

ภาคผนวก ค

- สำเนาใบรับรองมาตรฐาน ISO/IEC 17025/2017

- สำเนาใบรับรองมาตรฐาน ISO 9001/2015



Ref No. : 0303/17005

CERTIFICATE OF TESTING LABORATORY ACCREDITATION

This is to certify that

SGS (Thailand) Limited, Laboratory Services
10, 10/1-4 and 12 Soi Rama III S.59,
Chong Nonsi, Yan Nawa, Bangkok 10120

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

LABORATORY ACCREDITATION
Accreditation Number TESTING - 0017

BLA-DSS

The scope of accreditation is as annexed hereto

Issue date : 7th November 2022Expired date : 6th November 2026Signature : 

Director of Bureau of Laboratory Accreditation

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

Scope of Laboratory Accreditation

Laboratory Name : SGS (Thailand) Limited, Laboratory Services

Address : 10, 10/1-4 and 12 Soi Rama III S.59,
 Chong Nonsi, Yan Nawa, Bangkok 10120

Accreditation Number : Testing - 0017

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1	Water	- Cadmium 0.002 mg/L to 0.1 mg/L - Copper 0.01 mg/L to 1.0 mg/L - Lead 0.01 mg/L to 1.0 mg/L - Manganese 0.1 mg/L to 4.0 mg/L - Nickel 0.01 mg/L to 1.0 mg/L - Zinc 0.01 mg/L to 1.0 mg/L - Arsenic 0.002 mg/L to 0.008 mg/L	In - house method : LBEN-05119 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 3120 B, 3030 F In - house method : LBEN-05119 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 3114 C

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Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	- Antimony 0.63 µg/L to 12.5 µg/L - Arsenic 0.63 µg/L to 6.25 µg/L - Cadmium 0.63 µg/L to 6.25 µg/L - Chromium 0.63 µg/L to 12.5 µg/L - Cobalt 1.25 µg/L to 62.5 µg/L - Copper 0.63 µg/L to 6.25 µg/L - Lead 0.63 µg/L to 6.25 µg/L - Manganese 0.63 µg/L to 6.25 µg/L	In - house method : LBEN-14004 based on United States Environmental Protection Agency, 2014, EPA Method 6020B, Revision 2

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1 (cont.)	Water	- Nickel 0.63 µg/L to 6.25 µg/L - Silver 2.5 µg/L to 62.5 µg/L - Zinc 2.5 µg/L to 62.5 µg/L - Mercury 0.5 µg/L to 8.0 µg/L - Hexavalent chromium 1.0 µg/L to 6.25 µg/L	In - house method : LBEN-14004 based on United States Environmental Protection Agency, 2014, EPA Method 6020B, Revision 2 In - house method : LBEN-08145 based on United States Environmental Protection Agency, 1994, EPA Method 245.1, Revision 3.0 ISO 18412 : 2005

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	<p>- pH 6.0 to 10.0</p> <p>- Ammonia - Nitrogen 0.10 mg/L to 10.0 mg/L</p> <p>- Total phosphorus 0.10 mg/L to 10.0 mg/L</p>	<p>In - house method : LBEN-09152 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - H⁺ B</p> <p>In-house method : LBEN-19003 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500 - NH₃ F</p> <p>In - house method : LBEN-19002 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-P J</p>

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	<p>- Oil and Grease 0.50 mg/L to 100.0 mg/L</p> <p>- Color 0.10 m⁻¹ to 10.00 m⁻¹</p> <p>- Phenol 0.001 mg/L to 0.10 mg/L</p> <p>- Cyanide 0.01 mg/L to 0.50 mg/L</p>	<p>In - house method : LBEN-18005 based on United States Environmental Protection Agency, 2010, EPA, Method 1664, Revision B</p> <p>ISO 7887 : 2011, method B</p> <p>In - house method : LBEN-15007 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 5530 B, C</p> <p>In - house method : LBEN-97018 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23rd ed., 2017, part 4500-CH⁻ C, E</p>

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	<p>- Navy Blue 1.0 mg/L to 7.5 mg/L</p> <p>Azo colorants</p> <p>- Aniline</p> <p>- n-Methylaniline</p> <p>- p-Toluidine</p> <p>- o-Toluidine</p> <p>- m-Toluidine</p> <p>- n-Ethylaniline</p> <p>- 2-Chloroaniline</p> <p>- 2,4-Xyldine</p> <p>- 2,6-Xyldine</p> <p>0.10 µg/L to 3.00 µg/L</p>	<p>In - house method : LBLC-19004 based on United States Environmental Protection Agency, 2007, EPA Method 8321 B</p> <p>In - house method : SOP LBGC-18004 based on ISO 14362-1 : 2017</p>

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	<p>Azo colorants</p> <p>- o-Anisidine</p> <p>- 4-Chloroaniline</p> <p>- n,n-diethylaniline</p> <p>- p-Cresidine</p> <p>- 2,4,5-Trimethylaniline</p> <p>- 4-Chloro-o-toluidine</p> <p>- 2,4-Toluenediamine</p> <p>- 2,4-Diaminoanisole</p> <p>- 2-Naphtylamine</p> <p>- 5-Nitro-o-toluidine</p> <p>- 5-Nitro-o-anisidine</p> <p>- 4-Aminobiphenyl</p> <p>- 4-Aminoazobenzene</p> <p>- 4,4'-Oxydianiline</p> <p>0.10 µg/L to 3.00 µg/L</p>	<p>In - house method : SOP LBGC-18004 based on ISO 14362-1 : 2017</p>

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1 (cont.)	Water	Azo colorants - Benzidine - 4,4'-Thiodianiline - o-Aminoazotoluene - 3,3'-Dimethyl-4,4'-diaminodiphenylmethane - 3,3'-Dimethylbenzidine - 4,4'-Thiodianiline - 3,3'-Dichlorobenzidine - 4,4'-Methylene-bis-(2-chloro aniline) - 3,3'-Dimethoxybenzidine 0.10 µg/L to 3.00 µg/L	In - house method : SOP LBGC-18004 based on ISO 14362-1 : 2017

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1 (cont.)	Water	Organotin Compounds - Trimethyltin(TMT) - Dimethyltin(DMT) - Dipropyltin-dichloride(DProT) - Monobutyltin(MBT) - Tripropyltin(TPrT) - Dibutyltin(DBT) - Tributyltin(TBT) - Mono-octyltin(MOT) - Tetra-butyltin(TeBT) - Diphenyltin(DPhT) - Dioctyltin(DOT) - Triphenyltin(TPhT) - Tri-cyclohexyltin(TCyT) - Tri-n-octyltin(TOT) 0.05 µg/L to 2.0 µg/L	In - house method : SOP LBGC-18006 based on ISO 17353 : 2004

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Polycyclic Aromatic Hydrocarbons (PAHs) - Naphthalene - 2-Methylphtalene - 1-Methylphtalene - Acenaphthylene - Acenaphthene - Fluorene - Phenanthrene - Anthracene - Fluoranthene - Pyrene - Cyclopenta (c,d) pyrene - Benzo(a) Anthracene - Chrysene 0.01 µg/L to 2.0 µg/L	In - house method : SOP LBGC-18008 based on DIN 38407-39 : 2011

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Polycyclic Aromatic Hydrocarbons (PAHs) - Benzo (b) Fluoranthene - Benzo (j) Fluoranthene - Benzo (k) Fluoranthene - Benzo (e) pyrene - Benzo (a) pyrene - Indenol (1,2,3-cd) pyrene - Dibenzo (ah) anthracene - Benzo (ghi) perylene 0.01 µg/L to 2.0 µg/L	In - house method : SOP LBGC-18008 based on DIN 38407-39 : 2011

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1 (cont.)	Water	Chlorophenol - 4-Chloro-3-methylphenol - 2-Chlorophenol - 3-Chlorophenol - 4-Chlorophenol - 2,4-Dichlorophenol - 2,5-Dichlorophenol - 2,6-Dichlorophenol - 3,5-Dichlorophenol - 2,3-Dichlorophenol - 3,4-Dichlorophenol - Pentachlorophenol - 2,3,4,6-Tetrachlorophenol 0.5 µg/L to 20.0 µg/L	In - house method : SOP LBGC-18003 based on ISO 17070 : 2015

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1 (cont.)	Water	Chlorophenol - 2,4,5-Trichlorophenol - 2,4,6-Trichlorophenol - 2,3,4-Trichlorophenol - 2,3,5-Trichlorophenol - 3,4,5-Trichlorophenol - 2,3,4,5-Tetrachlorophenol - 2,3,5,6-Tetrachlorophenol - 2,3,6-Trichlorophenol 0.5 µg/L to 20.0 µg/L Phthalates - Dimethyl phthalate - Diethyl phthalate - Di-iso-butyl phthalate - Benzyl buthyl phthalate 5 µg/L to 30 µg/L	In - house method : SOP LBGC-18003 based on ISO 17070 : 2015 In - house method : SOP LBGC-18007 based on ISO 18856 : 2004

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Phthalates - Di-butyl phthalate - Di-2-ethyl hexyl phthalate - Di-isononyl phthalate - Bis-methylglycol ester phthalate - Di-isoheptyl phthalate - Bis cyclohexyl phthalate - Di-n-octyl phthalate - Bis (2-propylheptyl) phthalate - Bis-nonyl phthalate - Bis-propyl phthalate - Bis-iso-pentyl phthalate - n-pentyl-iso-pentyl phthalate - Bis-n-pentyl phthalate - Di-n-hexyl phthalate - Bis-iso-octyl phthalate - Di-isodecyl phthalate 5 µg/L to 30 µg/L	In - house method : SOP LBGC-18007 based on ISO 18856 : 2004

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Volatile Organic Compound - Methylene Chloride - Benzene - 1,2-Dichloroethane - Trichloroethylene - Tetrachloroethylene - Total Xylene 5 µg/L to 20 µg/L - p- Cresol - o- Cresol - m- Cresol 5 µg/L to 25 µg/L	In - house method : SOP LBGC-18009 based on United States Environmental Protection Agency, 1996, EPA, Method 8260B, Revision 2.0 In - house method : SOP LBGC-18010 based on United States Environmental Protection Agency, 1996, EPA, Method 8260 B, Revision 2.0

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Perfluorocarbons (PFCs) : - 6:2 FTOH - 8:2 FTOH - 10:2 FTOH - 6:2 FTA - 8:2 FTA - 10:2 FTA 5 µg/L to 25 µg/L Flame retardants - 2,2-bis(bromomethyl)-1,3-propane-diol - Tris (2-chloroethyl) phosphate - Tris (1,3-dichloro-isopropyl) phosphate - Hexabromocyclododecane 5.0 µg/L to 25.0 µg/L	In - house method : LBEGC-18011 based on GB/T 29493.2 : 2013 In - house method : LBGC-18005 based on United States Environmental Protection Agency, 2005, EPA, Method 527, Revision 1.0

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Flame retardants - Polybrominated biphenyls ethers - Polybrominated diphenyl ethers 0.25 µg/L to 1.5 µg/L Disperse dyes - Basic violet 1 - Basic violet 3 - Disperse Blue 1 - Disperse Blue 7 - Disperse Brown 1 - Disperse Orange 1 - Disperse Orange 3 - Disperse Orange 11 - Disperse Orange 37/76 - Disperse Red 1 10.0 µg/L to 50.0 µg/L	In - house method : LBGC-18005 based on United States Environmental Protection Agency, 2005, EPA, Method 527, Revision 1.0 In - house method : LBLC-18002 based on Journal of Chromatographic Science 2015, 53 : page 1257-1264

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Disperse dyes - Disperse Violet 1 - Disperse Yellow 1 - Disperse Yellow 9 - Disperse Yellow 39 - Disperse Yellow 54 - Solvent Yellow 1 - Solvent Yellow 2 - Solvent Yellow 3 - Solvent Yellow 14 10.0 µg/L to 50.0 µg/L	In - house method : LBLC-18002 based on Journal of Chromatographic Science 2015, 53 : page 1257-1264

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1 (cont.)	Water	Flame retardant - Tris (2,3-dibromopropyl) phosphate - Bis (2,3-dibromopropyl) phosphate 1.00 µg/L to 4.00 µg/L - Glycol 20 µg/L to 100 µg/L	In - house method : LBLC-18001 based on ISO 18857-2 : 2009 In - house method : LBGC-18012 based on United States Environmental Protection Agency, 2014, EPA, Method 600/R-14/008

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	- Conductivity 147 µS/cm to 12 880 µS/cm - Total solids dried at 103 °C to 105 °C 50 mg/L to 20 000 mg/L - Total suspended solids dried at 103 °C to 105 °C 5 mg/L to 10 000 mg/L	In - house method : LBEN-02110 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2510 B In - house method : LBEN-09150 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2540 B In - house method : LBEN-97042 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2540 D

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	- Total dissolved solids dried at 180 °C 50 mg/L to 20 000 mg/L - Total hardness (calculates as CaCO ₃) 1 mg/L to 300 mg/L - BOD 2 mg/L to 2 100 mg/L	In - house method : LBEN-00106 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2540 C In - house method : LBEN-00098 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2340 C In - house method : LBEN-97006 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5210 B

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1 (cont.)	Water	- COD 10 mg/L to 300 mg/L - COD 10 mg/L to 400 mg/L - pH 4.0 to 9.2	In - house method : LBEN-97010 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5220 C In - house method : LBEN-12161 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5220 D In - house method : LBEN-21001 based on United States Environmental Protection Agency, Editorial Revision 1978, 1982, EPA Method 150.1

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1 (cont.)	Water	- Nitrate 0.02 mg/L to 6.0 mg/L - Nitrite 0.02 mg/L to 1.0 mg/L - Sulfate 2.0 mg/L to 100.0 mg/L	In - house method : LBEN-97029 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - NO ₃ E In - house method : LBEN-97049 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - NO ₂ B In - house method : LBEN-14003 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - SO ₄ ²⁻ E

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	- Total organic carbon 0.5 mg/L to 10.0 mg/L Perfluorocarbons (PFCs) : - PFPeA - PFBS - PFHxS - PFHpS - PF-3,7-DMOA - PFDA - PFOS - PFUnA - PFDaA - PFDS 0.05 µg/L to 0.3 µg/L	In - house method : LBEN-09149 based on United States Environmental Protection Agency, 2004, EPA Method 9060 A, Revision 1.0 In - house method : LBLC-17014 based on DIN 38407-42 : 2011-03 and analysis with HPLC-MS

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Perfluorocarbons (PFCs) : - PFTrA - PFTeA - PFOSA 0.05 µg/L to 0.3 µg/L Alkyl phenol ethoxylate : - OPEO - NPEO 1 µg/L to 10 µg/L Chlorobenzenes and Chlorotoluenes (COCs) : - Chlorobenzene - 2-Chlorotoluene - 3-Chlorotoluene - 4-Chlorotoluene 0.20 µg/L to 5.00 µg/L	In - house method : LBLC-17014 based on DIN 38407-42 : 2011-03 and analysis with HPLC-MS In - house method : LBLC-17013 based on ISO 18857-2 : 2009 and analysis with HPLC-MS In - house method : LBGC-21010 based on United States Environmental Protection Agency, 2014, EPA Method 8270

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Chlorobenzenes and Chlorotoluenes (COCs) : - 1,3-Dichlorobenzene - 1,4-Dichlorobenzene - 1,2-Dichlorobenzene - 3,5-Dichlorotoluene - 2,4-Dichlorotoluene - 2,5-Dichlorotoluene - 2,6-Dichlorotoluene - 1,3,5-Trichlorobenzene - 2,3-Dichlorotoluene - 3,4-Dichlorotoluene - 1,2,4-Trichlorobenzene - 1,2,3-Trichlorobenzene 0.20 µg/L to 5.00 µg/L	In - house method : LBGC-21010 based on United States Environmental Protection Agency, 2014, EPA Method 8270

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Chlorobenzenes and Chlorotoluenes (COCs) : - 2,4,6-Trichlorotoluene - 2,4,5-Trichlorotoluene - 2,3,6-Trichlorotoluene - 1,2,3,5-Tetrachlorobenzene - 3,4,5-Trichlorotoluene - 1,2,4,5-Tetrachlorobenzene - 2,3,4-Trichlorotoluene - 1,2,3,4-Tetrachlorobenzene - 2,3,4,6-Tetrachlorotoluene - 2,3,5,6-Tetrachlorotoluene - 2,3,4,5-Tetrachlorotoluene - Pentachlorobenzene - 2,3,4,5,6-Pentachlorotoluene - Hexachlorobenzene 0.20 µg/L to 5.00 µg/L	In - house method : LBGC-21010 based on United States Environmental Protection Agency, 2014, EPA Method 8270

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
1 (cont.)	Water	Alkylphenol (AP) : - Nonylphenol (NP) - 4-n-Nonyl phenol (4-n-NP) - 4-n-Octylphenol (4-n-OP) - Octylphenol (4-tert-OP) 1.0 µg/L to 10.0 µg/L - Carbon disulfide 0.05 mg/L to 1 mg/L	In - house method : LBLC-17013 based on ISO 18857-2: 2009 In - house method : LBGC-2007 based on United States Environmental Protection Agency, 2017, EPA Method 8260D

