok 10250 Thailand

Calibration By: Mr. Kaewkan Suradech
Calibration Date: 26 December 2024

The Method used: In house method, CAL-WI-49, by comparison with standard thermometer

Traceability: This certificate is traceable to the International System of Unit maintained by Quality Forum Co., Ltd. (QF)

Person in charge: (Mr. Kaewkan Suradech) Authorized signatory

Person in charge: (Mr. Pongpat Suetchartha) Authorized signatory

Delivering Growth - in Asia and Beyond

DKSH
Certificate No. C15241274 Page 2 of 2

Reference standard equipment:

Equipment	Certificate no.	Cal. date	Next Cal. date
Digital Thermometer with Probe	Q124-3148	26 November 2024	26 November 2025

Calibration Results:

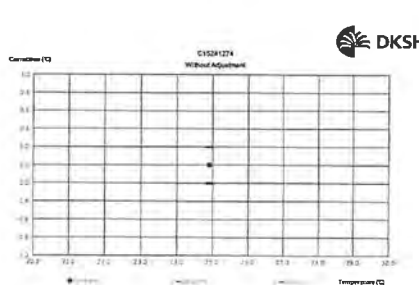
Without Adjustment

Device Type: RTD Electrode Serial No: 5011-15563 Channel: 12

Diameter (mm): 12 Length (mm): 120 Immersion (mm): 120

Calibrate Point (°C)	STD. Reading (°C)	UUC Reading (°C)	Correction of UUC (°C)	Uncertainty (± °C)
25.0	24.954	24.9	0.004	0.20

The End of Certificate



DKSH
ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

Equipment: Digital Thermometer with Probe
Serial No: 1001328
Model: T9000

Unit: ไมโคร

General

1. ตรวจสอบสายเคเบิล ☐ ☐

2. Adapter / Power supply 220 / 110 VAC ☐ ☐

3. การทำงาน Main Switch ☐ ☐

4. การทำงาน Selector Key ☐ ☐

5. การทำงาน Display ☐ ☐

6. Battery ☐ ☐

7. Alarm Function ☐ ☐

8. Alarm Sensor (In / Ex) ☐ ☐

Person in charge: Mr. Kaewkan Suradech Service Engineer

Delivering Growth - in Asia and Beyond

DKSH
Certificate of Calibration

Equipment: CONDUCTIVITY METER
Model: ORION STAR A215
Serial No (or ID): X56231
Manufacturer: Thermo Scientific
Electrode Serial No: IV1-15416
Condition: In Condition

Customer: ALS Laboratory Group (Thailand) Co., Ltd.
104 Soi Pattanakom 40, Pattanakom Rd.
Suan Luang, Bangkok 10250 Thailand

Environment Condition: Temperature 23 °C ± 3 °C
Humidity 50 %RH ± 15 %RH

Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (Wet Chemistry Lab 2)
104 Soi Pattanakom 40, Pattanakom Rd.
Suan Luang, Bangkok 10250 Thailand

Calibration By: Mr. Pongpat Suetchartha
Calibration Date: 26 December 2024
The Method used: In house method, CAL-WI-49, based on ASTM D 1125-14 and D 5391-14
Traceability: This certificate is traceable to the SI Units maintained by CRM of NIST(SRM) through CPA chem Co., Ltd. (ISO/IEC 17024) Certificate No. 950789, 950790, 950791

Person in charge: (Mr. Pongpat Suetchartha) Authorized signatory

Person in charge: (Mr. Kaewkan Suradech) Authorized signatory

Delivering Growth - in Asia and Beyond

Calibration Results:

Before Adjustment

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor	Uncertainty (±)
84.003 µS/cm	84.76 µS/cm	+15.757 µS/cm	2.00	0.18 µS/cm
1413.1 µS/cm	1427 µS/cm	+13.9 µS/cm	2.00	0.3 µS/cm
12.883 mS/cm	13.02 mS/cm	+0.142 mS/cm	2.00	0.062 mS/cm

After Adjustment

Standard Conductivity Solution	Unit Under Calibration Reading	Correction	Coverage Factor	Uncertainty (±)
84.003 µS/cm	84.21 µS/cm	-0.027 µS/cm	2.00	0.18 µS/cm
1413.1 µS/cm	1413 µS/cm	0.1 µS/cm	2.00	0.3 µS/cm
12.883 mS/cm	12.87 mS/cm	0.010 mS/cm	2.00	0.062 mS/cm

The End of Certificate

DKSH
ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

Equipment: CONDUCTIVITY METER
Model: ORION STAR A215
Serial No: X56231
Manufacturer: Thermo Scientific
Electrode Serial No: IV1-15416
Condition: In Condition

Customer: ALS Laboratory Group (Thailand) Co., Ltd.
104 Soi Pattanakom 40, Pattanakom Rd.
Suan Luang, Bangkok 10250 Thailand

Environment Condition: Temperature 23 °C ± 3 °C
Humidity 50 %RH ± 15 %RH

Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (Wet Chemistry Lab 2)
104 Soi Pattanakom 40, Pattanakom Rd.
Suan Luang, Bangkok 10250 Thailand

Calibration By: Mr. Pongpat Suetchartha
Calibration Date: 26 December 2024
The Method used: In house method, CAL-WI-49, based on ASTM D 1125-14 and D 5391-14
Traceability: This certificate is traceable to the SI Units maintained by CRM of NIST(SRM) through CPA chem Co., Ltd. (ISO/IEC 17024) Certificate No. 950789, 950790, 950791