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2	Wastewater	- Mercury 0.5 µg/L to 8.0 µg/L - pH 4.0 to 10.0 - Total solids dried at 103 °C to 105 °C 50 mg/L to 20 000 mg/L	In - house method : LBEN-08145 based on United States Environmental Protection Agency, 1994, EPA Method 245.1, Revision 3.0 In - house method : LBEN-09152 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - H ⁺ B In - house method : LBEN-09150 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2540 B

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Total suspended solids dried at 103 °C to 105 °C 5 mg/L to 10 000 mg/L - Total dissolved solids dried at 180 °C 50 mg/L to 20 000 mg/L - Conductivity 147 µS/cm to 12 880 µS/cm	In - house method : LBEN-97042 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2540 D In - house method : LBEN-00106 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2540 C In - house method : LBEN-02110 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2510 B

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Total hardness (calculates as CaCO ₃) 2 mg/L to 500 mg/L - BOD 2 mg/L to 2 100 mg/L - COD 10 mg/L to 3 000 mg/L	In - house method : LBEN-00098 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 2340 C In - house method : LBEN-97006 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5210 B In - house method : LBEN-97010 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5220 C

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- COD 10 mg/L to 500 mg/L - pH 4.0 to 9.2 - Nitrate 0.02 mg/L to 15.0 mg/L	In - house method : LBEN-12161 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5220 D In - house method : LBEN-21001 based on United States Environmental Protection Agency, Editorial Revision 1978, 1982, EPA Method 150.1 In - house method : LBEN-97029 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - NO ₃ ⁻ E

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Nitrite 0.02 mg/L to 1.0 mg/L - Sulfate 2.0 mg/L to 100.0 mg/L - Total organic carbon 0.5 mg/L to 10.0 mg/L	In - house method : LBEN-97049 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - NO ₂ ⁻ B In - house method : LBEN-14003 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - SO ₄ ²⁻ E In - house method : LBEN-09149 based on United States Environmental Protection Agency, 2004, EPA Method 9060 A, Revision 1.0

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Ammonia-Nitrogen 0.02 mg/L to 20 mg/L - Total phosphorus 0.01 mg/L to 40 mg/L - Dissolved phosphorus 0.005 mg/L to 20 mg/L	In - house method : LBEN-11158 based on ASTM D1426-08 In - house method : LBEN-97037 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - P B4, E In - house method : LBEN-97037 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - P B1, E

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Glycol 20 µg/L to 200 µg/L - Ammonia-Nitrogen 0.10 mg/L to 10.0 mg/L - Total phosphorus 0.10 mg/L to 10.0 mg/L	In - house method : LBGC-18012 based on United States Environmental Protection Agency, 2014, EPA, Method 600/R-14/008 In - house method : LBEN-19003 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - NH ₃ -F In - house method : LBEN -19002 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500-P J

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Chloride 1.0 mg/L to 20 000 mg/L - Navy Blue 1.0 mg/L to 7.5 mg/L	In - house method : LBEN-11157 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500-Cl ⁻ D In - house method : LBLC-19004 based on United States Environmental Protection Agency, 2007, EPA, Method 8321B

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Perfluorocarbons (PFCs) : - PFPeA - PFBS - PFHxS - PFHpS - PF-3,7-DMOA - PFDA - PFOS - PFUnA - PFDoA - PFDS - PFTra - PFTeA - PFOSA 0.05 µg/L to 0.3 µg/L	In - house method : LBLC-17014 based on DIN 38407-42 : 2011-03 and analysis with HPLC-MS

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Alkyl phenol ethoxylate : - OPEO - NPEO 1 µg/L to 10 µg/L - Phenol 0.001 mg/L to 0.1 mg/L - Cyanide 0.05 mg/L to 0.2 mg/L	In - house method : LBLC-17013 based on ISO 18857-2 : 2009 and analysis with HPLC-MS In - house method : LBEN-15007 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5530 B, C In - house method : LBEN-97018 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - CN ⁻ C, E

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Oil and Grease 1 mg/L to 100 mg/L - Oil and Grease 0.5 mg/L to 100 mg/L - Sulfide 0.01 mg/L to 1.0 mg/L	In - house method : LBEN-97031 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5520 B In - house method : LBEN-18005 based on United States Environmental Protection Agency, 2010, EPA, Method 1664, Revision B In - house method : LBEN-97045 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500-S ² -D

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Sulfite 0.75 mg/L to 3.0 mg/L - Total kjeldahl nitrogen 2 mg/L to 200 mg/L - Color 0.10 m ⁻¹ to 10.00 m ⁻¹	In - house method : LBEN-18006 based on United States Environmental Protection Agency, 1978, EPA, Method 377.1 In - house method : LBAG-18002 based on ISO 5663 : 1984 ISO 7887 : 2011, Method B

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Arsenic 0.63 µg/L to 6.25 µg/L - Lead 0.63 µg/L to 6.25 µg/L - Cadmium 0.63 µg/L to 6.25 µg/L - Copper 0.63 µg/L to 6.25 µg/L - Manganese 0.63 µg/L to 6.25 µg/L - Nickel 0.63 µg/L to 6.25 µg/L - Zinc 2.5 µg/L to 62.5 µg/L - Silver 2.5 µg/L to 62.5 µg/L	In - house method : LBEN-14004 based on United States Environmental Protection Agency, 2014, EPA, Method 6020B, Revision 2

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Chromium 0.63 µg/L to 12.5 µg/L - Antimony 0.63 µg/L to 12.5 µg/L - Cobalt 1.25 µg/L to 62.5 µg/L - Hexavalent chromium 1.0 µg/L to 5.0 µg/L Flame retardant - Tris (2,3-dibromopropyl) phosphate - Bis (2,3-dibromopropyl) phosphate - 2,2 Bis (bromomethyl)-1,3-propanediol 1.00 µg/L to 4.00 µg/L	In - house method : LBEN-14004 based on United States Environmental Protection Agency, 2014, EPA, Method 6020B, Revision 2 ISO 18412 : 2005 In - house method : LBLC-18001 based on ISO 18857-2 : 2009

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Disperse dyes - Disperse Blue 1 - Disperse Blue 7 - Disperse Brown 1 - Disperse Orange 1 - Disperse Orange 3 - Disperse Orange 11 - Disperse Orange 37/76 - Disperse Red 1 - Disperse Yellow 1 - Disperse Yellow 9 - Disperse Yellow 39 - Basic violet 3 - Solvent Yellow 1 - Solvent Yellow 2 - Solvent Yellow 3 10.0 µg/L to 50.0 µg/L	In - house method : LBLC-18002 based on Journal of Chromatographic Science 2015,53 : page 1257-1264

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2 (cont.)	Wastewater	Disperse dyes - Basic violet 1 - Solvent Yellow 14 - Disperse Yellow 54 - Disperse Violet 1 10.0 µg/L to 50.0 µg/L Azo colorants - Aniline - n-Methylaniline - p-Toluidine - o-Toluidine - m-Toluidine - n-Ethylaniline - 2-Chloroaniline - 2,4-Xyldine 2,6-Xyldine 0.5 µg/L to 3.0 µg/L	In - house method : LBLC-18002 based on Journal of Chromatographic Science 2015,53 : page 1257-1264 In - house method : SOP LBGC-18004 based on ISO 14362-1 : 2017

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Azo colorants - o-Anisidine - 4-Chloroaniline - n,n-diethylaniline - p-Cresidine - 2,4,5-Trimethylaniline - 4-Chloro-o-toluidine - 2,4-Toluenediamine - 2,4-Diaminoanisole - 2-Naphthylamine - 5-Nitro-o-toluidine - 5-Nitro-o-anisidine - 4-Aminobiphenyl - 4-Aminoazobenzene - 4,4'-Oxydianiline - Benzidine 0.5 µg/L to 3.0 µg/L	In - house method : SOP LBGC-18004 based on ISO 14362-1 : 2017

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2 (cont.)	Wastewater	Azo colorants - 4,4'-Thiodianiline - o-Aminoazotoluene - 3,3'-Dimethyl-4,4'-diaminodiphenylmethane - 3,3'-Dimethylbenzidine - 4,4'-Thiodianiline - 3,3'-Dichlorobenzidine - 4,4'-Methylenebis (2-Chloroaniline) - 3,3'-Dimethoxybenzidine 0.5 µg/L to 3.0 µg/L	In - house method : SOP LBGC-18004 based on ISO 14362-1 : 2017

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2 (cont.)	Wastewater	Flame retardants - 2,2-bis(bromomethyl)-1,3-propane-diol - Tris (2-chloroethyl) phosphate - Tris (1,3-dichloro-isopropyl) phosphate - Hexabromocyclododecane 5 µg/L to 25 µg/L - Polybrominated biphenyls ether - polybrominated diphenyl ethers 0.25 µg/L to 1.5 µg/L	In - house method : LBGC-18005 based on United States Environmental Protection Agency, 2005, EPA, Method 527, Revision 1.0

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2 (cont.)	Wastewater	Organotin compounds - Trimethyltin(TMT) - Dimethyltin(DMT) - Dipropyltin-dichloride(DProT) - Monobutyltin(MBT) - Tripropyltin(TPrT) - Dibutyltin(DBT) - Tributyltin(TBT) - Mono-octyltin(MOT) - Tetra-butyltin(TeBT) - Diphenyltin(DPhT) - Dioctyltin(DOT) - Triphenyltin(TPhT) - Tri-cyclohexyltin(TCyT) - Tri-n-octyltin(TOT) 0.05 µg/L to 1.0 µg/L	In - house method : SOP LBGC-18006 based on ISO 17353 : 2004

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Polycyclic Aromatic Hydrocarbons (PAH) - Naphthalene - 2-Methylphtalene - 1-Methylphtalene - Acenaphthylene - Acenaphthene - Fluorene - Phenanthrene - Anthracene - Fluoranthene - Pyrene - Cyclopenta (c,d) pyrene - Benzo(a) Anthracene - Chrysene 1.0 µg/L to 20.0 µg/L	In - house method : LBGC-18008 based on DIN 38407-39 : 2011

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Scope of Laboratory Accreditation

Laboratory Name : SGS (Thailand) Limited, Laboratory Services

Address : 10, 10/1-4 and 12 Soi Rama III 5.59,
Chong Nonsi, Yan Nawa, Bangkok 10120

Accreditation Number : Testing - 0017

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Polycyclic Aromatic Hydrocarbons (PAH) - Benzo(b) Fluoranthene - Benzo(j) Fluoranthene - Benzo(k) Fluoranthene - Benzo(e) Pyrene - Benzo(a) Pyrene - Indeno(1,2,3-cd) Pyrene - Dibenzo (ah) Anthracene - Benzo (ghi) perylene 1.0 µg/L to 20.0 µg/L	In - house method : LBGC-18008 based on DIN 38407-39 : 2011

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Scope of Laboratory Accreditation

Laboratory Name : SGS (Thailand) Limited, Laboratory Services

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Accreditation Number : Testing - 0017

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Chlorophenol - 4-Chloro-3-methylphenol - 2-Chlorophenol - 3-Chlorophenol - 4-Chlorophenol - 2,4-Dichlorophenol - 2,5-Dichlorophenol - 2,6-Dichlorophenol - 3,5-Dichlorophenol - 2,3-Dichlorophenol - 3,4-Dichlorophenol - Pentachlorophenol - 2,3,4,6-Tetrachlorophenol - 2,4,5-Trichlorophenol - 2,4,6-Trichlorophenol - 2,3,4-Trichlorophenol 0.5 µg/L to 20.0 µg/L	In - house method : SOP LBGC-18003 based on ISO 17070 : 2015

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 Chong Nonsi, Yan Nawa, Bangkok 10120
 Accreditation Number : Testing - 0017
 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Chlorophenol - 2,3,4,5-Tetrachlorophenol - 2,3,5-Trichlorophenol - 2,3,5,6-Tetrachlorophenol - 2,3,6-Trichlorophenol - 3,4,5-Trichlorophenol 0.5 µg/L to 20.0 µg/L Phthalates - Dimethyl phthalate - Diethyl phthalate - Bis-iso-butyl ester phthalate - Benzyl buthyl phthalate - Di-n-octyl phthalate - Di-2-ethyl hexyl phthalate - Di-isononyl phthalate - Bis methylglycol ester phthalate 5 µg/L to 30 µg/L	In - house method : SOP LBGC-18003 based on ISO 17070 : 2015 In - house method : LBGC-18007 based on ISO 18856 : 2004

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Phthalates - Di-isoheptyl phthalate - Bis cyclohexyl phthalate - Di-n-octyl phthalate - Bis-(2-propylheptyl) phthalate - Bis-nonyl phthalate - Bis-propyl phthalate - Bis-iso-pentyl phthalate - n-pentyl-iso-pentyl phthalate - Bis-n-pentyl phthalate - Di-n-hexyl phthalate - Bis-iso-octyl phthalate - Di-isodecyl phthalate 5 µg/L to 30 µg/L	In - house method : LBGC-18007 based on ISO 18856 : 2004

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Volatile organic compounds - Methylene Chloride - Benzene - 1,2-Dichloroethane - Trichloroethylene - Tetrachloroethylene - Total Xylene 5 µg/L to 20 µg/L - p- Cresol - o- Cresol - m- Cresol 5 µg/L to 25 µg/L	In - house method : SOP LBGC-18009 based on United States Environmental Protection Agency, 1996, EPA, Method 8260B, Revision 2.0 In - house method : LBGC-18010 based on United States Environmental Protection Agency, 1996, EPA, Method 8260B, Revision 2.0

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 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Perfluorocarbons (PFCs) : - 6:2 FTOH - 8:2 FTOH - 10:2 FTOH - 6:2 FTA - 8:2 FTA - 10:2 FTA 5 µg/L to 25 µg/L Chlorobenzenes and Chlorotoluenes (COCs) : - Chlorobenzene - 2-Chlorotoluene - 3-Chlorotoluene - 4-Chlorotoluene 0.20 µg/L to 5.00 µg/L	In - house method : LBGC-18011 based on DIN 38407-42 : 2011 In - house method : LBGC-21010 based on United States Environmental Protection Agency, 2014, EPA Method 8270

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Chlorobenzenes and Chlorotoluenes (COCs) : - 1,3-Dichlorobenzene - 1,4-Dichlorobenzene - 1,2-Dichlorobenzene - 3,5-Dichlorotoluene - 2,4-Dichlorotoluene - 2,5-Dichlorotoluene - 2,6-Dichlorotoluene - 1,3,5-Trichlorobenzene - 2,3-Dichlorotoluene - 3,4-Dichlorotoluene - 1,2,4-Trichlorobenzene - 1,2,3-Trichlorobenzene - 2,4,6-Trichlorotoluene - 2,4,5-Trichlorotoluene 0.20 µg/L to 5.00 µg/L	In – house method : LBGC-21010 based on United States Environmental Protection Agency, 2014, EPA Method 8270

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Chlorobenzenes and Chlorotoluenes (COCs) : - 1,2,3,5-Tetrachlorobenzene - 3,4,5-Trichlorotoluene - 1,2,4,5-Tetrachlorobenzene - 2,3,4-Trichlorotoluene - 1,2,3,4-Tetrachlorobenzene - 2,3,4,6-Tetrachlorotoluene - 2,3,5,6-Tetrachlorotoluene - 2,3,4,5-Tetrachlorotoluene - Pentachlorobenzene - 2,3,4,5,6-Pentachlorotoluene - Hexachlorobenzene 0.20 µg/L to 5.00 µg/L	In – house method : LBGC-21010 based on United States Environmental Protection Agency, 2014, EPA Method 8270

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	Alkylphenol (AP) : - Nonylphenol (NP) - 4-n-Nonyl phenol (4-n-NP) - 4-n-Octylphenol (4-n-OP) - Octylphenol (4-tert-OP) 1.0 µg/L to 10.0 µg/L - Carbon disulfide 0.05 mg/L to 1 mg/L - Hydrocarbon 1.0 mg/L to 50 mg/L	In – house method : LBLC-17013 based on ISO 18857-2: 2009 In – house method : LBGC-20007 based on United States Environmental Protection Agency, 2017, EPA Method 8260D In – house method : LBEN 21002 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 5220B, 5520F

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
2 (cont.)	Wastewater	- Coliforms MPN/100 mL Detected or Not detected/ 100 mL - Coliforms cfu/100 mL - E.coli MPN/100 mL Detected or Not detected/100 mL	Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed, 2017, part 9221 B ISO 9308 -1: 2014 / Amd.1: 2016 Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed, 2017, part 9221B, 9221C, 9221F and FDA BAM Online, 2020 (Chapter 4)

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
3	Surface water	- Ammonia-Nitrogen 0.02 mg/L to 20 mg/L - Chloride 1 mg/L to 20 000 mg/L - Total phosphorus 0.01 mg/L to 40 mg/L	In - house method : LBEN-11158 based on ASTM D1426-08 In - house method : LBEN-11157 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - Cl ⁻ D In - house method : LBEN-97037 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - P B4, E

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 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
3 (cont.)	Surface water	- Dissolved phosphorus 0.005 mg/L to 20 mg/L	In - house method : LBEN-97037 based on Standard Methods for the Examination of Water and Wastewater, APHA, AWWA & WEF, 23 rd ed., 2017, part 4500 - P B1, E
4	Sludge	- Mercury 0.1 mg/kg to 4.0 mg/kg - Hexavalent chromium 1.0 mg/kg to 40.0 mg/kg	In - house method : LBEN-18008 based on United States Environmental Protection Agency, 2007, EPA, Method 7473, Revision 0 In - house method : LBEN 18003 based on United States Environmental Protection Agency, 1992, EPA, Method 7196A, Revision 1