Person in charge: (Mr. Pongpat Suetchartha) Authorized signatory

Person in charge: (Mr. Kaewkan Suradech) Authorized signatory

Delivering Growth - in Asia and Beyond



Certificate of Calibration

Equipment: Digital Thermometer with Probe
Model: ORION STAR A215
Serial No: X54331
Manufacturer: Thermo Scientific
(Q No):
Customer: ALS Laboratory Group (Thailand) Co., Ltd.
104 Soi Patanakum 40, Patanakum Rd.
Suan Luang, Bangkok 10250 Thailand
Environment Condition: Temperature: 30 °C ± 10 °C
Humidity: 55 %RH ± 25 %RH
Voltage: 220 VAC ± 10 %
Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (We Chemistry Lab 2)
104 Soi Patanakum 40, Patanakum Rd.
Suan Luang, Bangkok 10250 Thailand

Calibration By: Mr. Kaewkan Surasochi
Calibration Date: 26 December 2024
The Method used: In house method, CAL-W-67, by comparison with standard thermometer.
Traceability: This certificate is traceable to the International System of Unit maintained by
Quintessence Co., Ltd. (QI)

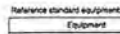
(Mr. Kaewkan Surasochi)
Person in charge

(Mr. Teewong Tachang)
Authorized signatory

This certificate is issued for the use of measurement according to the International System of Unit (SI). It is issued in accordance with the requirements of the International System of Unit (SI) and the requirements of the International System of Unit (SI). The measurement uncertainty stated in this certificate is based on the best available information and is not a guarantee of accuracy. The results may be affected by deviations from specified conditions. The results may only be used for the purpose indicated in this certificate. The results may be affected by deviations from specified conditions. The results may only be used for the purpose indicated in this certificate.

Delivering Growth - in Asia and Beyond

CAL-W-67-14 (16 Dec 2022)



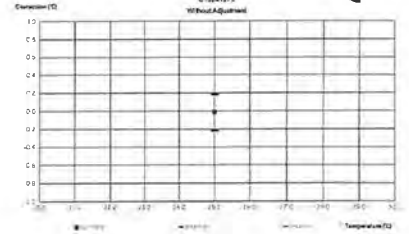
Certificate of Calibration

Equipment	Certificate No.	Cal. date	Next Cal. date
Digital Thermometer with Probe	Q124-3149	26 November 2024	26 November 2025

Calibration Results:

Without Adjustment	Without Adjustment	Without Adjustment	Without Adjustment
Serial Type: RTD	Electrode Serial No: VV1-18410	Driver: -	
Electrode (mm): 15	Length (mm): 120	Immersion (mm): 120	
Calibration Point (°C)	STD Reading (°C)	UNC Reading (°C)	Correction of UNC (°C)
25.0	24.988	25.0	-0.012
			0.02

The End of Certificate



Delivering Growth - in Asia and Beyond

CAL-W-67-14 (16 Dec 2022)

ใบตรวจสอบสภาพเครื่องวัดอุณหภูมิ

Equipment	Digital Thermometer with Probe		Certificate No.	C15241275	Model	ORION STAR A215
Serial No.	X59331					
Calibration Date	26 Dec-2024					
Unit	Unit					
General						
<input type="checkbox"/>	<input type="checkbox"/>	1. <input type="checkbox"/> Adapter / Power supply 220 / 115 VAC	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	2. <input type="checkbox"/> Immersion / Main Switch	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	3. <input type="checkbox"/> Immersion / Selector Key	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	4. <input type="checkbox"/> Immersion / Display	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	5. <input type="checkbox"/> Battery	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	6. <input type="checkbox"/> Immersion / Sensor (In / Ex)	<input type="checkbox"/>	<input type="checkbox"/>		

Delivering Growth - in Asia and Beyond

Mr. Kaewkan Surasochi
Service Engineer



Certificate of Calibration

Equipment: Automatic Titrator
Model: TitrLine 7000
Serial No: 10013828
Type of Titration: Motor - driven
Exchange Unit Model: WA-20
Burette Model: TZ 3920
Manufacturer: SI Analytics
Condition: In condition
Customer: ALS Laboratory Group (Thailand) Co., Ltd.
104 Soi Patanakum 40, Patanakum Rd.
Suan Luang, Bangkok 10250 Thailand
Environment Condition: Temperature: 22 °C ± 0.2 °C
Relative Humidity: 60 %RH ± 1.5 %RH
Atmospheric Pressure: 1014 mbar ± 0.4 mbar
Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (We Chemistry Lab 2)
104 Soi Patanakum 40, Patanakum Rd.
Suan Luang, Bangkok 10250 Thailand
Calibration By: Mr. Atsach Ngamchuan
Calibration Date: 26 December 2024
The Method used: In house method, CAL-W-67, based on ISO 8655:2002
Traceability: This certificate is traceable to the SI Unit maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited. Certificate No. C01243006

(Mr. Atsach Ngamchuan)
Person in charge

(Mr. Kaewkan Surasochi)
Authorized signatory

Delivering Growth - in Asia and Beyond

CAL-W-67-14 (17 Nov 2022)

Volume (ml)	Volume (ml)	Measurement Volume (V ₀) (ml)	Systematic error (mmol/l)	Random error (mmol/l)	Measurement Uncertainty (mmol/l)	k
10%	2.0000	2.0005	-0.0005	0.0003	0.0003	2.00
50%	10.0000	10.0007	-0.0007	0.0003	0.0003	2.00
100%	20.0000	20.0008	-0.0008	0.0003	0.0003	2.00

ISO 8655-3:2002(B) Table 1 - Maximum permissible errors for motor-driven piston burettes

Nominal volume (ml)	Maximum permissible systematic error (mmol/l)	Maximum permissible random error (mmol/l)
10	0.0005	0.0003
20	0.0005	0.0003
30	0.0005	0.0003
40	0.0005	0.0003
50	0.0005	0.0003
60	0.0005	0.0003
70	0.0005	0.0003
80	0.0005	0.0003
90	0.0005	0.0003
100	0.0005	0.0003

a. Expressed as the deviation of the mean of tenfold measurement from the nominal volume of the burette.
b. Expressed as the coefficient of variation of a tenfold measurement (see ISO 8655-3:2002, 8.5).
c. Expressed as the repeatability standard deviation of a tenfold measurement (see ISO 8655-3:2002, 8.5).