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 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
4 (cont.)	Sludge	- Arsenic 0.50 mg/kg to 5.00 mg/kg - Cadmium 0.50 mg/kg to 5.00 mg/kg - Lead 0.50 mg/kg to 5.00 mg/kg - Zinc 1.00 mg/kg to 5.00 mg/kg - Nickel 1.00 mg/kg to 5.00 mg/kg - Copper 1.00 mg/kg to 5.00 mg/kg	In - house method : LBEN 18007 based on United States Environmental Protection Agency, 2014, EPA, Method 6020B, Revision 2

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 Accreditation Number : Testing - 0017
 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
4 (cont.)	Sludge	- Cadmium 10 mg/kg to 1 000 mg/kg - Lead 10 mg/kg to 1 000 mg/kg - Cyanide 0.50 mg/kg to 10.0 mg/kg	In - house method : LBEN 18007 based on United States Environmental Protection Agency, 2007, EPA, Method 6010C, Revision 3 In - house method : SOP LBEN-19001 based on ISO 11262 : 2011
5	Sludge Waste	Chlorophenol : - 4-Chloro-3-methylphenol - 2-Chlorophenol - 3-Chlorophenol - 4-Chlorophenol 0.05 mg/kg to 1.00 mg/kg	In - house method SOP LBGC-20004 based on ISO 14154 : 2005

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 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Chlorophenol : - 2,3-Dichlorophenol - 2,4-Dichlorophenol - 2,5-Dichlorophenol - 2,6-Dichlorophenol - 3,4-Dichlorophenol - 3,5-Dichlorophenol - Pentachlorophenol - 2,3,4-Trichlorophenol - 2,3,5-Trichlorophenol - 2,3,6-Trichlorophenol - 2,4,5-Trichlorophenol - 2,4,6-Trichlorophenol - 3,4,5-Trichlorophenol 0.05 mg/kg to 1.00 mg/kg	In - house method SOP LBGC-20004 based on ISO 14154 : 2005

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 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Chlorophenol : - 2,3,4,5-Tetrachlorophenol - 2,3,4,6-Tetrachlorophenol - 2,3,5,6-Tetrachlorophenol 0.05 mg/kg to 1.00 mg/kg Polycyclic Aromatic Hydrocarbons (PAHs) : - Naphthalene - 2-Methylphtalene - 1-Methylphtalene - Acenaphthylene - Acenaphthene - Fluorene - Phenanthrene 0.0025 mg/kg to 0.1 mg/kg	In - house method SOP LBGC-20004 based on ISO 14154 : 2005 In - house method : SOP LBGC-20005 based on DIN 38407-39 : 2011

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Reference No. : 0303/17005

Scope of Laboratory Accreditation

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Polycyclic Aromatic Hydrocarbons (PAHs) : - Anthracene - Fluoranthene - Pyrene - Cyclopenta (c,d) pyrene - Benzo(a) anthracene - Chrysene - Benzo(k) fluoranthene - Benzo(b) fluoranthene - Benzo(j) fluoranthene - Benzo(e) pyrene - Benzo(a) pyrene - Indeno(1,2,3-cd) pyrene - Dibenzo (ah) anthracene - Benzo (ghi) perylene 0.0025 mg/kg to 0.1 mg/kg	In - house method : SOP LBGC-20005 based on DIN 38407-39:2011

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 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Glycol : - 2-Methoxyethanol - 2-Ethoxyethyl acetate - Bis(2-methoxyethyl)ether - 2-Ethoxyethanol - 2-Methoxypropylacetate - 2-Methoxyethylacetate - Triethylene glycol dimethyl ether - Ethylene glycol dimethyl ether 0.50 mg/kg to 5.00 mg/kg Organotin Compounds : - Trimethyltin (TMT) - Dimethyltin (DMT) - Monomethyltin(MMT) - Dipropyltin-dichloride (DProT) 0.50 mg/kg to 2.00 mg/kg	In - house method : SOP LBGC-20006 based on ISO 22892:2006 In - house method : SOP LBGC-21011 based on ISO 23161:2018

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Organotin Compounds : - Monobutyltin (MBT) - Tripropyltin (TPtT) - Dibutyltin (DBT) - Monophenyltin (MPHT) - Tributyltin (TBT) - Monooctyltin (MOT) - Tetraethyltin (TeBT) - Diphenyltin (DPhT) - Dioctyltin (DOT) - Tri-cyclohexyltin (TCyT) - Triphenyltin (TPHT) - Tri-n-octyltin (TOT) 0.50 mg/kg to 2.00 mg/kg	In - house method : SOP LBGC-21011 based on ISO 23161:2018

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Disperse dyes : - Acid Violet 49 - Basic Blue 26 - Basic Green 4 - Basic Red 9 - Basic Violet 1 - Basic Violet 3 - Disperse Blue 1 - Disperse Blue 3 - Disperse Blue 7 - Disperse Blue 106 - Disperse Yellow 1 - Disperse Yellow 3 - Disperse Yellow 9 - Disperse Red 17 - Solvent Yellow 1 - Solvent Yellow 3 1.00 mg/kg to 4.00 mg/kg	In - house method : SOP LBGC-21006 based on ISO 16373-3: 2014

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Chlorobenzenes and Chlorotoluenes (COCs) : - Chlorobenzene - 2-Chlorotoluene - 3-Chlorotoluene - 4-Chlorotoluene - 1,3-Dichlorobenzene - 1,4-Dichlorobenzene - 1,2-Dichlorobenzene - 2,4-Dichlorotoluene - 2,5-Dichlorotoluene - 2,6-Dichlorotoluene - 1,3,5-Trichlorobenzene - 2,3-Dichlorotoluene - 3,4-Dichlorotoluene 0.025 mg/kg to 0.50 mg/kg	In - house method : LBGC-21014 based on United States Environmental Protection Agency, 2014, EPA Method 8270D

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Accreditation Number : Testing - 0017

Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Chlorobenzenes and Chlorotoluenes (COCs) : - 1,2,4-Trichlorobenzene - 1,2,3-Trichlorobenzene - 2,4,6-Trichlorotoluene - 2,4,5 -Trichlorotoluene - 2,3,6-Trichlorotoluene - 1,2,3,5-Tetrachlorobenzene - 3,4,5-Trichlorotoluene - 1,2,4,5-Tetrachlorobenzene - 2,3,4-Tetrachlorotoluene - 1,2,3,4-Tetrachlorobenzene - 2,3,4,6-Tetrachlorotoluene - 2,3,5,6-Tetrachlorotoluene - 2,3,4,5-Tetrachlorotoluene 0.025 mg/kg to 0.50 mg/kg	In - house method : LBGC-21014 based on United States Environmental Protection Agency, 2014, EPA Method 8270D

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 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Chlorobenzenes and Chlorotoluenes (COCs) : - Pentachlorobenzene - 2,3,4,5,6-Pentachlorotoluene - Hexachlorobenzene 0.025 mg/kg to 0.50 mg/kg Azo dyes : - Aniline (62-53-3) - n-methylaniline (100-61-8) - p-Toluidine (106-49-0) - o-Toluidine (95-53-4) - m-Toluidine (108-44-1) - n-ethylaniline (103-69-5) - 2-Chloroaniline (95-51-2) 0.20 mg/kg to 1.50 mg/kg	In - house method : LBGC-21014 based on United States Environmental Protection Agency, 2014, EPA Method 8270D In - house method : LBGC-21019 based on ISO 14362-1 and 3: 2017

Initial Issue Date 22nd June 2007

Issue Number 13

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

Scope of Laboratory Accreditation

Laboratory Name : SGS (Thailand) Limited, Laboratory Services
 Address : 10, 10/1-4 and 12 Soi Rama III 5.59,
 Chong Nonsi, Yan Nawa, Bangkok 10120
 Accreditation Number : Testing - 0017
 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Azo dyes : - 2,4-Xyldine (95-68-1) - 2,6-Xyldine (87-62-7) - o-Anisidine (90-04-0) - 4-Chloroaniline (106-47-8) - n,n-Diethylaniline (91-66-7) - p-Cresidine (120-71-8) - 2,4,5-Trimethylaniline (137-17-7) - 4-Chloro-o-toluidine (95-69-2) - 2,4-Toluenediamine (95-80-7) - 2,4-Diaminoanisole (615-05-4) - 2-Naphthylamine (91-59-8) - 3,3'-dimethylbenzidine (119-90-4) - 3,3'-dimethylbenzidine (119-93-7) 0.20 mg/kg to 1.50 mg/kg	In - house method : LBGC-21019 based on ISO 14362-1 and 3: 2017

Initial Issue Date 22nd June 2007

Issue Number 13

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

Scope of Laboratory Accreditation

Laboratory Name : SGS (Thailand) Limited, Laboratory Services
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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Azo dyes : - 4,4'-Thiodianiline (139-65-1) - 3,3'-Dichlorobenzidine (91-94-1) - 4,4'-Methylene bis(2-chloroaniline) (101-14-4) - 4-Aminobipheny (92-67-1) - 4,4'-Oxydianiline (101-80-4) - Benzidine (92-87-5) - 4,4'-Thiodianiline (101-77-9) - 3,3'-Dimethy- 4,4'-diaminodiphenylmethane (838-88-0) 0.20 mg/kg to 1.50 mg/kg	In - house method : LBGC-21019 based on ISO 14362-1 and 3: 2017

Initial Issue Date 22nd June 2007

Issue Number 13

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

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 Chong Nonsi, Yan Nawa, Bangkok 10120
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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Perfluorinated/Polyfluorinated (PFCs) : - 1H,1H,2H,2H-Tridecafluoro-1-n-octanol (6:2 FTOH) - 1H,1H,2H,2H-Heptadecafluoro-1-decanol (8:2 FTOH) - 1H,1H,2H,2H-Perfluoro-1-dodecanol (10:2 FTOH) - 1H,1H,2H,2H-Perfluorooctyl acrylate (6:2 FTA) - 1H,1H,2H,2H-Heptadecafluorodecyl Acrylate (8:2 FTA) - 1H,1H,2H,2H-Perfluorododecyl acrylate (10:2 FTA) 0.25 mg/kg to 1.5 mg/kg	In - house method : LBGC-21023 based on DIN 38407-42: 2011

Initial Issue Date 22nd June 2007

Issue Number 13

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

Scope of Laboratory Accreditation

Laboratory Name : SGS (Thailand) Limited, Laboratory Services
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 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Perfluorinated/Polyfluorinated (PFCs) : - PFOA - PFOS - PFBS - PFHxA 0.025 mg/kg to 0.15 mg/kg Flame retardant : - Tris(2-chloroethyl) phosphate (TCEP) - Tris(1,3-dichloro-isopropyl) phosphate (TDCP) - Hexabromocyclododecane (HBCDD) - Tri-o-cresyl phosphate(TOCP) - Tris-(aziridinyl)phosphine oxide (TEPA) - Polybromobiphenyls (PBB) - Polybromobiphenyls ether (PBDE) 0.25 mg/kg to 0.75 mg/kg	In - house method : LBLC-17014 based on DIN 38407-42: 2011 In - house method : LBGC-21020 based on ISO 22032: 2006

Initial Issue Date 22nd June 2007

Issue Number 13

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

Scope of Laboratory Accreditation

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 Address : 10, 10/1-4 and 12 Soi Rama III 5.59,
 Chong Nonsi, Yan Nawa, Bangkok 10120
 Accreditation Number : Testing - 0017
 Laboratory Status : ☒ Permanent ☐ Site ☐ Temporary ☐ Mobile

Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Flame retardant : - Tris(2,3-dibromopropyl) phosphate - Bis(2,3-dibromopropyl) phosphate - 2,2-Bis(bromomethyl)-1,3-propanediol 0.5 mg/kg to 2 mg/kg Alkylphenol (AP) : - Nonylphenol (NP) - 4-n-Nonyl phenol (4-n-NP) - 4-n-Octylphenol (4-n-OP) - Octylphenol (4-tert-OP) 0.5 mg/kg to 5 mg/kg Alkylphenol Ethoxylates (APEOs) : - Nonylphenol ethoxylates (NPEO) - Octylphenol ethoxylates (OPEO) 0.1 mg/kg to 2 mg/kg	In - house method : LBLC-18001 based on ISO 22032: 2006 In - house method : LBLC-17013 based on ISO 18857-2: 2009 In - house method : LBLC-17013 based on ISO 18857-2: 2009

Initial Issue Date 22nd June 2007

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Volatile Organic compound (Halogenated solvent) : - Methylene chloride - Benzene - 1,2-Dichloroethane - Trichloroethylene - tetrachloroethylene - p,m Xylene - o-xylene 0.02 mg/kg to 0.20 mg/kg	In - house method : LBGC-21024 based on United States Environmental Protection Agency, 2014, EPA Method 5021

Initial Issue Date 22nd June 2007

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

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Laboratory Name : SGS (Thailand) Limited, Laboratory Services
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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Phthalates : - Dimethyl phthalate (DMP) - Bis-iso-butyl ester Phthalate (DIBP) - Di-butyl Phthalate (DBP) - Benzyl Butyl Phthalate (BBP) - Di-2-Ethyl Hexyl Phthalate (DEHP) - Di-n-octyl Phthalate (DNOP) - Bis-ethyl phthalate (DEP) - Bis-methylglycol ester Phthalate (DMEP) - Bis-iso-pentyl ester Phthalate (DiPP) - n-Pentyl-iso-Pentyl phthalate (iPnPP) - Bis-n-pentyl ester Phthalate (DnPP) - Di-n-hexyl Phthalate (DnHP/DnHxP) - Bis-cyclohexyl phthalate (DCHP) - Bis-(2-Propylheptyl) phthalate (DPHP) 0.05 mg/kg to 1.5 mg/kg	In - house method : LBGC-21021 based on ISO 18856: 2004

Initial Issue Date 22nd June 2007

Issue Number 13

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Phthalates : - Bis-propyl phthalate (DPpP) - Bis-n-heptyl phthalate (DHpP/DnHpP) - Bis-phenylphthalate (DIPHENYL/ DPhP) - Bis-benzyl phthalate (DBzP) - Bis-nonyl phthalate (DNP) - Didecyl Phthalate (DDP) - Diundecyl phthalate(DUDP) 0.05 mg/kg to 1.5 mg/kg - Diisononyl Phthalate (DINP) - Diisodecyl Phthalate (DIDP) - Diheptyl Phthalate (DHP) - Bis-iso-octyl phthalate (DIOP) - Disoheptyl phthalate (DHHP/DHppP) 0.20 mg/kg to 6.0 mg/kg	In - house method : LBGC-21021 based on ISO 18856: 2004

Initial Issue Date 22nd June 2007

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

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
5 (cont.)	Sludge Waste	Volatile Organic compound (Cresol) : - o-cresol - m-cresol - p-cresol 0.25 mg/kg to 1.5 mg/kg	In - house method : LBGC-21022 based on United States Environmental Protection Agency, 2017, EPA Method 8260D
6	Chemical fertilizer	- Water soluble potassium (Calculated as K ₂ O) 1.0 g/100 g to 60.4 g/100 g - Total Nitrogen 1.0 g/100 g to 46.5 g/100 g	In - house method : SOP LBCH-99246 based on Notification of Ministry of Agriculture and Cooperatives Re: Prescribing the methods of analysis of chemical fertilizers, B.E. 2559, method 1.12.02 In - house method : SOP LBAG-12276 based on Notification of Ministry of Agriculture and Cooperatives Re: Prescribing the methods of analysis of chemical fertilizers, B.E. 2559, method 1.05.01

Initial Issue Date 22nd June 2007

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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
6 (cont.)	Chemical fertilizer	- Total phosphorus (Calculated P ₂ O ₅) 2.00 g/100 g to 61.68 g/100 g - Calcium oxide (Calculated from total calcium) 0.02 g/100 g to 51.8 g/100 g - Magnesium oxide (Calculated from total magnesium) 0.02 g/100 g to 81.04 g/100 g	In - house method : SOP LBAG-00106 based on Notification of Ministry of Agriculture and Cooperatives Re: Prescribing the methods of analysis of chemical fertilizers, B.E. 2559, method 1.09.01 In - house method : SOP LBCH-16010 based on Notification of Ministry of Agriculture and Cooperatives Re: Prescribing the methods of analysis of chemical fertilizers, B.E. 2559, method 1.13.01 In - house method : SOP LBCH-16010 based on Notification of Ministry of Agriculture and Cooperatives Re: Prescribing the methods of analysis of chemical fertilizers, B.E. 2559, method 1.14.01

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 Accreditation Number : Testing - 0017
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Item Number	Test Material / Product	Test item / Range of Testing	Test Method / Technique Used
6 (cont.)	Chemical fertilizer	- Total sulfur 0.02 g/100 g to 32.76 g/100 g	In - house method : SOP LBCH-16010 based on Notification of Ministry of Agriculture and Cooperatives Re: Prescribing the methods of analysis of chemical fertilizers, B.E. 2559, method 1.15.01

Issue Date : 7th November 2022

Signature :