The End of Certificate

Delivering Growth - in Asia and Beyond

CAL-W-67-14 (17 Nov 2022)

ใบตรวจสอบสภาพเครื่องวัดค่าคลอไรด์

စက်ကိရိယာ		Automatic Titrator		Model: TitrLine 7000		စက်အမှတ်		10013828	
ပြုစုသူ (Date)		တက္ကသိုလ်				ပြုစုသူ (Date)		ကွပ်ကဲသူ	
26 Dec 2024						26 Dec 2024			
Unit	တိုက်								
General									
<input type="checkbox"/>	1	အားပေးစနစ်				<input type="checkbox"/>			
<input type="checkbox"/>	2	အားပေးစနစ် (သို့မဟုတ်, အားပေးစနစ်)				<input type="checkbox"/>			
<input type="checkbox"/>	3	အားပေးစနစ် (သို့မဟုတ်, အားပေးစနစ်)				<input type="checkbox"/>			
<input type="checkbox"/>	4	အားပေးစနစ်				<input type="checkbox"/>			
<input type="checkbox"/>	5	အားပေးစနစ် (သို့မဟုတ်, အားပေးစနစ်)				<input type="checkbox"/>			
Specialty/Parameter									
<input type="checkbox"/>	6	အားပေးစနစ် (Battery Backup) > 7.5 VDC				<input type="checkbox"/>			
<input type="checkbox"/>	7	အားပေးစနစ် (Wavelength Control)				<input type="checkbox"/>			
<input type="checkbox"/>	8	အားပေးစနစ် (Wavelength Check)				<input type="checkbox"/>			
<input type="checkbox"/>	9	အားပေးစနစ် (UV < 3.000 hour)				<input type="checkbox"/>			
<input type="checkbox"/>	10	အားပေးစနစ် (Visible < 3.000 hour)				<input type="checkbox"/>			
<input type="checkbox"/>	11	အားပေးစနစ် (Complex Module)				<input type="checkbox"/>			
pH Meter and Conductivity Meter									
<input type="checkbox"/>	12	pH (Electrode and Connection Cable)				<input type="checkbox"/>			
<input type="checkbox"/>	13	Conductivity (Electrode (Level ACH))				<input type="checkbox"/>			
<input type="checkbox"/>	14	pH/Conductivity Electrode (Dual Protection Hood)				<input type="checkbox"/>			
<input type="checkbox"/>	15	pH/Conductivity (Stand)				<input type="checkbox"/>			
Turbidity									
<input type="checkbox"/>	16	Turbidity (Two Samples)				<input type="checkbox"/>			
<input type="checkbox"/>	17	Turbidity (Two Samples) (± 2.5 Turbidity)				<input type="checkbox"/>			
Automatic Titrator									
<input type="checkbox"/>	18	Automatic Titrator				<input type="checkbox"/>			
<input type="checkbox"/>	19	Automatic Titrator				<input type="checkbox"/>			
<input type="checkbox"/>	20	Automatic Titrator				<input type="checkbox"/>			

Delivering Growth - in Asia and Beyond

Mr. Atsach Ngamchuan
Service Engineer



Certificate of Calibration

Equipment: Automatic Titrator
Model: TitrLine 7000
Serial No: 10013828
Type of Titration: Motor - driven
Exchange Unit Model: WA-20
Burette Model: TZ 3920
Manufacturer: SI Analytics
Condition: In condition
Customer: ALS Laboratory Group (Thailand) Co., Ltd.
104 Soi Patanakum 40, Patanakum Rd.
Suan Luang, Bangkok 10250 Thailand
Environment Condition: Temperature: 21 °C ± 0.3 °C
Relative Humidity: 61 %RH ± 1.6 %RH
Atmospheric Pressure: 1014 mbar ± 0.6 mbar
Calibration Place: ALS Laboratory Group (Thailand) Co., Ltd. (We Chemistry Lab 2)
104 Soi Patanakum 40, Patanakum Rd.
Suan Luang, Bangkok 10250 Thailand
Calibration By: Mr. Atsach Ngamchuan
Calibration Date: 26 December 2024
The Method used: In house method, CAL-W-67, based on ISO 8655:2002
Traceability: This certificate is traceable to the SI Unit maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited. Certificate No. C01243006

(Mr. Atsach Ngamchuan)
Person in charge

(Mr. Kaewkan Surasochi)
Authorized signatory

Delivering Growth - in Asia and Beyond

CAL-W-67-14 (17 Nov 2022)

Volume (ml)	Volume (ml)	Measurement Volume (V ₀) (ml)	Systematic error (mmol/l)	Random error (mmol/l)	Measurement Uncertainty (mmol/l)	k
10%	2.0000	2.0005	-0.0005	0.0003	0.0003	2.00
50%	10.0000	10.0007	-0.0007	0.0003	0.0003	2.00
100%	20.0000	20.0008	-0.0008	0.0003	0.0003	2.00

ISO 8655-3:2002(B) Table 1 - Maximum permissible errors for motor-driven piston burettes

Nominal volume (ml)	Maximum permissible systematic error (mmol/l)	Maximum permissible random error (mmol/l)
10	0.0005	0.0003
20	0.0005	0.0003
30	0.0005	0.0003
40	0.0005	0.0003
50	0.0005	0.0003
60	0.0005	0.0003
70	0.0005	0.0003
80	0.0005	0.0003
90	0.0005	0.0003
100	0.0005	0.0003

a. Expressed as the deviation of the mean of tenfold measurement from the nominal volume of the burette.
b. Expressed as the coefficient of variation of a tenfold measurement (see ISO 8655-3:2002, 8.5).
c. Expressed as the repeatability standard deviation of a tenfold measurement (see ISO 8655-3:2002, 8.5).

The End of Certificate

Delivering Growth - in Asia and Beyond

CAL-W-67-14 (17 Nov 2022)

ชื่อย่อเครื่องวัด Automatic Thriller

รุ่น T100Line 7000

เลขที่ใบงาน WD-0066577

หมายเลขเครื่อง 10013626

การสอบ (ปี)	รายการการตรวจ	การสอบ (ปี)	หมายเหตุ
26 Dec 2024		26 Dec 2024	
ผ่าน ไม่ผ่าน		ผ่าน ไม่ผ่าน	
	General		
<input type="checkbox"/>	1. ตรวจสอบรุ่นเครื่อง	<input type="checkbox"/>	
<input type="checkbox"/>	2. ตรวจสอบสาย (ของใช้ไม่สะอาด, สายวัดไม่แน่น)	<input type="checkbox"/>	
<input type="checkbox"/>	3. ทดสอบ On-Off สวิตช์ (On-Off Switch)	<input type="checkbox"/>	
<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input type="checkbox"/>	
<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input type="checkbox"/>	
	Spectrophotometer		
<input type="checkbox"/>	6. แบตเตอรี่ (Battery Backup) >= 2.6 VDC	<input type="checkbox"/>	
<input type="checkbox"/>	7. ควบคุมความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	
<input type="checkbox"/>	8. ตรวจสอบความยาวคลื่น (Wavelength Check)	<input type="checkbox"/>	
<input type="checkbox"/>	9. เวลาจำแนก (UV < 3,000 hour)	<input type="checkbox"/>	
<input type="checkbox"/>	10. เวลาจำแนก (Visible < 5,000 hour)	<input type="checkbox"/>	
<input type="checkbox"/>	11. ชุดวัดความนำไฟฟ้า (Conductivity Module)	<input type="checkbox"/>	
	pH Meter and Conductivity Meter		
<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	
<input type="checkbox"/>	13. อิเล็กโทรดละลาย (Electrode (Leak KCl))	<input type="checkbox"/>	
<input type="checkbox"/>	14. หัววัดฝุ่น (Dust Protection Head)	<input type="checkbox"/>	
<input type="checkbox"/>	15. ขั้วสัมผัสไฟฟ้า (Stand)	<input type="checkbox"/>	
	Turbidimeter		
<input type="checkbox"/>	16. ตัวอย่างที่หาค่า (No Sample)	<input type="checkbox"/>	
<input type="checkbox"/>	17. ขั้วสัมผัสไฟฟ้า (No Sample)	<input type="checkbox"/>	
	Automatic Strider		
<input type="checkbox"/>	18. 60Hz Proton Burster	<input type="checkbox"/>	
<input type="checkbox"/>	19. Function Rinsing and Drying	<input type="checkbox"/>	
<input type="checkbox"/>	20. ขั้วสัมผัสไฟฟ้า (No Sample)	<input type="checkbox"/>	

เซ็นเซอร์อัตโนมัติ

Mr. Atsachai Ngsanchanal

Service Engineer

DKSH Instrument Limited
201 North Bridge Road, Singapore 088400
Phone: +65 3357 7000 Email: info@dksh.com.sg

Cal. File R31-03 29 Jul 2022

ภาคผนวก จ

หนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
จากกรมโรงงานอุตสาหกรรม

ที่ อก ๐๓๐๑(๑)/ ๑ ๖ ๑ ๘



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๖๐๐

๒ ๐ พฤศจิกายน ๒๕๖๖

เรื่อง ค่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ค่ออายุ/เปลี่ยนแปลงบุคลากร และขอปิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๔ สิงหาคม ๒๕๖๖

สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ แผ่น
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอค่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๔ สดวนที่สิ่งเลขที่ ๑๐๔ ขอขออนุญาต ๔๐
ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ต่อกรมโรงงานอุตสาหกรรม นับ

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ความเห็นชอบ และออกหนังสือ รับขึ้นทะเบียน
ค่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ ๓๘๑ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนวิเคราะห์ในน้ำเสีย น้ำใต้ดิน อากาศเสีย สิ่งปฏิกูล
หรือวัสดุที่ไม่ใช้แล้ว และดิน ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๘ หากประสงค์จะค่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดของหนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
ครั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ทั้งนี้ขอให้ท่านรีบดำเนินการยื่นขอต่อกรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิระ ชื่นพันธ์)

อธิบดีกรมโรงงานอุตสาหกรรม
ผู้อำนวยการกองส่งเสริมและสนับสนุนโรงงาน
ปฏิบัติการตามแผนปฏิบัติการด้านความปลอดภัย

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบและทะเบียนห้องปฏิบัติการ

โทร ๐ ๒๕๓๖ ๖๓๑๒ ต่อ ๒๕๐๑๔

โทรสาร ๐ ๒๕๓๖ ๖๓๑๒ ต่อ ๒๕๐๔๔

ไปรษณีย์อิเล็กทรอนิกส์ sarabangadw@mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



เอกสารแนบท้ายหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด เลขทะเบียน ๖-๒๐๔
ที่ อก ๐๓๐๑(๑)/ ๑ ๖ ๑ ๘ ลงวันที่ ๒ ๐ พฤศจิกายน ๒๕๖๖