Director of Bureau of Laboratory Accreditation


Initial Issue Date 22nd June 2007

Issue Number 13

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



รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ
(Scope of Accreditation for Testing)
ใบรับรองเลขที่ 23-LB0119
(Certification No. 23-LB0119)



ชื่อห้องปฏิบัติการ
(Laboratory Name)
หมายเลขการรับรองที่
(Accreditation No.)
ฉบับที่ 03
(Issue No. 03)
สถานภาพห้องปฏิบัติการ
(Laboratory status)

บริษัท เอสจีเอส (ประเทศไทย) จำกัด ห้องปฏิบัติการทดสอบสิ่งแวดล้อม (สาขารายอง)
(SGS (Thailand) Limited, Environmental Laboratory (Rayong Branch))
ทดสอบ 0470
(Testing 0470)
ออกให้ตั้งแต่วันที่ 25 ธันวาคม พ.ศ. 2566
(Valid from (25 December B.E. 2566 (2023))

ถึงวันที่ 10 พฤศจิกายน พ.ศ. 2570
(Until) (10 November B.E. 2570 (2027))

☒ถาวร
(Permanent)

☐นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

☐เคลื่อนที่
(Mobile)


☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสิ่งแวดล้อม (Environmental field)</p> <p>1. น้ำและน้ำเสีย (Water and wastewater)</p>	<ul style="list-style-type: none"> - Arsenic (As) 0.01 mg/L to 0.50 mg/L - Barium (Ba) 0.01 mg/L to 10 mg/L - Cadmium (Cd) 0.002 mg/L to 10 mg/L - Chromium (Cr) 0.01 mg/L to 10 mg/L - Copper (Cu) 0.01 mg/L to 10 mg/L - Iron (Fe) 0.02 mg/L to 10 mg/L - Lead (Pb) 0.01 mg/L to 10 mg/L - Manganese (Mn) 0.01 mg/L to 5 mg/L - Nickel (Ni) 0.004 mg/L to 10 mg/L - Selenium (Se) 0.01 mg/L to 0.50 mg/L - Silver (Ag) 0.01 mg/L to 10 mg/L - Zinc (Zn) 0.02 mg/L to 10 mg/L 	<ul style="list-style-type: none"> - Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd edition, 2017, part 3120 B and part 3030 K

กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
(Ministry of Industry, Thai Industrial Standards Institute)

หน้าที่ 1/4

รายละเอียดสาขาและขอบข่ายใบรับรองห้องปฏิบัติการ
(Scope of Accreditation for Testing)
ใบรับรองเลขที่ 23-LB0119
(Certification No. 23-LB0119)



ฉบับที่ 03
(Issue No. 03)

สถานภาพห้องปฏิบัติการ
(Laboratory status)

ออกให้ตั้งแต่วันที่ 25 ธันวาคม พ.ศ. 2566
(Valid from 25 December B.E. 2566 (2023))

☒ ถาวร
(Permanent)

☐ นอกสถานที่
(Site)

☐ชั่วคราว
(Temporary)

ถึงวันที่ 10 พฤศจิกายน พ.ศ. 2570
(Until 10 November B.E. 2570 (2027))

☐เคลื่อนที่
(Mobile)

☐หลายสถานที่
(Multisite)

สาขาการทดสอบ (Field of Testing)	รายการทดสอบ (Parameter)	วิธีทดสอบ (Test Method)
<p>สาขาสังแวดล้อม (Environmental field)</p> <p>2. อากาศที่ระบายออก (Emission air)</p>	<p>- Hydrogen chloride (HCl) 1.54 µg/sample to 257.00 µg/sample</p> <p>- Hydrogen chloride (HCl) 15.42 µg/sample to 2 570.00 µg/sample</p> <p>- Hydrogen fluoride (HF) 1.05 µg/sample to 263.25 µg/sample</p> <p>- Hydrogen fluoride (HF) 10.53 µg/sample to 2 632.50 µg/sample</p>	<p>- US EPA, Code of Federal Regulations, 40 CFR 60 appendix A Method 26, 30 May 2023 (Exclude sampling)</p> <p>- US EPA, Code of Federal Regulations, 40 CFR 60 appendix A Method 26A, 7 October 2020 (Exclude sampling)</p> <p>- US EPA, Code of Federal Regulations, 40 CFR 60 appendix A Method 26, 30 May 2023 (Exclude sampling)</p> <p>- US EPA, Code of Federal Regulations, 40 CFR 60 appendix A Method 26A, 7 October 2020 (Exclude sampling)</p>
<p>3. บรรยากาศของสถานที่ทำงาน (Workplace air)</p>	<p>- Benzene 1 µg/tube to 20 µg/tube</p> <p>- Ethylbenzene 1 µg/tube to 20 µg/tube</p>	<p>- NIOSH Manual of Analytical Method (NMAM), 4th edition, method 1501, Issue 3, 15 March 2003 (Exclude sampling)</p> <p>- NIOSH Manual of Analytical Method (NMAM), 4th edition, method 1501, Issue 3, 15 March 2003 (Exclude sampling)</p>

กระทรวงอุตสาหกรรม สำนักงานมาตรฐานผลิตภัณฑ์อุตสาหกรรม
(Ministry of Industry, Thai Industrial Standards Institute)

หน้าที่ 4/4

ABS Quality Evaluations

Certificate Of Conformance

This is to certify that the Quality Management System of:

SGS (Thailand) Ltd.

100 Nanglinchee Road
Chongnonsee, Yannawa
Bangkok 10120
Thailand

(WITH ADDITIONAL FACILITIES LISTED ON ATTACHED ANNEX)

has been assessed by ABS Quality Evaluations, Inc. and found to be in conformance with the requirements set forth by:

ISO 9001:2015

The Quality Management System is applicable to:

PROVISION OF PHYSICAL INSPECTION, FUMIGATION, PEST CONTROL AND LABORATORY TESTING AND CALIBRATION

This certificate may be found on the ABS QE Website (www.abs-qe.com). For certificates issued in the People's Republic of China information may also be verified on the CNCA website (www.cnca.gov.cn).




Certificate No: 52229

Certification Date: 30 July 2015

Effective Date: 14 July 2023

Expiration Date: 24 July 2026

Revision Date: 20 July 2023

Validity of this certificate is based on the successful completion of the periodic surveillance audits of the management system defined by the above scope and is contingent upon prompt written notification to ABS Quality Evaluations, Inc. of significant changes to the management system or components thereof.

ABS Quality Evaluations, Inc. 1701 City Plaza Drive, Spring, TX 77389, U.S.A.
Validity of this certificate may be confirmed at www.abs-qe.com/cert_validation.

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ABS Quality Evaluations

ISO 9001:2015

Certificate Of Conformance

ANNEX

Certificate No: 52229

SGS (Thailand) Ltd.

At Below Facilities:

Facility: 100 Nanglinchee Road, Chongnonsee, Yannawa, Bangkok 10120 Thailand

Activity: Management of QMS, Inspection Service

Facility: Rayong Branch 1/209 and 1/211 Moo 1 T. Ban Chang, A. Ban Chang, Rayong 21130 Thailand

Activity: Inspection & Testing.

Facility: Siracha Office 144, 146 Siracha Nekom 1 Road, T. Siracha, A. Siracha, Chonburi 20110 Thailand

Activity: Inspection, Fumigation & Pest Control.

Facility: Nakhonratchasima Office 1340/46 Surinwasi Road, T. Nai-Muang, A. Muang Nakhonratchasima, 30000 Thailand

Activity: Inspection & Fumigation.

Facility: Hat Yai Branch 57, 59 and 61 Soi 10 Phetkasem Road, T. Hat Yai, A. Hat Yai, Songkhla 90110 Thailand

Activity: Inspection, Fumigation, Pest Control & Testing

Facility: Rama III Branch, Laboratory Services 10, 10/1-4, 12 Rama III Road, Soi 59, Chongnonsee, Yannawa, Bangkok 10120 Thailand

Activity: Testing





Validity of this certificate may be confirmed at www.abs-qe.com/cert_validation.

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ABS Quality Evaluations

ISO 9001:2015

Certificate Of Conformance

ANNEX

Certificate No: 52229

SGS (Thailand) Ltd.


At Below Facilities:

Facility: SGS (Cambodia) Limited No.1076 A-D Street 371 Phum Trei II, Sangkat Sleung Meanchey, Khan Meanchey, Phnom Penh, Cambodia

Activity: Inspection.

Facility: Rama III Branch - Soft Line & Hard-goods Laboratory Services 1025/1 Soi Rang III 61, Rama III Road Chongnonsee, Yannawa Bangkok 10120 Thailand

Activity: Testing


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ภาคผนวก ง

สำเนาใบรับรองการสอบเทียบเครื่องมือ



บริษัท ไอคอนโซลูชั่น จำกัด (ประเทศไทย) จำกัด
1035/66 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10230
Tel. 0 2322 1832-34 ext.100

ISE CONSULTANT (THAILAND) CO., LTD.
1035/66 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10230
Tel. +66 2322 1832-34 ext.100

รายงานผลการปรับเทียบระบบควบคุมอัตราการไหลอากาศบริสุทธิ์ MASS FLOW CONTROL ZERO AIR CALIBRATION REPORT

Calibration Instrument

เครื่องมือตรวจวัด : เครื่องมือควบคุมการสอบเทียบ
Instrument : 4010
รุ่น : 4010
ยี่ห้อ : SABIO
Manufacturer :
วันที่เข้ารับการสอบเทียบ : 11 พฤษภาคม 2566
Date of Calibration :

หมายเลขเครื่อง : 08500311
Serial No :
อำนาจการตรวจวัด : 0 - 10 LPM
Measuring Range :
ผู้ค้า : SGS (THAILAND) LIMITED
Customer :

Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
		Before		After	
Flow Set (LPM)	Monitor (LPM)	LPM	%Error	LPM	%Error
1.00	1.000	1.038	3.661	1.010	0.990
2.00	2.000	2.082	3.890	2.011	0.497
3.00	3.000	3.096	3.101	3.021	0.495
4.00	4.000	4.096	2.344	4.025	0.621
5.00	5.000	5.086	1.691	5.030	0.596
6.00	6.000	6.079	1.300	6.032	0.531
7.00	7.000	7.089	1.255	7.030	0.427
8.00	8.000	8.110	1.356	8.023	0.287
9.00	9.000	9.187	2.035	9.003	0.033
10.00	10.000	10.270	2.629	9.991	-0.006
AVERAGE DIFFERENCE (%)		2.3263		0.4587	
Interception		-0.0162		-0.0239	
Correlation		0.9999		1.0000	

Calibration Tolerance % Difference be should +/- 1 % of Full Scale
User Manual of Reference

Reference Standard Instrument

เครื่องมือสอบเทียบ : DryCal (High)
Instrument : DCL-AH
รุ่น : DCL-AH
ยี่ห้อ : BICOS
Manufacturer :
หมายเลขเครื่อง : 3222
Serial No :
อำนาจการตรวจวัด : 30 L/min
Measuring Range :
เครื่องมือสอบเทียบ : DryCal (Low)
Instrument : Defender 520-L
รุ่น : Defender 520-L
ยี่ห้อ : BICOS
Manufacturer :
หมายเลขเครื่อง : 122189
Serial No :
อำนาจการตรวจวัด : 500ml/min
Measuring Range :

Result ☒ Accepted
☐ Not Accepted

ผู้ดำเนินการ :
Service By :

ผู้ตรวจสอบ :
Approved By :

Doc. No. : -

Page 1 of 1

VERIFIED



บริษัท ไอคอนโซลูชั่น จำกัด (ประเทศไทย) จำกัด
1035/66 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10230
Tel. 0 2322 1832-34 ext.100

ISE CONSULTANT (THAILAND) CO., LTD.
1035/66 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10230
Tel. +66 2322 1832-34 ext.100

รายงานผลการปรับเทียบระบบควบคุมอัตราการไหลอากาศบริสุทธิ์ MASS FLOW CONTROL STANDARD GAS CALIBRATION REPORT

Calibration Instrument

เครื่องมือตรวจวัด : เครื่องมือควบคุมการสอบเทียบ
Instrument : 4010
รุ่น : 4010
ยี่ห้อ : SABIO
Manufacturer :
วันที่เข้ารับการสอบเทียบ : 11 พฤษภาคม 2566
Date of Calibration :

หมายเลขเครื่อง : 08500311
Serial No :
อำนาจการตรวจวัด : 0 - 100 CCPM
Measuring Range :
ผู้ค้า : SGS (THAILAND) LIMITED
Customer :

Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
		Before		After	
Flow Set (CCPM)	Monitor (CCPM)	CCPM	%Error	CCPM	%Error
10.00	10.00	10.80	7.41	9.85	-1.52
20.00	20.00	21.59	7.36	19.97	-0.15
30.00	30.00	32.25	6.98	30.05	0.17
40.00	40.00	42.79	6.52	40.51	0.03
50.00	50.00	53.57	6.44	49.84	-0.32
60.00	60.00	63.97	6.21	59.82	-0.30
70.00	70.00	74.53	6.08	69.65	-0.50
80.00	80.00	85.00	5.88	79.60	-0.50
90.00	90.00	95.45	5.71	89.64	-0.40
100.00	100.00	107.46	6.94	100.10	0.10
AVERAGE DIFFERENCE (%)		6.5751		-0.3410	
Interception		-0.1778		0.0351	
Correlation		0.9999		1.0000	

Calibration Tolerance % Difference be should +/- 1 % of Full Scale
User Manual of Reference

Reference Standard Instrument

เครื่องมือสอบเทียบ : DryCal (High)
Instrument : DCL-AH
รุ่น : DCL-AH
ยี่ห้อ : BICOS
Manufacturer :
หมายเลขเครื่อง : 3222
Serial No :
อำนาจการตรวจวัด : 30 L/min
Measuring Range :
เครื่องมือสอบเทียบ : DryCal (Low)
Instrument : Defender 520-L
รุ่น : Defender 520-L
ยี่ห้อ : BICOS
Manufacturer :
หมายเลขเครื่อง : 122189
Serial No :
อำนาจการตรวจวัด : 500ml/min
Measuring Range :

Result ☒ Accepted
☐ Not Accepted

ผู้ดำเนินการ :
Service By :

ผู้ตรวจสอบ :
Approved By :

Doc. No. : -

Page 1 of 1



บริษัท ไอคอนโซลูชั่น จำกัด (ประเทศไทย) จำกัด
1035/66 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10230
Tel. 0 2322 1832-34 ext.100

ISE CONSULTANT (THAILAND) CO., LTD.
1035/66 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10230
Tel. +66 2322 1832-34 ext.100

รายงานผลการปรับเทียบระบบผลิตก๊าซโอโซน OZONE GENERATOR CALIBRATION REPORT

Calibration Instrument

เครื่องมือตรวจวัด : เครื่องมือควบคุมการสอบเทียบ
Instrument : 4010
รุ่น : 4010
ยี่ห้อ : SABIO
Manufacturer :
สถานี : สถานีตรวจวัดคุณภาพอากาศในกรุงเทพมหานคร (จตุจักร)
Station :
วันที่เข้ารับการสอบเทียบ : 11 พฤษภาคม 2566
Date of Calibration :

หมายเลขเครื่อง : 08500311
Serial No :
อำนาจการตรวจวัด : 0 - 100 CCPM
Measuring Range :
ผู้ค้า : SGS (THAILAND) LIMITED
Customer :

Result of Calibration

Flow Rate Volume (Multi Gas Calibrator Display)		Sensor Reading			
		Before		After	
Flow Set (PPB)	Monitor (PPB)	PPB	%Error	PPB	%Error
0.0	0.0	0.0	0.0	1.0	1.0
100.0	100.0	96.0	-4.0	98.0	-2.0
200.0	200.0	190.0	-10.0	198.0	-2.0
300.0	300.0	283.0	-17.0	301.0	1.0
400.0	400.0	372.0	-28.0	399.0	-1.0
500.0	500.0	457.0	-43.0	500.0	0.0
600.0	600.0	544.0	-56.0	600.0	0.0
700.0	700.0	626.0	-74.0	701.0	1.0
800.0	800.0	704.0	-96.0	802.0	2.0
AVERAGE DIFFERENCE (%)		-41.0000		-0.1250	
Interception		-19.97989		2.313293	
Correlation		0.999578		0.999994	

Calibration Tolerance % Difference be should +/- 3 PPB At 5 LPM
User Manual of Reference

Reference Standard Instrument

เครื่องมือสอบเทียบ : Ozone Primary Standard
Instrument :
ยี่ห้อ : Tanabyte Engineering Inc.
Manufacturer :
อำนาจการตรวจวัด : 0 - 1500 PPB
Measuring Range :
รุ่น : 5A2-734
Model :
หมายเลขเครื่อง : 0140
Serial No :

Result ☒ Accepted
☐ Not Accepted

ผู้ดำเนินการ :
Service By :

ผู้ตรวจสอบ :
Approved By :

Doc. No. :

Page 1 of 1



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด
KINETICS CORPORATION LTD.

AGCM 22001

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / บริษัท : SGS (Thailand) Co., Ltd.
วันที่ : 16 กุมภาพันธ์ 2567
รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer
บริษัทผู้ผลิต : Teledyne API
รุ่นของอุปกรณ์ / เครื่องมือ : T300
หมายเลขอุปกรณ์ / เครื่องมือ : 5881

TEST VALUES			
API MODEL T300		BEFORE	AFTER
1	RANGE	50.0	50.0
2	STABILITY	0.01	0.01
3	CO MEASURE	2900 - 4800 mV	3889
4	CO REFERENCE	2000 - 4800 mV	3361
5	MR RATIO	1.1 - 1.3	1.2
6	PRESSURE	25 - 35 in - Hg-A	28.9
7	SAMPLE FLOW	800 ± 10% cc/min	827
8	SAMPLE TEMP	48 ± 4 °C	46.9
9	BENCH TEMP	48 ± 2 °C	48.0
10	WHEEL TEMP	68 ± 2 °C	67.9
11	BOX TEMP	AMBIENT ± 5 °C	34.6
12	PHI DRIVE	250 - 4750 mV	2430
13	CO SLOPE	1.0 ± 0.3	1.059
14	CO OFFSET	0.0 ± 0.3	-0.049
15	CO READING (AMBIENT)	PPM	0.732
16	ELECTRICAL TEST	40 ± 2 PPM	40.3
17	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.20/12.15/16.26/15.25
18	ZERO GAS	0.00 PPM	-0.326
19	SPAN GAS	40.0 PPM	40.341

หมายเหตุ

- ทำการเปลี่ยน Sintered Filter 1 ชิ้น, Spring 1 ชิ้น, O-ring 2 ชิ้น

- ทำการ Calibrate Multi-Point

ต้องการข้อมูลเพิ่มเติมติดต่อทางฝ่ายเทคนิค กรุณา
โทร 388 ถนนวิภาวดีรังสิต แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10230 โทรสาร : 0-2515-8994 โทรสาร : 0-2515-898

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : CO Analyzer

MANUFACTURER : Teledyne - API

MODEL : T300

SERIAL NO : 5881

STANDARD GAS CONCENTRATION (PPM) :

4512

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) :

1550

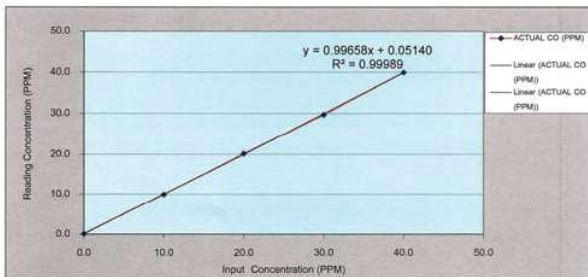
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPM)	ACTUAL CO (PPM)	ERROR CO (PPM)	% ERROR CO
ZERO	0.00	0.064	0.064	0.00
1	10.00	9.932	-0.068	-0.680
2	20.00	20.198	0.198	0.990
3	30.00	29.724	-0.276	-0.920
4	40.00	39.997	-0.003	-0.008
AVERAGE (%)				0.649



CALIBRATED BY

DATE : 16/02/2567

ต้องการข้อมูลทาง

เลขที่ 388 ถนนพหลโยธิน แขวงจันทรมาน เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8968 E-Mail

KINETICS
Environmental science business LTD

Customer service report

บริษัท เคทีเอส (ประเทศไทย) จำกัด

Manufacturer

Equipment

Model

Teledyne API

CO Analyzer

T300

S/N

Quotation

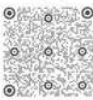
5881

• Checking Date •

16/02/2567

• Problem

B2



contact us

• Correlation working / Remark

- ทำการเปลี่ยน Sintered Filter 1 ชิ้น, Spring 1 ชิ้น O-ring 2 ชิ้น
- ทำการ Calibrate Multi-point

• Repair parts •

Sintered Filter 1 ชิ้น, Spring 1 ชิ้น, O-ring 2 ชิ้น

Technician / Engineer

KINETICS

AACM | 7002

บริษัท เคทีเอส คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.

วันที่ : 17 เมษายน 2567

รายชื่ออุปกรณ์ / เครื่องมือ : SO₂ Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T100

หมายเลขอุปกรณ์ / เครื่องมือ : 1385

TEST VALUES

	API MODEL T100	BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	SO ₂ STABILITY	≤ 1 PPB	0.00
3	PRESSURE	25 - 35 in - Hg-A	27.4
4	SAMPLE FLOW	700 ± 10% cc/min	670.0
5	PMT	mV	35.9
6	NORM PMT	mV	39.2
7	UV LAMP	1000 - 4800 mV	3552.0
8	LAMP RATIO	30 To 120 %	95.4
9	STRAY LIGHT	≤ 100 PPB	32.2
10	DARK PMT	-50 ± 200 % mV	43.5
11	DARK LAMP	-50 ± 200 % mV	0.8
12	SO ₂ SLOPE	1.0 ± 0.3	1.658
13	SO ₂ OFFSET	< 250 mV	38.8
14	HVPS	400 - 900 V	615
15	RX CELL TEMP	50 ± 1 °C	50.0
16	BOX TEMP	AMBIENT ± 5 °C	33.4
17	PMT TEMP	1 ± 2 °C	8.6
18	SO ₂ SAMPLE READING	PPB	0.3
19	OPTIC TEST	2000 ± 1000 mV	3332.0
20	ELECTRICAL TEST	2000 ± 1000 mV	2107.0
21	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.14/ 12.24 /16.24 ±15.28
22	ZERO GAS	0.00 PPB	2.0
23	SPAN GAS	400.00 PPB	377.8

หมายเหตุ

- ทำการเปลี่ยน Sintered Filter 1 ชิ้น, Spring 1 ชิ้น, O-ring 2 ชิ้น Filter 47 mm.1ชิ้น

- ทำการ Calibrate Multi-Point

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม

เลขที่ 388 ถนนพหลโยธิน แขวงจันทรมาน เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8968 E-Mail

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : SO₂ Analyzer

MANUFACTURER : Teledyne - API

MODEL : T100

SERIAL NUMBER : 1385

STANDARD GAS CONCENTRATION (PPM) : 53.79

CYLINDER NO : CC745169

CYLINDER PRESSURE (PSIG) : 1550

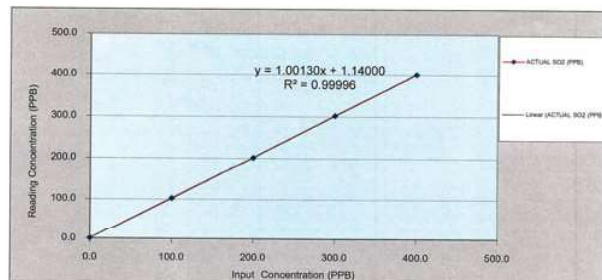
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPB)	ACTUAL SO ₂ (PPB)	ERROR SO ₂ (PPB)	% ERROR SO ₂
ZERO	0.0	0.1	0.1	-
1	100.0	102.4	2.4	2.4
2	200.0	201.4	1.4	0.7
3	300.0	302.3	2.3	0.8
4	400.0	400.8	0.8	0.2
AVERAGE (%)				1.0



CALIBRATED BY

DATE : 17/04/2567

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม

เลขที่ 388 ถนนพหลโยธิน แขวงจันทรมาน เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8968 E-Mail

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.
รายชื่ออุปกรณ์ / เครื่องมือ : NOx Analyzer
รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 16 กุมภาพันธ์ 2567
บริษัทผู้ผลิต : Teledyne API
หมายเลขอุปกรณ์ / เครื่องมือ : 7533

TEST VALUES			
	API MODEL T200	BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.31
3	SAMPLE FLOW	500 ± 10% cc/min	494
4	OZONE FLOW	80 ± 10% cc/min	79
5	PMT	mV	178.4
6	NORM PMT	mV	-2.2
7	A ZERO	-20 To 150 MV	134.7
8	HPVS	400 - 900 V	660
9	RX CELL TEMP	50 ± 1 °C	50.1
10	BOX TEMP	AMBIENT ± 5 °C	29.2
11	PMT TEMP	7 ± 2 °C	6.8
12	MOLY TEMP	315 ± 5 °C	316.0
13	RX CELL PRESSURE	<10 in -Hg-A	4.5
14	SAMPLE PRESSURE	25 - 35 in -Hg-A	28.6
15	NOX SLOPE	1.0 ± 0.3	1.034
16	NOX OFFSET	-50 To 150	20.4
17	NO SLOPE	1.0 ± 0.3	1.002
18	NO OFFSET	-50 To 150	-0.2
19	NO SAMPLE READING	PPB	-0.8
20	NO2 SAMPLE READING	PPB	5.5
21	NOX SAMPLE READING	PPB	4.7
22	OPTIC TEST	2000 ± 1000 mV	2626.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2665.0
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.08 / 11.99 / 15.27 / -15.16
25	ZERO GAS	0.00/0.00 PPB	-2.1 / -7.8
26	SPAN GAS	400.00/400.00 PPB	403.0 / 402.8

หมายเหตุ

- ทำการเปลี่ยน Sintered Filter 3 ชิ้น, Spring 3 ชิ้น, O-ring 6 ชิ้น

- ทำการ Calibrate Multi-point

ต้องการข้อมูลเพิ่มเติมทางอีเมล

เลขที่ 388 ถนนศรีนครินทร์ แขวงจันทน์เกษม เขตบางนา กรุงเทพมหานคร 10900 โทรศัพท์: 0-2515-8999 โทรสาร: 0-2515-8988 E-Mail: info@kinetics.co.th

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : NOx Analyzer

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 7533

STANDARD GAS CONCENTRATION (PPM) : 53.40

CYLINDER NO : CC745189

CYLINDER PRESSURE (psig) : 1550

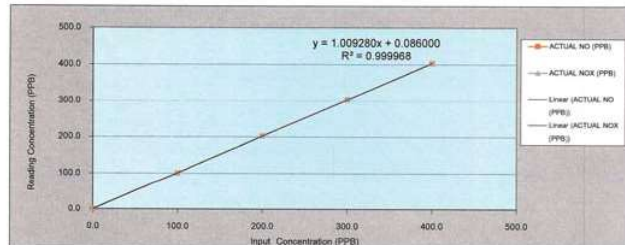
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

CALIBRATION RESULTS							
POINT NO	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO, (PPB)	ERROR NO, (PPB)	% ERROR NO,
ZERO	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1	100.0	100.6	0.6	0.6	100.3	0.3	0.3
2	200.0	202.1	2.1	1.1	202.6	2.6	1.3
3	300.0	304.0	4.0	1.3	304.0	4.0	1.3
4	400.0	403.0	3.0	0.8	402.8	2.8	0.7
AVERAGE (%)				1.0			0.9



CALIBRATED BY : M

DATE : 16 /02 /2566

ต้องการข้อมูลเพิ่มเติม

เลขที่ 388 ถนนศรีนครินทร์ แขวงจันทน์เกษม เขตบางนา กรุงเทพมหานคร 10900 โทรศัพท์: 0-2515-8999 โทรสาร: 0-2515-8988 E-Mail: info@kinetics.co.th

Customer service report

บริษัท เอส ซี เอส (ประเทศไทย) จำกัด

Manufacturer
Teledyne API

Equipment
NOx Analyzer

Model
T200

S/N
7533

Quotation

• Checking Date •

16/02/2567

• Problem



B2



contact us

• Correlation working / Remark

1. ทำการเปลี่ยน Sintered Filter 3 ชิ้น , Spring 3 ชิ้น O-ring 6 ชิ้น
2. ทำการ Calibrate Multi-point

• Repair parts •

Sintered Filter 3 ชิ้น , Spring 3 ชิ้น, O-ring 6 ชิ้น

Technician / Engineer

บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.
รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer
รุ่นของอุปกรณ์ / เครื่องมือ : T300

วันที่ : 20 กรกฎาคม 2566
บริษัทผู้ผลิต : Teledyne API
หมายเลขอุปกรณ์ / เครื่องมือ : 1885

TEST VALUES			
	API MODEL T300	BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0
2	STABILITY	≤ 1 PPM	0.009
3	CO MEASURE	2500 - 4800 mV	3877.5
4	CO REFERENCE	2000 - 4800 mV	3153.2
5	MR RATIO	1.1 - 1.3	1.233
6	PRESSURE	25 - 35 in -Hg-A	29.2
7	SAMPLE FLOW	800 ± 10% cc/min	806
8	SAMPLE TEMP	48 ± 4 °C	45.5
9	BENCH TEMP	48 ± 2 °C	48.0
10	WHEEL TEMP	68 ± 2 °C	68.0
11	BOX TEMP	AMBIENT ± 5 °C	32.2
12	PMT DRIVE	250 - 4750 mV	3316.2
13	CO SLOPE	1.0 ± 0.3	0.892
14	CO OFFSET	0.0 ± 0.3	0.024
15	CO READING (AMBIENT)	PPM	0.852
16	ELECTRICAL TEST	40 ± 2 PPM	1100.000
17	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.20 / 12.24 / 16.71 / -15.32
18	ZERO GAS	0.00 PPM	0.480
19	SPAN GAS	40.0 PPM	43.073

หมายเหตุ

- ทำการเปลี่ยน Spring 1 ชิ้น, Sintered Filter 1 ชิ้น, O-ring 2 ชิ้น

ต้องการข้อมูลเพิ่มเติมทางอีเมล กรุณาติดต่อ: คุณพรชัย คุณวราภรณ์ โทรศัพท์: 0-2515-8987

เลขที่ 388 ถนนศรีนครินทร์ แขวงจันทน์เกษม เขตบางนา กรุงเทพมหานคร 10900 โทรศัพท์: 0-2515-8999 โทรสาร: 0-2515-8988 E-Mail: info@kinetics.co.th

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : CO Analyzer

MANUFACTURER : Teledyne - API MODEL : T300 SERIAL NO : 1885

STANDARD GAS CONCENTRATION (PPM) : 4512 CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1420 CERTIFIED DATE : Mar 10 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES EXPIRED DATE : Mar 10 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPM)	ACTUAL CO (PPM)	ERROR CO (PPM)	% ERROR CO
ZERO	0.00	0.002	0.002	0.00
1	10.00	9.939	-0.061	-0.610
2	20.00	20.251	0.251	1.255
3	30.00	30.008	0.008	0.027
4	40.00	40.006	0.006	0.015
AVERAGE (%)				0.476

Calibration curve: $y = 1.00077x + 0.02580$, $R^2 = 0.99994$

CALIBRATED BY : [Redacted]

ต้องการข้อมูลทางค่า : [Redacted]

เลขที่ 388 ถนนพหลโยธิน แขวงจันทริก เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ 0-2515-8999 โทรสาร 0-2515-8998

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 5
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number: E04N199E15A0622
Cylinder Number: CC745169
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12021
Gas Code: CO,NO,NOX,SO2,BALN

Reference Number: 160-402045691-1
Cylinder Volume: 144.4 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 650
Certification Date: Mar 10, 2021

Expiration Date: Mar 10, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards May 2012" document EPA 820R-13-011, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.
Do Not Use This Cylinder Below 160 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Date
NOX	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/03/2021, 03/10/2021
NITROGEN	Balance				03/04/2021

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060227	EB0079118	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
PRM	12386	D650525	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124205889	CC323707	4.029 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/-0.6%	Dec 23, 2021
NTRM	06012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

Instrument/Make/Model

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 8 N1X0579	NDIR	Feb 26, 2021
Nicolet 5550 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet 5550 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet 5550 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Trid Data Available Upon Request

NOTES:
Gross Weight: 28.1 Kg
Net Weight: 4.6 Kg

Page 1 of 160-402045691-1

KINETICS

บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการสอบและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd. วันที่ : 29 มีนาคม 2567

รายชื่ออุปกรณ์ / เครื่องมือ : NOx Analyzer บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T200 หมายเลขอุปกรณ์ / เครื่องมือ : 2199

TEST VALUES

API MODEL T200	BEFORE	AFTER
1 RANGE	50 - 20,000 PPB	500.0
2 STABILITY	≤ 1 PPB	0.4
3 SAMPLE FLOW	500 ± 10% cc/min	xxx
4 OZONE FLOW	80 ± 10% cc/min	86
5 PMT	mV	86.1
6 NORM PMT	mV	86.1
7 A ZERO	-20 To 150 mV	85.5
8 HPVS	400 - 900 V	684
9 RX CELL TEMP	50 ± 1 °C	50.0
10 BOX TEMP	AMBIENT ± 5 °C	32.5
11 PMT TEMP	7 ± 2 °C	6.8
12 MOLT TEMP	315 ± 5 °C	314.0
13 RX CELL PRESSURE	<10 in.-Hg-A	30.1
14 SAMPLE PRESSURE	25 - 35 in.-Hg-A	30.1
15 NOX SLOPE	1.0 ± 0.3	2.494
16 NOX OFFSET	-50 To 150	11.9
17 NO SLOPE	1.0 ± 0.3	2.289
18 NO OFFSET	-50 To 150	-1.1
19 NO SAMPLE READING	PPB	0.1
20 NO2 SAMPLE READING	PPB	11.2
21 NOX SAMPLE READING	PPB	11.3
22 OPTIC TEST	2000 ± 1000 mV	2309.0
23 ELECTRICAL TEST	2000 ± 1000 mV	2639.0
24 VOLTAGE TEST	+5 V +12 V +15 V -15 V	4.47 /12.10/ 15.45/ -15.16
25 ZERO GAS NONOX	0.000.00 PPB	0.5 / -5.0
26 SPAN GAS NONOX	400.00/400.00 PPB	754.6 / 762.3

หมายเหตุ

- Sample Flow Warning, RX Cell Warning
- ทำการปรับเทียบ PNEU SENSOR 1 BG
- ทำการปรับเทียบ Gasflow Filter 3 ชิ้น, Spring 3 ชิ้น, O-ring 6 ชิ้น Filter 47 mm, 1x10
- ทำการ Calibrate Multi-Point

CALIBRATED BY : [Redacted]

ต้องการข้อมูลทางค่า : [Redacted]

เลขที่ 388 ถนนพหลโยธิน แขวงจันทริก เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ 0-2515-8999 โทรสาร 0-2515-8998

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : NOx Analyzer

MANUFACTURER : Teledyne - API MODEL : T200 SERIAL NO : 2199

STANDARD GAS CONCENTRATION (PPM) : 53.40 CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1550 CERTIFIED DATE : Mar 10 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES EXPIRED DATE : Mar 10 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS				ACTUAL NOx (PPB)	ERROR NOx (PPB)	% ERROR NOx
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO			
ZERO	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1	100.0	100.8	0.8	0.8	101.0	1.0	1.0
2	200.0	200.6	-0.7	0.3	201.0	1.0	0.5
3	300.0	300.1	0.1	0.0	302.9	2.9	1.0
4	400.0	399.0	-1.0	-0.3	401.3	1.3	0.3
AVERAGE (%)				0.4			0.7

Calibration curve: $y = 1.004480x + 0.346000$, $R^2 = 0.999976$

CALIBRATED BY : [Redacted]

ต้องการข้อมูลทางค่า : [Redacted]

เลขที่ 388 ถนนพหลโยธิน แขวงจันทริก เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ 0-2515-8999 โทรสาร 0-2515-8998 E-Mail : [Redacted]

รายงานผลการซ่อมและปรับเทียบแก๊สอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.