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๓๘๑ ราย

- ๑) นายเกษม บัณฑิต กิตติคุณชัย
- ๒) นายภัทรพล สว่างใจธรรม
- ๓) นายบรรณิปป เทือกชัยคำ
- ๔) นายศิริโชค พรหมประสม
- ๕) นายณัฐวัฒน์ คิ้วแพง
- ๖) นางสาวจินดา โชติธรรม
- ๗) นางสาววราภรณ์ น้อยเสถียร
- ๘) นางสาวชนัญญาญญ์ อินชม
- ๙) นางสาววันวิมล สายเสถียร
- ๑๐) นางสาวนันทาดี สมบูรณ์
- ๑๑) นางสาวศรินดา เจริญจันทร์
- ๑๒) นางสาวณัฐพร มงคลจิตร
- ๑๓) นางสาวศิริลักษณ์ บุญนาค
- ๑๔) นายณพพงศ์ จันทร์พันธุ์
- ๑๕) นายบรรณิปป เทือกชัยคำ
- ๑๖) นายณัฐวัฒน์ คิ้วแพง
- ๑๗) นางสาวณิชากรินทร์ แก้วมัน
- ๑๘) นางสาวสุวิมล ชัยเรืองวุฒิ
- ๑๙) นางสาวสุชาดา ธรรมถาวร
- ๒๐) นางสาวเปรมิกา ชื่นเดชบุญกุล
- ๒๑) นางสาวศศิธร พุ่มวิทย์
- ๒๒) นางสาวเสาวลักษณ์ กุณาอำพร
- ๒๓) นายอภิสิทธิ์ สิงหา
- ๒๔) นายศักดิ์สิทธิ์ ไพศาลพิบูลย์
- ๒๕) ว่าที่ร้อยตรีหญิง พรหมนิภา ขำเจริญ
- ๒๖) นางจิลดา คำแก้ว
- ๒๗) นางสาวอรพรรณ ภิรมย์
- ๒๘) นางสาวนพรัตน์ อัมมการณ
- ๒๙) นางจุลลดา วารินทร์
- ๓๐) นางสาวกาญจนา รุ่งคำ
- ๓๑) นายพริ้ม ศรีปิตะบุตร
- ๓๒) นายอุทัย คุ้มสัน
- ๓๓) ว่าที่ร้อยตรี เติมเกียรติ อมรศรีเสริม
- ๓๔) นางสาววิภา สว่างมา
- ๓๕) นายอนุพงศ์ รัตนประเสริฐ

- ทะเบียนเลขที่ ๖-๒๐๔-๙-๐๐๐๑
- ทะเบียนเลขที่ ๖-๒๐๔-๙-๐๐๐๒
- ทะเบียนเลขที่ ๖-๒๐๔-๙-๐๐๐๓
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- ทะเบียนเลขที่ ๖-๒๐๔-๙-๐๐๓๕

๓๖) นางสาวจุฑาทิพย์

- ๓๖) นางสาวจุฑาทิพย์ โอนันต์เพ็ญ
- ๓๗) นางสาวจางวรรณ พิมพ์กฤตติยา
- ๓๘) นางสาวปรารถนา ศิริโชค
- ๓๙) นางสาววราภรณ์ น้อยเสถียร
- ๔๐) นางสาวจิราพร ศิริโชค
- ๔๑) นายวราภรณ์ น้อยเสถียร
- ๔๒) นายทรง วิริยะสกลกิจ
- ๔๓) นายณัฐวัฒน์ คิ้วแพง
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- ๑๐๐) นายณัฐวัฒน์ คิ้วแพง

๓๗) นายประเสริฐ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
19	Copper	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
20	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
21	2,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
22	4,4'-DDD	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
23	2,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
24	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
25	2,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
27	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
28	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
29	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
30	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
31	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
32	Endrin Aldehyde	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
33	Formaldehyde	Distillation, Colorimetric Method ⁽⁴⁾
34	Free Chlorine	1) DPD Ferrous Titrimetric Method ⁽⁴⁾ 2) DPD Colorimetric Method ⁽⁴⁾
35	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
36	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
37	Hexavalent Chromium	Colorimetric Method ⁽⁴⁾
38	3-Hydroxycarbofuran	High-Performance Liquid Chromatographic Method ⁽⁴⁾
39	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

40 Manganese...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
40	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
41	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
42	Methiocarb	High-Performance Liquid Chromatographic Method ⁽⁴⁾
43	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
44	Methomyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
45	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
46	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽⁴⁾ 2) Soxhlet Extraction Method ⁽⁴⁾
47	Oxamyl	High-Performance Liquid Chromatographic Method ⁽⁴⁾
48	Propoxur	High-Performance Liquid Chromatographic Method ⁽⁴⁾
49	pH	Electrometric Method ⁽⁴⁾
50	Phenols	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Distillation, Direct Photometric Method ⁽⁴⁾
51	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
52	Sulfide	Iodometric Method ⁽⁴⁾
53	Temperature	Laboratory and Field Methods ⁽⁴⁾
54	Total Dissolved Solids	Dried at 180 °C ⁽⁴⁾
55	Total Kjeldahl Nitrogen	Semi-Micro Kjeldahl Method ⁽⁴⁾
56	Total Phosphorous	Digestion, Colorimetric Method ⁽⁴⁾
57	Total Suspended Solids	Dried from 103-105 °C ⁽⁴⁾
58	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	Trivalent Chromium	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
60	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾

น้ำดื่ม...

น้ำดื่ม จำนวน 126 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
8	Barium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
9	Benz(a)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
11	Benzo(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
12	Benzo(k)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
13	Benzoic Acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
14	Benzo(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
15	Benzo(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

18 Bis(2-ethylhexyl)phthalate...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
32	2-Chlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ⁽⁴⁾
35	Chromium (VI)	Colorimetric Method ⁽⁴⁾

36 Chrysene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
36	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
37	Cyanide	Distillation, Colorimetric Method ⁽⁴⁾
38	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
39	DDO	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
40	DDE	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
41	DDT	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
42	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
43	Di-n-Butyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
47	3,3-Dichlorobenzidine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
53	2,4-Dichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

56 1,3-Dichloropropene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
57	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
58	Diethyl Phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
59	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
60	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
61	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
62	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
63	Di-n-octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
64	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
65	Endrin	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
67	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
68	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
69	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
70	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
71	Hexachlorobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
73	n-Hexane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
74	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
75	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

76 γ-HCH...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
76	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
77	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
78	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
79	Indeno(1,2,3-cd)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
80	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
81	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
83	Mercury	1) Digestion, Cold Vapor Atomic Absorption Spectrometric Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
84	Methanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
85	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
86	Methyl bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
87	Methylene chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
88	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
89	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
90	Methyl tert-butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
91	Naphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
93	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾

94 N-Nitrosodiphenylamine...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
94	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
95	N-Nitrosodi-n-Propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
96	Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
97	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
98	pH	Electrometric Method ⁽⁴⁾
99	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
100	Phenol	1) Distillation, Chloroform Extraction Method ⁽⁴⁾ 2) Distillation, Direct Photometric Method ⁽⁴⁾ 3) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
101	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
102	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
103	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽⁴⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽⁴⁾
104	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
105	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
106	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
107	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
108	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽⁴⁾
109	TPH (C ₃ -C ₉)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(4,28)

110 TPH (C₁₀-C₁₆)...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
110	TPH (C ₉ -C ₁₀)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^{9,22}
111	TPH (C ₁₁ -C ₁₃)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^{9,22}
112	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
113	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
114	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
115	Trichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
116	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁶¹
117	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ⁶¹
118	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
119	Vanadium	1) Digestion, Inductively Coupled Plasma Method ⁶² 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
120	Vinyl acetate	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
121	Vinyl chloride	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
122	m-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
123	o-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶¹
124	p-Xylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶²
125	Xylene (Total)	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁶²
126	Zinc	1) Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹

ตรวจพบ...

ตรวจพบ (ไม่ตรวจพบ) จำนวน 28 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Antimony	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
2	Arsenic	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶² 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
3	Beryllium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
4	Cadmium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
5	Carbon Monoxide	1) Instrumental Analyzer Method ⁶¹ 2) Sampling Bag Non-Dispersive Infrared Method ⁶¹
6	Chlorine	1) Adsorption Sampling, Ion Chromatographic Method ⁶¹ 2) Isokinetic Sampling, Ion Chromatographic Method ⁶¹
7	Chromium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
8	Cobalt	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
9	Copper	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶²
10	Cresol	Absorption Sampling, Gas Chromatographic Method ⁶¹
11	Dioxins	Isokinetic Sampling ⁶¹
12	Hydrogen Chloride	1) Absorption Sampling, Ion Chromatographic Method ⁶¹ 2) Isokinetic Sampling, Ion Chromatographic Method ⁶¹
13	Hydrogen Fluoride	1) Absorption Sampling, Ion Chromatographic Method ⁶¹ 2) Isokinetic Sampling, Ion Chromatographic Method ⁶¹
14	Hydrogen Sulfide	Absorption Sampling, Iodometric Method ⁶¹

15 Lead...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
15	Lead	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶²
16	Manganese	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
17	Mercury	1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁶¹ 2) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁶¹
18	Nickel	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
19	Opacity	Ringelmann's Method ⁶¹
20	Oxides of Nitrogen	1) Absorption Sampling, Phenoldisulfonic Acid Method ⁶¹ 2) Absorption Sampling, Alkaline Permanganate/Colorimetric Method ⁶¹ 3) Instrumental Analyzer Method ⁶¹
21	Selenium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
22	Sulfur Dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ⁶¹ 2) Instrumental Analyzer Method ⁶¹
23	Sulfuric Acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ⁶¹
24	Tellurium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
25	Tin	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶² 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
26	Total Suspended Particulate	1) Isokinetic Sampling, Gravimetric Method ⁶¹ 2) Paired Train, Isokinetic Sampling, Gravimetric Method ⁶¹

27 Vanadium...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
27	Vanadium	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ⁶¹ 2) Isokinetic Sampling, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ⁶¹
28	Xylene	Absorption Sampling, Gas Chromatographic Method ⁶¹

สิ่งปฏิกูลหรือวัสดุที่ไม่เป็นพิษ จำนวน 35 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^{13,24} 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^{13,24} 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^{13,24}
2	Antimony	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{13,16} 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{13,17} 3) Digestion, Inductively Coupled Plasma Method ^{13,18} 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{13,17}
3	Arsenic	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{13,16} 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{13,17} 3) Digestion, Inductively Coupled Plasma Method ^{13,18} 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{13,17}
4	Barium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{13,16} 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{13,17} 3) Digestion, Inductively Coupled Plasma Method ^{13,18} 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^{13,17}

5 Beryllium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
5	Beryllium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.4.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.4.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
6	Cadmium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.4.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.4.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
7	Chlordane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
8	Chromium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.4.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.4.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
9	Chromium (III)	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.4.16,19) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^(1.4.17,19) 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.15,19) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.17,19)

10 Chromium (VI)...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
10	Chromium (VI)	1) Waste Extraction, Colorimetric Method ^(1.4.19) 2) Alkaline Digestion, Colorimetric Method ^(1.19)
11	Cobalt	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.4.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.4.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
12	Copper	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.4.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.4.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
13	2,4-D	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
14	DDO	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
15	DDE	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
16	DDT	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)