วันที่ : 20 พฤษภาคม 2568

รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T300

หมายเลขอุปกรณ์ / เครื่องมือ : 2550

TEST VALUES			
	API MODEL T300	BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0
2	STABILITY	≤ 1 PPM	0.00
3	CO MEASURE	2500 - 4800 mV	3471.8
4	CO REFERENCE	2000 - 4800 mV	2904.2
5	MR RATIO	1.1 - 1.3	-
6	PRESSURE	25 - 35 in - Hg-A	29.4
7	SAMPLE FLOW	800 ± 10% cc/min	783.9
8	SAMPLE TEMP	48 ± 4 °C	44.8
9	BENCH TEMP	48 ± 2 °C	48.0
10	WHEEL TEMP	68 ± 2 °C	68.0
11	BOX TEMP	AMBIENT ± 5 °C	36.0
12	PMT DRIVE	250 - 4750 mV	-
13	CO SLOPE	1.0 ± 0.3	0.958
14	CO OFFSET	0.0 ± 0.3	-0.008
15	CO READING (AMBIENT)	PPM	0.21
16	ELECTRICAL TEST	40 ± 2 PPM	0.30
17	VOLTAGE TEST	+5V +12V +15V -15V	5.23 / 12.23 / 16.58 / -15.17
18	ZERO GAS	0.00 PPM	-0.07
19	SPAN GAS	40.0 PPM	42.55

NOTES

- ทำการเปลี่ยน Spring 1 ชิ้น, Sintered Filter 1 ชิ้น, O-ring 2 ชิ้น

ต้องการข้อมูลเพิ่มเติมทางอีเมลจาก คุณณัฐนิศ :

เลขที่ 388 ถนนศรีวิภาวดี แขวงจันทน์เกษม เขตจตุจักร กรุงเทพฯ 10000 โทรศัพท์: 0-2515-8999 โทรสาร: 0-2515-8988 E-Mail:

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : CO Analyzer

MANUFACTURER : Teledyne - API

MODEL : T300

SERIAL NO : 2550

STANDARD GAS CONCENTRATION (PPM) : 4512

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1420

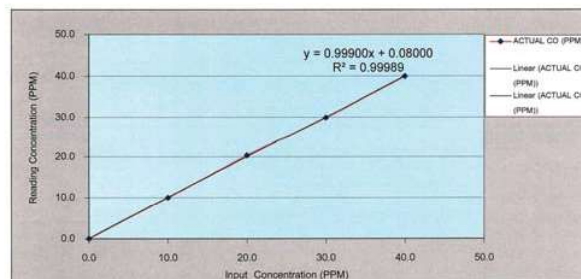
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPM)	ACTUAL CO (PPM)	ERROR CO (PPM)	% ERROR CO
ZERO	0.00	0.02	0.02	0.00
1	10.00	10.00	0.00	0.00
2	20.00	20.35	0.35	1.75
3	30.00	29.92	-0.08	-0.27
4	40.00	40.01	0.01	0.02
AVERAGE (%)				0.51



CALIBRATED BY :

ต้องการข้อมูลเพิ่มเติมทางอีเมลจาก :

เลขที่ 388 ถนนศรีวิภาวดี แขวงจันทน์เกษม เขตจตุจักร กรุงเทพฯ 10000 โทรศัพท์: 0-2515-8999 โทรสาร: 0-2515-8988 E-Mail:

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number: E04N196E15A022

Reference Number: 160-402045691-1

Cylinder Number: CC745169

Cylinder Volume: 144.4 CF

Laboratory: 124 - Plumsteadville - PA

Cylinder Pressure: 2015 PSIG

PGVP Number: A12021

Valve Outlet: 660

Gas Code: CO, NO, NOX, SO2, BALN

Certification Date: Mar 10, 2021

Expiration Date: Mar 10, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/011, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration medium. All concentrations are on a mole/mole basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig (i.e. 6.7 megapascals).

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	53.00 PPM	53.40 PPM	G1	±1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	±1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.75 PPM	G1	±0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	±0.6% NIST Traceable	03/03/2021, 03/10/2021
NITROGEN	Balance				03/04/2021

CALIBRATION STANDARDS					
Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07000227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	±1.0%	Jul 23, 2023
PRM	12386	D865025	9.91 PPM ARGON/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	12400689	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	±0.8%	Dec 23, 2021
NTRM	06012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	±0.6%	Jun 07, 2024

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1X0476	NDIR	Feb 26, 2021
Nicolet iS50 FTIR AUP2010246 NO	FTIR	Feb 11, 2021
Nicolet iS50 FTIR AUP2010246 NO2	FTIR	Feb 22, 2021
Nicolet iS50 FTIR AUP2010246 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.1 Kg

Net Weight: 4.6 Kg



รายงานผลการซ่อมและปรับเทียบแก๊สอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.

วันที่ : 7 มีนาคม 2567

รายชื่ออุปกรณ์ / เครื่องมือ : SO_x Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T100

หมายเลขอุปกรณ์ / เครื่องมือ : 1771

TEST VALUES			
	API MODEL T100	BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	SO ₂ STABILITY	≤ 1 PPB	11.60
3	PRESSURE	25 - 35 in - Hg-A	28.4
4	SAMPLE FLOW	700 ± 10% cc/min	487.0
5	PMT	mV	78.3
6	NORM PMT	mV	87.7
7	UV LAMP	1000 - 4800 mV	3770.0
8	LAMP RATIO	30 To 120 %	91.9
9	STRAY LIGHT	≤ 100 PPB	68.7
10	DARK PMT	-50 ± 200 mV	9.7
11	DARK LAMP	-50 ± 200 mV	-1.6
12	SO ₂ SLOPE	1.0 ± 0.3	2.199
13	SO ₂ OFFSET	< 250 mV	62.5
14	HVPS	400 - 900 V	578
15	RX CELL TEMP	50 ± 1 °C	50.0
16	BOX TEMP	AMBIENT ± 5 °C	31.5
17	PMT TEMP	7 ± 2 °C	8.4
18	SO ₂ SAMPLE READING	PPB	27.5
19	OPTIC TEST	2000 ± 1000 mV	1093.0
20	ELECTRICAL TEST	2000 ± 1000 mV	1449.0
21	VOLTAGE TEST	+5V +12V +15V -15V	5.28 / 11.96 / 16.92 / -15.20
22	ZERO GAS	0.00 PPB	16.3
23	SPAN GAS	400.00 PPB	673.8

NOTES

- Relay Board Warning ทำการเปลี่ยน Power Supply 12Vdc 1 ea, Relay DPDT 1 ea

- ทำการเปลี่ยน CO Filter 330NM 1 ea

- ทำการเปลี่ยน Sintered Filter 1 ชิ้น, Spring 1 ชิ้น, O-ring 2 ชิ้น, Filter 47 mm, 1 ชิ้น

- ทำการ Calibrate Multi-Point

ต้องการข้อมูลเพิ่มเติมทางอีเมลจาก คุณณัฐนิศ :

เลขที่ 388 ถนนศรีวิภาวดี แขวงจันทน์เกษม เขตจตุจักร กรุงเทพฯ 10000 โทรศัพท์: 0-2515-8999 โทรสาร: 0-2515-8988 E-Mail:

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : SO₂ Analyzer

MANUFACTURER : Teledyne - API

MODEL : T100

SERIAL NUMBER : 1771

STANDARD GAS CONCENTRATION (PPM) : 53.79

CYLINDER NO : CC745169

CYLINDER PRESSURE (PSIG) : 1550

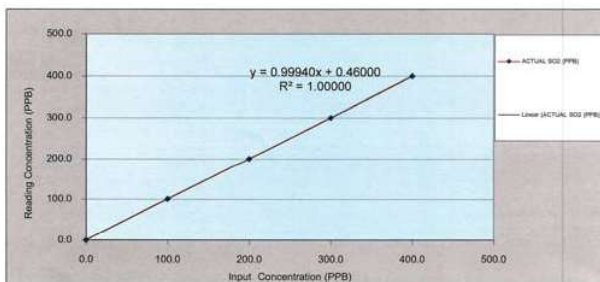
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPB)	ACTUAL SO ₂ (PPB)	ERROR SO ₂ (PPB)	% ERROR SO ₂
ZERO	0.0	0.1	0.1	-
1	100.0	100.8	0.8	0.8
2	200.0	200.5	0.5	0.3
3	300.0	300.2	0.2	0.1
4	400.0	400.1	0.1	0.0
AVERAGE (%)				0.3



CALIBRATED BY :

DATE : 7 /03 /2567

ต้องการข้อมูลทางค่า

เลขที่ 388 ถนนวิภาวดีรังสิต แขวงจันทน์เกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8998 E-Mail :



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการวัดและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า : หน่วยยาม : SGS (Thailand) Co., Ltd

วันที่ : 24 กรกฎาคม 2566

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer

บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T200

หมายเลขอุปกรณ์ / เครื่องมือ : 1652

TEST VALUES

API MODEL T200	BEFORE	AFTER
1 RANGE	50 - 20,000 PPB	500.0
2 STABILITY	≤ 1 PPB	0.1
3 SAMPLE FLOW	500 ± 10% cc/min	300X
4 OZONE FLOW	80 ± 10% cc/min	XXX
5 PMT	mV	130.6
6 NORM PMT	mV	31.0
7 A ZERO	-20 To 150 mV	137.4
8 HPVS	400 - 900 V	749
9 RX CELL TEMP	50 ± 1 °C	50.0
10 BOX TEMP	AMBIENT ± 5 °C	26.3
11 PMT TEMP	7 ± 2 °C	6.8
12 MOLY TEMP	315 ± 5 °C	316.4
13 RX CELL PRESSURE	<10 in -Hg-A	-3.0
14 SAMPLE PRESSURE	25 - 35 in -Hg-A	29.0
15 NOX SLOPE	1.0 ± 0.3	1.150
16 NOX OFFSET	-50 To 150	3.0
17 NO SLOPE	1.0 ± 0.3	1.080
18 NO OFFSET	-50 To 150	1.8
19 NO SAMPLE READING	PPB	2.3
20 NO ₂ SAMPLE READING	PPB	57.7
21 NO _x SAMPLE READING	PPB	60.0
22 OPTIC TEST	2000 ± 1000 mV	2219.6
23 ELECTRICAL TEST	2000 ± 1000 mV	2507.9
34 VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.26 / 12.33 / 15.82 / -15.21
25 ZERO GAS	NONOX	0.000/0.00 PPB
26 SPAN GAS	NONOX	400.00/400.00 PPB

หมายเหตุ

- วิธีการวัดแบบ Sintered Filter 3 ชั้น, O-ring, 6 ชั้น, Spring 3 ชั้น

- ตรวจสอบค่า Moly Temp Warning, Relay Board Warning, Ozone Gen และ Sample Flow ไม่สามารถใช้งานได้ / แก้ไขเรียบร้อยแล้ว

- วิธีการวัดแบบ Pressure Sensor 0-15 PSIG จำนวน 1 ชิ้น

ต้องการข้อมูลเพิ่มเติมนำมาส่งเอกสาร กรุณาติดต่อ :

เลขที่ 388 ถนนวิภาวดีรังสิต แขวงจันทน์เกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8998 E-Mail :

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd

EQUIPMENT NAME : NO_x Analyzer

MANUFACTURER : Teledyne - API

MODEL : T200

SERIAL NO : 1652

STANDARD GAS CONCENTRATION (PPM) : 53.45

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1420

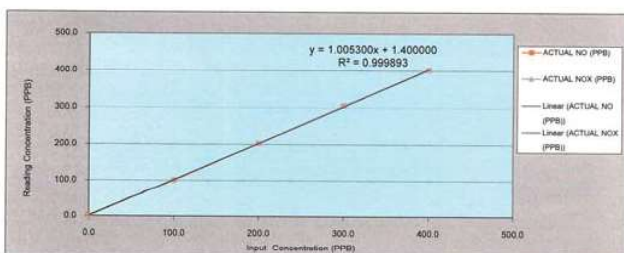
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS							
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO ₂ (PPB)	ERROR NO ₂ (PPB)	% ERROR NO ₂	
ZERO	0.0	0.5	0.5	-	0.9	0.9	-	
1	100.0	101.0	1.0	1.0	101.7	1.7	1.7	
2	200.0	202.2	2.2	1.1	202.5	2.5	1.3	
3	300.0	305.4	5.4	1.8	305.6	5.6	1.9	
4	400.0	401.4	1.4	-0.1	401.6	1.6	0.4	
AVERAGE (%)				1.0			1.3	



CALIBRATED BY :

ต้องการข้อมูลทางค่า

เลขที่ 388 ถนนวิภาวดีรังสิต แขวงจันทน์เกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8998 E-Mail :



an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Barton Road
Bldg 2
Plymouthville, PA 18949
Airgas.comCERTIFICATE OF ANALYSIS
Grade of Product: EPA ProtocolPart Number: E04N99E15A0522
Cylinder Number: CC745169
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12021
Gas Code: CO,NO,NO₂,SO₂,BALNReference Number: 160-402045691-1
Cylinder Volume: 144.4 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 660
Certification Date: Mar 10, 2021

Expiration Date: Mar 10, 2029

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800R-12851, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	53.00 PPM	53.40 PPM	G1	±1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	±1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	±1.0% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	±1.0% NIST Traceable	03/04/2021
NITROGEN	Balance				

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07002027	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	±1.10%	Jul 23, 2023
PRM	12356	D650525	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
QMS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 16, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	±1.0%	Dec 23, 2021
NTRM	06012341	KAL04715	4857 PPM CARBON MONOXIDE/NITROGEN	±1.0%	Jun 07, 2024

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 5 N1X02579	NDR	Feb 26, 2021
Nicolet iS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet iS50 FTIR AUP2010245 NO ₂	FTIR	Feb 22, 2021
Nicolet iS50 FTIR AUP2010245 SO ₂	FTIR	Feb 18, 2021

Triad Data Available Upon Request

NOTES:

Gross Weight: 28.1 Kg

Net Weight: 4.6 Kg



Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.
Address : 100 Nanglinchee Road, Chongnonsi, Yannawa Bangkok
10120

Certificate No : 23-ACT-138

Request No : Req-2023-1892

Unit Under Calibration Details

Measurement item : Acoustic Calibrator
Manufacturer : Cirrus
Model : CR-515
Serial Number : 88350
ID : ENSL 19175
Class : I
Range : 94 dB / 1000 Hz
Instrument Status : Used

Calibration Environment and Details

Temperature : (23 ± 2 °C)
Humidity : (50 ± 20 %RH)
Barometric Pressure : (1013 ± 10.0 hPa)
Received Date : 4 September 2023
Calibration Date : 18 September 2023
Location of Calibration : LAB 1 Acoustic
Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEL	31 May 2024
THD Multimeter	2015	1047765	NIMT	31 January 2024

Traceability : This certificate provides traceability of measurement to recognized national standard, and to the realization of the international System of Units (SI).

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor k=2, providing a level of confidence approximately 95 %.

Calibrated By :

Approved By :

Calibration Engineer Supervisor

Issue Date : 18 September 2023

The results relate only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-708-ACT-02 Rev.00 Issue date 01/07/19

Certificate No : 23-ACT-138

Request No : Req-2023-1892

Sound pressure level

Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance limit Class 1 (± dB)
	Measured	Error	Measured	Error		
94 dB / 1000 Hz	93.95	-0.05	-	-	0.13	0.25

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
94 dB / 1000 Hz	1000.00	0.00	-	-	0.01	0.70

Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)
	Measured (%)	Error (%)	Measured (%)	Error (%)		
94 dB / 1000 Hz	0.07	-	-	-	0.40	2.5

Note :

- Acceptance limit was IEC60942:2017 Class 1
- The calibration results exclude the calibrator pressure correction
- The calibration results exclude the microphone volume correction

End of Calibration

The results relate only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-708-ACT-02 Rev.00 Issue date 01/07/19



ENSL 18165

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL. BP. 38/0367

CALIBRATION CERTIFICATE

Submitted by : SGS (Thailand) Limited.
Address : 100 Nanglinchee Road, Chongnonsi, Yannawa, Bangkok 10120.
Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre,
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., A.Muang, Samutprakan 10280.

Instrument Calibrated :
Description : Sound Level Meter
Manufacturer : Cirrus
Model : CR-161B
Serial No. : G080132
Microphone : MK 224 No.211770D
Preamplifier : No.5638F
Ambient Environment
Temperature : (23 ± 3) °C
Relative Humidity : (50 ± 15) %
Ambient Pressure : (101.325 ± 1.5) kPa

Standards used :

1. Band Pass Filter Wavetek 752A S/N 90010494.
2. Condenser Microphone Brüel&Kjær 4180 S/N 2889871.
3. Decade Attenuator Ando AL-205 S/N 00464602.
4. Function/Arbitrary Waveform Generator Agilent 33220A S/N MY44042668.
5. Digital Function Synthesizer NF Electronic Instruments DF-193A S/N 122037.
6. Digital Multimeter Fluke 8520A S/N 4985007.
7. Multifunction Acoustic Calibrator Brüel&Kjær 4226 S/N 2810358.
8. Measuring Amplifier Brüel&Kjær 2636 S/N 1537484.

Date of Receipt : 12 Mar. 2024

Date of Calibration : 28-29 Mar. 2024

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FM-BL-MTC.002 Rev.5

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL. BP. 38/0367

9. Power Amplifier Brüel&Kjær 2706 S/N 1517650.
10. Speaker Tannoy Limited, Great Britain British Patent No. 215300.
11. Digital Multimeter Agilent 34401A S/N MY44005560.
12. Programmable Attenuator Tamagawa TPA-303A S/N 2212.

Calibration Procedure :

This instrument was calibrated by using calibration procedures no CP-102-02 and CP-102-03, which were based on IEC 61672-3 Electroacoustics - Sound Level Meters - Part 3 : Periodic tests (2013). These calibration procedures were related to the electrical and acoustic signal tests. The electrical signal test was carried out with the direct measurement method. The acoustic signal test was performed in an anechoic room with the comparison measurement method.

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

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

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

Date of Calibration : 28-29 Mar. 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL- BP. 38/0367

1. Absolute Sensitivity

Reference Acoustic Signal (dB)	Measured value (dB)	Deviation value (dB)	Acceptance limit Class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
93.70	93.8	0.1	0.7	0.48	N/A

Note: No adjustment.

2. Self-generated noise

2.1 Normal test

Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
19.2	0.10	N/A

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

Frequency Weighting	Measured value (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-Weight	under-range	-	N/A
C-Weight	21.1	0.10	N/A
Flat	30.8	0.10	N/A

Note: The under-range means the indicator cannot display the value because it is under the setting range 20-140 dB.

Date of Calibration : 28-29 Mar. 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL- BP. 38/0367

3. Acoustical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 1 (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
125	0.7	0.4	0.4	±1.0	0.45	0.6
1 000	-0.5	-0.5	-0.5	±0.7	0.45	0.6
8 000	0.9	1.0	1.3	+1.5; -2.5	0.45	0.7

4. Electrical signal test of frequency weightings

Frequency (Hz)	Deviation from frequency response (dB)			Acceptance limit class 1 (dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
	A-weight	C-weight	Flat			
63	0.7	0.1	0.0	±1.0	0.20	0.6
125	0.3	0.0	0.0	±1.0	0.20	0.6
250	0.2	0.0	0.0	±1.0	0.20	0.6
500	0.1	0.0	0.0	±1.0	0.20	0.6
1 000	0.0	0.0	0.0	±0.7	0.20	0.6
2 000	-0.1	0.0	0.0	±1.0	0.20	0.6
4 000	-0.3	-0.2	0.0	±1.0	0.20	0.6
8 000	-0.5	-0.3	-0.1	+1.5; -2.5	0.20	0.7
16 000	0.1	0.3	-0.2	+2.5; -16.0	0.20	1.0

Date of Calibration : 28-29 Mar. 2024

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL- BP. 38/0367

5. Long-term stability

Time	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	114.0	0.0	0.1	0.10	0.1
End	114.0				

6. Frequency and time weightings at 1 kHz

6.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
A-weight	114.0	0.0	0.2	0.20	0.2
C-weight	114.0	0.0	0.2	0.20	0.2
Flat	114.0	0.0	0.2	0.20	0.2

6.2 Time weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	114.0	0.0	0.1	0.20	0.2
Slow	114.0	0.0	0.1	0.20	0.2
Leq	114.0	0.0	0.1	0.20	0.2

Date of Calibration : 28-29 Mar. 2024

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FM.BLMTC.002 Rev.5

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL- BP. 38/0367

7. Level linearity on the reference level range

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
138	138.0	0.0	0.8	0.30	0.3
137	137.0	0.0	0.8	0.30	0.3
136	136.0	0.0	0.8	0.30	0.3
135	135.0	0.0	0.8	0.30	0.3
134	134.0	0.0	0.8	0.30	0.3
129	129.0	0.0	0.8	0.30	0.3
124	124.0	0.0	0.8	0.30	0.3
119	119.0	0.0	0.8	0.30	0.3
114	114.0	0.0	0.8	0.30	0.3
109	109.0	0.0	0.8	0.30	0.3
104	104.0	0.0	0.8	0.30	0.3
99	99.0	0.0	0.8	0.30	0.3
94	94.0	0.0	0.8	0.30	0.3
89	89.2	0.2	0.8	0.30	0.3
84	84.0	0.0	0.8	0.30	0.3
79	79.0	0.0	0.8	0.30	0.3
74	74.0	0.0	0.8	0.30	0.3
69	68.9	-0.1	0.8	0.30	0.3
64	63.9	-0.1	0.8	0.30	0.3
59	58.9	-0.1	0.8	0.30	0.3
54	53.9	-0.1	0.8	0.30	0.3

Date of Calibration : 28-29 Mar. 2024

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FM.BLMTC.002 Rev.5

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL- BP. 38/0367

7. Level linearity on the reference level range (cont.)

Anticipated value (dB)	Measured Value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
49	49.0	0.0	0.8	0.30	0.3
44	43.9	-0.1	0.8	0.30	0.3
39	38.9	-0.1	0.8	0.30	0.3
34	34.0	0.0	0.8	0.30	0.3
29	29.1	0.1	0.8	0.30	0.3
24	24.3	0.3	0.8	0.30	0.3

8. Level linearity including the level range control

At reference sound level on the reference level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
20-140	114.0	114.0	0.0	0.8	0.30	0.3

Date of Calibration : 28-29 Mar. 2024

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FMBLMTC.002 Rev.5

Head Office

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Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
(66) 08 1889 6827



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL- BP. 38/0367

8. Level linearity including the level range control

At reference level at 5 dB greater than the under-range on a level range

Range	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
20-140	25.0	25.1	0.1	0.8	0.30	0.3

9. Tone burst response

Time Weighting	Toneburst Duration, Tb (ms)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Fast	200	136.0	0.0	±0.5	0.20	0.3
	2	118.9	-0.1	+1.0; -1.5	0.20	0.3
	0.25	109.9	-0.1	+1.0; -3.0	0.20	0.3
Slow	200	129.6	0.0	±0.5	0.20	0.3
	2	110.0	0.0	+1.0; -3.0	0.20	0.3
	0.25	101.0	0.0	+1.0; -3.0	0.20	0.3
SEL	200	130.0	0.0	±0.5	0.20	0.3
	2	110.0	0.0	+1.0; -1.5	0.20	0.3
	0.25	101.0	0.0	+1.0; -3.0	0.20	0.3

Date of Calibration : 28-29 Mar. 2024

8 / 9

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0337

MTC No. EEL- BP. 38/0367

10. Peak C sound level

Number of cycles in test signal	Anticipated value (dB)	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Complete cycle	135.4	135.4	0.0	2.0	0.20	0.35
Positive half cycle	134.4	134.2	-0.2	1.0	0.20	0.35
Negative half cycle	134.4	134.2	-0.2	1.0	0.20	0.35

11. Overload indication

Measured value (dB)		Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Positive one-half cycle	Negative one-half cycle				
138.7	138.7	0.0	1.5	0.20	0.25

12. High-level stability

Time	Measured value (dB)	Deviated value (dB)	Acceptance limit class 1 (±dB)	Uncertainty (±dB)	Maximum-permitted uncertainty of measurement (±dB)
Begin	139.0	0.0	0.1	0.10	0.1
End	139.0				

Calibrated by :

Approved by :

Director

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 28-29 Mar. 2024

Date of Issue : 1 Apr. 2024

Ref : 2011267031201035002

End of Certificate

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INNOVATIVE INSTRUMENT CALIBRATION LAB
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TEL. 080-2110-7800-1 FAX. 080-2110-7140

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.
Address : 100 Nangliet Road, Chongsoni, Yama Bangkok 10120

Certificate No : 23-SLM-041
Request No : Req-2023-0293

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : Cirrus
Model : CR-161B
Serial Number : G078054
ID : ENSL 16122
Resolution : 0.1 dB
Microphone Class : 1
Microphone Model : MK224
Microphone S/N : 206565A
Preamplifier Model : KM-170
Preamplifier S/N : 0824
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 2 February 2023
Calibrated Date : 9 February 2023
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN.	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multi-frequency Calibrator	Quant	Quant-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svaneck	Svaneck	131	12 October 2023	WK Electric

Note

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

Calibrated By :

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File: IIS-02-SLM-01 Rev. A Issue date: 01/07/19

Certificate No : 23-SLM-041
Request No : Req-2023-0295

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust	Adjust	UNCERTAINTY	Acceptance
FAST / A / 20-140	Level	UUC	ERR	UUC	Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(± dB)
1000 Hz 94.00 dB	93.81	93.7	-0.11	93.8	-0.01
				0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SVANTEK, Model SV 35A, SN: 58079

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	(± dB)
A	19.7	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	(± dB)
A	-	0.10
C	18.2	0.10
Z	31.1	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency	UNCERTAINTY	Acceptance
FAST / 20-140	Weighting Response curve	Limit	Limit
STD Setting	A (dB) C (dB) Z (dB)	(± dB)	(± dB)
125 Hz	0.5 0.3 0.2	0.50	1.0
1000 Hz	0.0 0.0 0.0	0.60	0.7
4000 Hz	-0.8 -0.7 -0.3	0.60	1.0
8000 Hz	0.2 0.5 0.9	0.70	+1.5 -2.5

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P16-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-041
Request No : Req-2023-0295

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency	UNCERTAINTY	Acceptance
FAST / 20-140	Weighting Response curve	Limit	Limit
STD Setting	A (dB) C (dB) Z (dB)	(± dB)	(± dB)
63 Hz	0.2 0.0 0.0	0.2	1.0
125 Hz	0.2 0.0 0.0	0.2	1.0
250 Hz	0.2 0.0 0.0	0.2	1.0
500 Hz	0.1 0.0 0.0	0.2	1.0
1000 Hz	0.0 0.0 0.0	0.2	0.7
2000 Hz	-0.2 0.0 0.0	0.2	1.0
4000 Hz	-0.4 -0.2 0.0	0.2	1.0
8000 Hz	-0.5 -0.4 -0.1	0.2	+1.5 -2.5
16000 Hz	0.1 0.2 -0.3	0.2	+2.5 -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
FAST / 20-140	REF	UUC	ERR	Limit
UUC Weighting	(dB)	(dB)	(dB)	(± dB)
A	114.00	114.0	0.0	0.2
C	114.00	114.0	0.0	0.2
Z	114.00	114.0	0.0	0.2

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
20-140 / A	REF	UUC	ERR	Limit
UUC Time Response	(dB)	(dB)	(dB)	(± dB)
Fast	114.00	114.0	0.0	0.1
Slow	114.00	114.0	0.0	0.1
Log	114.00	114.0	0.0	0.1

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P16-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-041
Request No : Req-2023-0295

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC	(± dB)	Limit
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance
FAST / A / 20-140	REF	UUC	ERR	Limit
STD dB	(dB)	(dB)	(dB)	(± dB)
139.00	139	139.0	0.0	0.8
134.00	134	134.0	0.0	0.8
129.00	129	129.0	0.0	0.8
124.00	124	124.0	0.0	0.8
119.00	119	119.0	0.0	0.8
114.00	114	114.0	0.0	0.8
109.00	109	109.0	0.0	0.8
104.00	104	104.0	0.0	0.8
99.00	99	99.0	0.0	0.8
94.00	94	94.0	0.0	0.8
89.00	89	89.0	0.0	0.8
84.00	84	84.0	0.0	0.8
79.00	79	79.0	0.0	0.8
74.00	74	74.0	0.0	0.8
69.00	69	69.0	0.0	0.8
64.00	64	64.0	0.0	0.8
59.00	59	59.0	0.0	0.8
54.00	54	54.0	0.0	0.8
49.00	49	49.0	0.0	0.8
44.00	44	44.0	0.0	0.8
39.00	39	39.0	0.0	0.8
34.00	34	34.0	0.0	0.8
29.00	29	29.1	0.1	0.8
24.00	24	23.9	-0.1	0.8

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P16-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-041
Request No : Req-2023-0295

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	Limit
UUC Range	(dB)	(dB)	(dB)	(± dB)
20-140	25.3	25.4	0.1	0.8
	114	114.0	0.0	0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance
A / 20-140	Toneburst	Ref	UUC	ERR	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)	(± dB)
Fast	200	136.0	136.0	0.0	0.5
	2	119.0	118.9	-0.1	+1.0, -1.5
	0.25	110.0	109.9	-0.1	+1.0, -3.0
Slow	200	129.6	129.6	0.0	0.5
	2	110.0	110.0	0.0	+1.0, -3.0
SEL	200	130.0	130.0	0.0	0.5
	2	110.0	110.0	0.0	+1.0, -1.5
	0.25	101.0	101.0	0.0	+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance
FAST / C / 20-140	REF	UUC	ERR	Limit
STD Setting	(dB)	(dB)	(dB)	(± dB)
Complete cycle	133.4	133.6	+0.20	2.0
Positive half cycle	134.4	134.2	-0.20	1.0
Negative half cycle	134.4	134.2	-0.20	1.0

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P16-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-041
Request No : Req-2023-0295

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	143.7		
Negative one-half cycle	143.6		
Deviant	0.1	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	139.0		
Final	139.0		
Deviant	0.0	0.1	0.1

End of Certificate

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FIM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-089
Request No : Req-2023-0583

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust	Adjust	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	Level	UUC	ERR	UUC	ERR
Calibrator Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
1000 Hz 94.00 dB	94.03	93.7	-0.33	93.8	-0.23
				0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR-315, SN: 80400

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140		
UUC Weighting	(dB)	(± dB)
A	17.2	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140		
UUC Weighting	(dB)	(± dB)
A	-	0.10
C	16.8	0.10
Z	29.4	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance Limit
FAST / 20-140	A C Z		
STD Setting	(dB) (dB) (dB)	(± dB)	(± dB)
125 Hz	0.3 0.1 0.0	0.50	1.0
1000 Hz	0.0 0.0 0.0	0.50	0.7
4000 Hz	-0.1 0.1 0.2	0.60	1.0
8000 Hz	0.3 0.4 0.7	0.70	+1.5 -2.5

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FIM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.
Address : 100 Nanglinchee Road, Chongsoni, Yamaewa Bangkok 10120

Certificate No : 23-SLM-089
Request No : Req-2023-0583

Unit Under Calibration Details

Measurement item : Sound Level Meter
Microphone Class : 1
Manufacturer : Cirrus
Microphone Model : MK224
Model : CR1718
Microphone SN : 2118250
Serial Number : G078137
Preamplifier Model : MK170
ID : ENSL 16126
Preamplifier SN : 0799
Resolution : 0.1 dB
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 30 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 7 March 2023
Calibrated Date : 13 March 2023
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multi-frequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svante	Svan401	131	12 October 2023	WK Electric

Note

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

Calibrated By

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FIM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-089
Request No : Req-2023-0583

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance Limit
FAST / 20-140	A (dB) C (dB) Z (dB)	(± dB)	(± dB)
STD Setting			
63 Hz	0.3 0.0 0.0	0.2	1.0
125 Hz	0.2 0.0 0.0		1.0
250 Hz	0.1 0.0 0.0		1.0
500 Hz	0.1 0.0 0.0		1.0
1000 Hz	0.0 0.0 0.0		0.7
2000 Hz	-0.2 0.0 0.0		1.0
4000 Hz	-0.4 -0.2 0.0		1.0
8000 Hz	-0.4 -0.3 -0.2		+1.5 -2.5
16000 Hz	0.2 0.3 -0.2		+2.5 -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / 20-140	REF	UUC ERR	(± dB)	(± dB)
UUC Weighting	(dB)	(dB) (dB)		
A	114.00	114.0 0.0	0.2	0.2
C	114.00	114.0 0.0	0.2	0.2
Z	114.00	114.0 0.0	0.2	0.2