2) Soxhlet...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
17	Dieldrin	2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
18	Endrin	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
19	Heptachlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
20	Lead	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.4.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.4.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
21	Lindane	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)

22 Mercury...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.4.20) 2) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(1.4.20) 3) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.9) 4) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^(1.9) 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ⁽²¹⁾
23	Methoxychlor	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
24	Mirex	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24)
25	Molybdenum	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.4.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.4.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
26	Nickel	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.4.14) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1.4.17) 3) Digestion, Inductively Coupled Plasma Method ^(7.14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7.17)
27	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9.24) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1.9.24) 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^(1.9.24)

- 2-Chlorobiphenyl...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
28	<ul style="list-style-type: none"> - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5',6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl - Pentachlorophenol 	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1.9,26) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,20) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26) Electrometric Method ^(23,25) 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,17) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
29	pH	
30	Selenium	

31 Silver...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
31	Silver	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
32	Thallium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
33	Toxaphene	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,9,26) 2) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,20) 3) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
34	Vanadium	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
35	Zinc	1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,4,16) 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(1,4,17) 3) Digestion, Inductively Coupled Plasma Method ^(7,14) 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)

ดิน...

ดิน จำนวน 125 รายการ

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
1	Acenaphthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
2	Acetone	1) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,25) 2) Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(1,13)
3	Aldrin	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
4	Anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
5	Antimony	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
6	Arsenic	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
7	Atrazine	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
8	Barium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
9	Benz(a)anthracene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
10	Benzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,25)

11 Benzo(b)fluoranthene

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
11	Benzo(b)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
12	Benzo(k)fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
13	Benzoic acid	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
14	Benzo(a)pyrene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
15	Benzo(g,h,i)perylene	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
16	Beryllium	1) Digestion, Inductively Coupled Plasma Method ^(7,14) 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^(7,17)
17	Bis(2-chloroethyl)ether	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
18	Bis(2-ethylhexyl)phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)
19	Bromodichloromethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,25)
20	Bromoform	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(15,25)
21	Butanol	Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^(15,25)
22	Butyl Benzyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(10,26) 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,26)

23 Cadmium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
23	Cadmium	1) Digestion, Inductively Coupled Plasma Method ^(7.14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
24	Carbazole	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
25	Carbon Disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
27	Chlordane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
28	p-Chloroaniline	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
31	Chloroform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
32	2-Chlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
33	Chromium	1) Digestion, Inductively Coupled Plasma Method ^(7.14) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^(7.17)
34	Chromium (III)	1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.14,15) 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^(7.17,18)
35	Chromium (VI)	Alkaline Digestion, Colorimetric Method ^(8.13)

36 Chrysene...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
36	Chrysene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
37	Cyanide	Extraction, Distillation, Colorimetric Method ^(7.23,24)
38	2,4-D	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
39	DDD	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
40	DDE	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
41	DDT	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
42	Dibenz(a,h)anthracene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
43	Di-n-Butyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
44	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
45	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
46	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
47	3,3-Dichlorobenzidine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
48	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)

49 1,2-Dichloroethane...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
49	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
50	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
51	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
52	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
53	2,4-Dichlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
54	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
55	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
56	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
57	Dieldrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
58	Diethyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
59	2,4-Dimethylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
60	2,4-Dinitrophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
61	2,4-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
62	2,6-Dinitrotoluene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)

63 Di-n-Octyl Phthalate...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
63	Di-n-Octyl Phthalate	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
64	Endosulfan	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
65	Endrin	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
66	Ethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
67	Fluoranthene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
68	Fluorene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
69	Heptachlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
70	Heptachlor epoxide	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
71	Hexachlorobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(10.24) 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
72	Hexachloro-1,3-butadiene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23)
73	n-Hexane	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(15.23) 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽¹¹⁾

73 n-Hexane...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
74	α -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
75	β -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
76	γ -HCH	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
77	Hexachlorocyclopentadiene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
78	Hexachloroethane	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
79	Indeno(1,2,3-cd)pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
80	Isophorone	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
81	Lead	1) Digestion, Inductively Coupled Plasma Method ⁽²⁾⁽¹⁾⁽³⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾⁽¹⁾⁽⁷⁾
82	Manganese	1) Digestion, Inductively Coupled Plasma Method ⁽²⁾⁽¹⁾⁽³⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾⁽¹⁾⁽⁷⁾
83	Mercury	1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽²⁾⁽³⁾ 2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ⁽²⁾⁽¹⁾ 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ⁽²⁾⁽⁴⁾

84 Methanol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
84	Methanol	1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
85	Methoxychlor	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
86	Methyl Bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
87	Methylene Chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
88	2-methylphenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
89	2-Methylnaphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
90	Methyl tert-Butyl Ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
91	Naphthalene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
92	Nickel	1) Digestion, Inductively Coupled Plasma Method ⁽²⁾⁽¹⁾⁽³⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾⁽¹⁾⁽⁷⁾
93	Nitrobenzene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
94	N-Nitrosodiphenylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
95	N-Nitrosodi-n-propylamine	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾

96 Polychlorinated biphenyls (PCBs)

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
96	Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,2',3,4',5'-Pentachlorobiphenyl - 2,2',3,4,5'-Hexachlorobiphenyl - 2,2',3,5,5',6'-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5'-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5',6'-Heptachlorobiphenyl - 2,2',3,4',5,5',6'-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6'-Nonachlorobiphenyl	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
97	Pentachlorophenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
98	Phenanthrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾

99 Phenol...

ลำดับที่	สารมลพิษ	วิธีวิเคราะห์
99	Phenol	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
100	Pyrene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
101	Selenium	1) Digestion, Inductively Coupled Plasma Method ⁽²⁾⁽¹⁾⁽³⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾⁽¹⁾⁽⁷⁾
102	Silver	1) Digestion, Inductively Coupled Plasma Method ⁽²⁾⁽¹⁾⁽³⁾ 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ⁽²⁾⁽¹⁾⁽⁷⁾
103	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
104	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
105	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
106	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
107	Toxaphene	1) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
108	TPH (C ₅ -C ₈)	1) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁴⁾
109	TPH (C ₉ -C ₁₂)	1) Automated Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Solvent Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽³⁾ 3) Ultrasonic Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽³⁾
110	TPH (C ₁₃ -C ₁₅)	1) Automated Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽³⁾ 2) Solvent Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽³⁾ 3) Ultrasonic Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽³⁾
111	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
112	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
113	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾
114	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽³⁾

115 2,4,5-Trichlorophenol...

อนึ่ง หนังสือฉบับนี้จะมีผลตั้งแต่วันที่ออก之日起เป็นอันขาด
ในวันที่ ๒ กันยายน ๒๕๖๕

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายพรหม ก่อเกียรติ)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมอุตสาหกรรม

กองวิจัยและพัฒนายุทธศาสตร์
กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียน
โทร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕
ไปรษณีย์อิเล็กทรอนิกส์ sarabang@div.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๑)/ ๑๒๓๖ ๘



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๔ ธันวาคม ๒๕๖๕

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอนเอเอส แล็บราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขอคืนสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒ ธันวาคม ๒๕๖๕

ตามคำขอที่อ้างถึง บริษัท เอนเอเอส แล็บราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๕ สถานที่ตั้งเลขที่ ๑๐๕ ซอยพัฒนาการ ๕๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๘ ราย ได้แก่

๑) นายประพนธ์ วรรณชัย	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๐
๒) นายจิรเมธี ขวรสอ	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๑
๓) นายพิรพัฒน์ คำคำ	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๒
๔) นางสาวอรุณ คำคำ	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๓
๕) นายกิตติพงษ์ แซ่ลี	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๔
๖) นายจิรเมธี ประเสริฐสิทธิ์	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๕
๗) นายภัทรพงษ์ มณฑาทอง	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๖
๘) นางสาวจรรยาพร กระจำพันธุ์	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๗

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรศักดิ์ อัครางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนายุทธศาสตร์โรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ

โทร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

ไปรษณีย์อิเล็กทรอนิกส์ sarabang@div.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"



ที่ อก ๐๓๑๐(๑)/ ๑๒๓๖ ๘



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๐ เมษายน ๒๕๖๕

เรื่อง ยกเลิกบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอนเอเอส แล็บราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขอคืนสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๒ เมษายน ๒๕๖๕

ตามคำขอที่อ้างถึง บริษัท เอนเอเอส แล็บราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๕ สถานที่ตั้งเลขที่ ๑๐๕ ซอยพัฒนาการ ๕๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอยกเลิกบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์
จำนวน ๒ ราย ได้แก่

๑) นายธีรศักดิ์ บัวแดง	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๐
๒) นายมงคล ผลาภัย	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๑

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรศักดิ์ อัครางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนายุทธศาสตร์โรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ

โทร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

ไปรษณีย์อิเล็กทรอนิกส์ sarabang@div.mail.go.th



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ที่ อก ๐๓๑๐(๑)/ ๑๒๓๖ ๘



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๕๐๐

๑๕ มิถุนายน ๒๕๖๕

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอนเอเอส แล็บราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และขอคืนสารเคมีของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๗ พฤษภาคม ๒๕๖๕

ตามคำขอที่อ้างถึง บริษัท เอนเอเอส แล็บราทอรี่ กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการ
วิเคราะห์เอกชน เลขทะเบียน ๖-๒๐๕ สถานที่ตั้งเลขที่ ๑๐๕ ซอยพัฒนาการ ๕๐ ถนนพัฒนาการ แขวงพัฒนาการ
เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากร ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เพิ่มเจ้าหน้าที่ห้องปฏิบัติการวิเคราะห์เอกชน
จำนวน ๑๑ ราย ได้แก่

๑) นายคุณากร มั่นชื่น	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๘
๒) นายชัยมงคล แสนมาตร	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๐๙
๓) นายเอกกรีนทร์ บุณย์สิทธิ์	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๐
๔) นายพิชานนท์ อินทิก	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๑
๕) นายศุภวราห์ แก้วกันหา	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๒
๖) นายวิกรม มีศิริ	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๓
๗) นายคณินท์ คำจันทร์	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๔
๘) นายศิริวิทย์ มีโพธิ์	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๕
๙) นายธีรพงษ์ ศรีคำแหง	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๖
๑๐) นายอภิสิทธิ์ ศรีวงษ์	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๗
๑๑) ว่าที่ร้อยตรี กาญจน์ แสนศิริ	ทะเบียนเลขที่ ๖-๒๐๕-๑-๐๑๑๘

อนึ่ง หนังสือฉบับนี้จะมีผลตั้งแต่วันที่ออก之日起เป็นอันขาด
ในวันที่ ๒ กันยายน ๒๕๖๕

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายธีรศักดิ์ อัครางกูร ณ อยุธยา)
รองอธิบดี ปฏิบัติราชการแทน
อธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและพัฒนายุทธศาสตร์โรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนห้องปฏิบัติการ

โทร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๕๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

ไปรษณีย์อิเล็กทรอนิกส์ sarabang@div.mail.go.th



"อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว"





บริษัท เอแอลเอส แลборาทอรี กรุ๊ป (ประเทศไทย) จำกัด
104 ซอยพัฒนาการ 40 ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร 10250
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