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
20-140 / A	REF	UUC ERR	(± dB)	(± dB)
UUC Time Response	(dB)	(dB) (dB)		
Fast	114.00	114.0 0.0	0.2	0.1
Slow	114.00	114.0 0.0		0.1
Imp	114.00	114.0 0.0		0.1

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FIM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-089
Request No : Req-2023-0583

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC		Limit
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance
FAST / A / 20-140	REF	UUC	ERR	Limit
STD dB	(dB)	(dB)	(dB)	(± dB)
130.00	130	130.0	0.0	0.8
134.00	134	134.0	0.0	0.8
129.00	129	129.0	0.0	0.8
124.00	124	124.0	0.0	0.8
119.00	119	119.0	0.0	0.8
114.00	114	114.0	0.0	0.8
109.00	109	109.0	0.0	0.8
104.00	104	104.0	0.0	0.8
99.00	99	99.0	0.0	0.8
94.00	94	94.0	0.0	0.8
89.00	89	89.0	0.0	0.8
84.00	84	84.0	0.0	0.8
79.00	79	79.0	0.0	0.8
74.00	74	74.0	0.0	0.8
69.00	69	69.0	0.0	0.8
64.00	64	64.0	0.0	0.8
59.00	59	59.0	0.0	0.8
54.00	54	54.0	0.0	0.8
49.00	49	49.0	0.0	0.8
44.00	44	44.0	0.0	0.8
39.00	39	39.1	0.1	0.8
34.00	34	34.1	0.1	0.8
29.00	29	29.1	0.1	0.8
24.00	24	24.2	0.2	0.8

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PM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-089
Request No : Req-2023-0583

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	Limit
UUC Range	(dB)	(dB)	(dB)	(± dB)
20-140	29.2	29.2	0.3	0.8
	114	114.0	0.0	0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance
A / 20-140	Toneburst	Ref	UUC	ERR	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)	(± dB)
Fast	200	136.0	136.0	0.0	0.8
	2	119.0	118.9	-0.1	+1.0, -1.5
	0.25	110.0	109.9	-0.1	+1.0, -3.0
Slow	200	129.6	129.5	-0.1	0.5
	2	110.0	109.9	-0.1	+1.0, -3.0
SEL	200	130.0	130.0	0.0	0.5
	2	110.0	109.9	-0.1	+1.0, -1.5
	0.25	101.0	100.9	-0.1	+1.0, -3.0

11. Peak C sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance
FAST / C / 20-140	REF	UUC	ERR	Limit
STD Setting	(dB)	(dB)	(dB)	(± dB)
Complete cycle	135.4	135.2	-0.20	2.0
Positive half cycle	134.4	134.2	-0.20	1.0
Negative half cycle	134.4	134.2	-0.20	1.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

PM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-089
Request No : Req-2023-0583

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC		Limit
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	141.3		
Negative one-half cycle	141.4		
Deviated	-0.1	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC		Limit
STD Setting	(dB)	(± dB)	(± dB)
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	0.1

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

PM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.
Address : 100 Nanglincher Road, Chongsoni, Yammwa Bangkok 10120

Certificate No : 23-SLM-088
Request No : Req-2023-0582

Unit Under Calibration Details

Measurement item : Sound Level Meter
Microphone Class : 1
Manufacturer : Cirrus
Microphone Model : MK224
Model : CR371B
Microphone S/N : 202157A
Serial Number : G078138
Preamplifier Model : MK170
ID : ENSL 16127
Preamplifier S/N : 0805
Resolution : 0.1 dB
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 7 March 2023
Calibrated Date : 13 March 2023
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svante	Svante401	131	12 October 2023	WK Electric

Note

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

Calibrated By

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

PM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-088
Request No : Req-2023-0582

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust	Adjust	UNCERTAINTY	Acceptance
FAST / A / 20-140	Level	UUC	ERR	UUC	Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(± dB)
1000 Hz 94.00 dB	94.03	93.8	-0.23	93.8	-0.23
				0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR315, SN: R0400

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	(± dB)
UUC Weighting		
A	18.1	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	(± dB)
UUC Weighting		
A	-	0.10
C	19.4	0.10
Z	30.9	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance
FAST / 20-140	A C Z	(± dB)	Limit
STD Setting	(dB) (dB) (dB)	(± dB)	(± dB)
125 Hz	0.4 0.5 0.6	0.50	1.0
1000 Hz	0.0 0.0 0.0	0.50	0.7
4000 Hz	-0.6 -0.5 -0.4	0.60	1.0
8000 Hz	-1.7 -1.6 -1.7	0.70	+1.5 -2.5

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-088
Request No : Req-2023-0582

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance
FAST / 20-140	A (dB) C (dB) Z (dB)	(± dB)	Limit
STD Setting	(dB) (dB) (dB)	(± dB)	(± dB)
63 Hz	0.2 0.1 0.0	0.2	1.0
125 Hz	0.2 0.0 0.0	0.2	1.0
250 Hz	0.1 0.0 0.0	0.2	1.0
500 Hz	0.1 0.0 0.0	0.2	1.0
1000 Hz	0.0 0.0 0.0	0.2	0.7
2000 Hz	-0.2 0.0 0.0	0.2	1.0
4000 Hz	-0.3 -0.2 0.0	0.2	1.0
8000 Hz	-0.4 -0.3 -0.1	0.2	+1.5 -2.5
16000 Hz	0.2 0.2 -0.2	0.2	+2.5 -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
FAST / 20-140	REF	UUC	ERR	Limit
UUC Weighting	(dB)	(dB)	(dB)	(± dB)
A	114.00	114.0	0.0	0.2
C	114.00	114.0	0.0	0.2
Z	114.00	114.0	0.0	0.2

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
20-140 / A	REF	UUC	ERR	Limit
UUC Time Response	(dB)	(dB)	(dB)	(± dB)
Fast	114.00	114.0	0.0	0.1
Slow	114.00	114.0	0.0	0.1
Eq	114.00	114.0	0.0	0.1

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-088
Request No : Req-2023-0582

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC	(± dB)	Limit
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance
FAST / A / 20-140	REF	UUC	ERR	Limit
STD dB	(dB)	(dB)	(dB)	(± dB)
130.00	130	130.0	0.0	0.8
134.00	134	134.0	0.0	0.8
129.00	129	129.0	0.0	0.8
124.00	124	124.0	0.0	0.8
119.00	119	119.0	0.0	0.8
114.00	114	114.0	0.0	0.8
109.00	109	109.0	0.0	0.8
104.00	104	104.0	0.0	0.8
99.00	99	99.0	0.0	0.8
94.00	94	94.0	0.0	0.8
89.00	89	89.0	0.0	0.8
84.00	84	84.0	0.0	0.8
79.00	79	79.0	0.0	0.8
74.00	74	74.0	0.0	0.8
69.00	69	69.0	0.0	0.8
64.00	64	64.0	0.0	0.8
59.00	59	59.0	0.0	0.8
54.00	54	54.1	0.1	0.8
49.00	49	49.1	0.1	0.8
44.00	44	44.1	0.1	0.8
39.00	39	39.1	0.1	0.8
34.00	34	34.1	0.1	0.8
29.00	29	29.2	0.2	0.8
24.00	24	24.2	0.2	0.8

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-088
Request No : Req-2023-0582

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	Limit
UUC Range	(dB)	(dB)	(dB)	(± dB)
20-140	24.9	25.3	0.4	0.8
	114	114.0	0.0	0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance
A / 20-140	Toneburst	Ref	UUC	ERR	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)	(± dB)
Fast	200	136.0	136.0	0.0	0.5
	2	119.0	118.9	-0.1	+1.0, -1.5
	0.25	110.0	109.9	-0.1	+1.0, -3.0
Slow	200	129.6	129.6	0.0	0.5
	2	110.0	110.0	0.0	+1.0, -3.0
SEL	200	130.0	130.0	0.0	0.5
	2	110.0	110.0	0.0	+1.0, -1.5
	0.25	101.0	100.9	-0.1	+1.0, -3.0

11. Peak C sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance
FAST / C / 20-140	REF	UUC	ERR	Limit
STD Setting	(dB)	(dB)	(dB)	(± dB)
Complete cycle	135.4	135.5	+0.10	2.0
Positive half cycle	134.4	134.3	-0.10	1.0
Negative half cycle	134.4	134.3	-0.10	1.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-088
Request No : Req-2023-0582

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(\pm dB)	(\pm dB)
STD Setting	(dB)		
Positive one-half cycle	141.1		
Negative one-half cycle	140.9		
Deviated	0.2	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(\pm dB)	(\pm dB)
STD Setting	(dB)		
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	0.1

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FSM-700-SLM-01 Rev.0 Issue date 01/07/19

ENSL 14130

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited
Address : 100 Nangliachue Road, Chongmon, Yantawa Bangkok 10120

Certificate No : 23-SLM-202
Request No : Req-2023-1230

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : Cirrus
Model : CR161B
Serial Number : G078509
ID : ENSL 16130
Resolution : 0.1 dB
Microphone Class : 1
Microphone Model : MK224
Microphone S/N : 209930D
Preamplifier Model : -
Preamplifier S/N : 7794F
Instrument Status : Used

Calibration Environment and Details

Temperature : $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$
Humidity : $50\% \text{RH} \pm 20\% \text{RH}$
Barometric Pressure : $1013 \text{ hPa} \pm 10 \text{ hPa}$
Received Date : 2 June 2023
Calibrated Date : 14 June 2023
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multi-frequency Calibrator	Quest	Quant-cal	IFA000214	29 June 2023	TSI
Audio Generator	Svante	Svan401	131	12 October 2023	WK Electric

Note

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

Calibrated By :

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FSM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-202
Request No : Req-2023-1230

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust	After Adjust	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	Level	UUC	ERR	UUC	ERR
Calibrator Setting	(dB)	(dB)	(dB)	(\pm dB)	(\pm dB)
1000 Hz 94 dB	93.90	94.1	+0.20	93.9	0.0
				0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR515, SN. 88346

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140		
UUC Weighting	(dB)	(\pm dB)
A	15.1	0.1

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140		
UUC Weighting	(dB)	(\pm dB)
A	UR	0.1
C	15.4	0.1
Z	28.4	0.1

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance Limit
FAST / 20-140	A C Z	(\pm dB)	(\pm dB)
STD Setting	(dB)		
125 Hz	0.4 0.2 0.1	0.6	1.0
1000 Hz	0.0 0.0 0.0	0.6	0.7
4000 Hz	-0.8 -0.7 -0.5	0.6	1.0
8000 Hz	-1.0 -0.9 -0.6	0.7	+1.5 -2.5

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FSM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-202
Request No : Req-2023-1230

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance Limit
FAST / 20-140	A (dB) C (dB) Z (dB)	(\pm dB)	(\pm dB)
STD Setting			
63 Hz	0.3 0.0 0.0	0.2	1.0
125 Hz	0.3 0.1 0.0		1.0
250 Hz	0.2 0.0 0.0		1.0
500 Hz	0.1 0.1 0.0		1.0
1000 Hz	0.0 0.0 0.0		0.7
2000 Hz	-0.1 0.0 0.0		1.0
4000 Hz	-0.3 -0.2 0.0		1.0
8000 Hz	-0.5 -0.3 -0.1		+1.5 -2.5
16000 Hz	0.2 0.4 -0.2		+2.5 -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / 20-140	REF	UUC	ERR	
UUC Weighting	(dB)	(dB)	(dB)	(\pm dB)
A	114.00	114.0	0.0	0.2
C	114.00	114.0	0.0	0.2
Z	114.00	114.0	0.0	0.2

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
20-140 / A	REF	UUC	ERR	
UUC Time Response	(dB)	(dB)	(dB)	(\pm dB)
Fast	114.00	114.0	0.0	0.1
Slow	114.00	114.0	0.0	0.1
Lsq	114.00	114.0	0.0	0.1

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FSM-700-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-202
Request No : Req-2023-1230

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(\pm dB)	(\pm dB)
STD Setting	(dB)		
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	REF	UUC	ERR	(\pm dB)
STD dB	(dB)	(dB)	(dB)	(\pm dB)
139.00	139	139.0	0.0	0.5
134.00	134	134.0	0.0	0.5
129.00	129	129.0	0.0	0.5
124.00	124	124.0	0.0	0.5
119.00	119	119.0	0.0	0.5
114.00	114	114.0	0.0	0.5
109.00	109	109.0	0.0	0.5
104.00	104	104.0	0.0	0.5
99.00	99	99.0	0.0	0.5
94.00	94	94.0	0.0	0.5
89.00	89	89.1	0.1	0.5
84.00	84	84.0	0.0	0.5
79.00	79	79.1	0.1	0.5
74.00	74	74.1	0.1	0.5
69.00	69	69.1	0.1	0.5
64.00	64	64.1	0.1	0.5
59.00	59	59.1	0.1	0.5
54.00	54	54.1	0.1	0.5
49.00	49	49.1	0.1	0.5
44.00	44	44.1	0.1	0.5
39.00	39	39.1	0.1	0.5
34.00	34	34.1	0.1	0.5
29.00	29	29.1	0.1	0.5
24.00	24	24.2	0.2	0.5

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

PM-789-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-202
Request No : Req-2023-1230

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / A	REF	UUC	ERR	(\pm dB)
UUC Range	(dB)	(dB)	(dB)	(\pm dB)
20-140	29.0	29.2	0.2	0.5
	114	114.0	0.0	0.5

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
A / 20-140	Toneburst	Ref	UUC	ERR	(\pm dB)
UUC Time Response	(ms)	(dB)	(dB)	(dB)	(\pm dB)
Fast	200	136.0	136.0	0.0	0.5
	2	119.0	118.9	-0.1	+1.0, -1.5
	0.25	110.0	109.8	-0.2	+1.0, -3.0
Slow	200	129.6	129.5	-0.1	0.5
	2	110.0	109.9	-0.1	+1.0, -3.0
	0.25	110.0	109.9	-0.1	0.5
SEL	200	130.0	130.0	0.0	0.5
	2	110.0	109.9	-0.1	+1.0, -1.5
	0.25	101.0	100.9	-0.1	+1.0, -3.0

11. Peak C sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
FAST / C / 20-140	REF	UUC	ERR	(\pm dB)
STD Setting	(dB)	(dB)	(dB)	(\pm dB)
Complete cycle	135.4	135.5	+0.10	2.0
Positive half cycle	134.4	134.3	-0.10	1.0
Negative half cycle	134.4	134.3	-0.10	1.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

PM-789-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-202
Request No : Req-2023-1230

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(\pm dB)	(\pm dB)
STD Setting	(dB)		
Positive one-half cycle	141.6		
Negative one-half cycle	141.6		
Deviated	0.0	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(\pm dB)	(\pm dB)
STD Setting	(dB)		
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	0.1

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

PM-789-SLM-01 Rev.0 Issue date 01/07/19

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.
Address : 100 Nangliueh Road, Chongsonsi, Yunnan Bangkok 10120

Certificate No : 23-SLM-021
Request No : Req-2023-0114

Unit Under Calibration Details

Measurement item : Sound Level Meter.
Microphone Class : 1
Manufacturer : Cirrus
Microphone Model : MK224
Model : CR161B
Microphone S/N : 2099300
Serial Number : G080148
Preamplifier Model : KM170
ID : ENSL 18166
Preamplifier S/N : 0777
Resolution : 0.1 dB
Instrument Status : Used

Calibration Environment and Details

Temperature : 23 °C \pm 2 °C
Humidity : 50 %RH \pm 20 %RH
Barometric Pressure : 1013 hPa \pm 10 hPa
Received Date : 12 January 2023
Calibrated Date : 26 January 2023
Calibration Procedure : In-house method CP-SLM-01 based on IEC 61672-1 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Qunt	Qunt-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svante	Svante	131	12 October 2023	WK Electric

Note

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

Calibrated By :

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

PM-789-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-021

Request No : Req-2023-0114

1. Indication at the calibration check frequency

UUC Setting		Before Adjust		Adjust		UNCERTAINTY	Acceptance
FAST / A / 20-140	Level	UUC	ERR	UUC	ERR		
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)
1000 Hz 94.00 dB	94.01	94.2	+0.19	93.8	-0.21	0.20	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR515, SN. 80411

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	(± dB)
UUC Weighting		
A	13.2	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140	(dB)	(± dB)
UUC Weighting		
A	-	0.10
C	15.4	0.10
Z	30.0	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance
FAST / 20-140	A C Z	(± dB)	Limit
STD Setting	(dB) (dB) (dB)	(± dB)	(± dB)
125 Hz	0.4 0.2 0.1	0.50	1.0
1000 Hz	0.0 0.0 0.0	0.60	0.7
4000 Hz	-0.4 -0.3 -0.1	0.60	1.0
8000 Hz	0.2 0.3 0.5	0.70	+1.5 -2.5

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd

PI4-708-SLM-01 Rev.0 Issue Date 01/07/19

Certificate No : 23-SLM-021

Request No : Req-2023-0114

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY	Acceptance
FAST / 20-140	A (dB) C (dB) Z (dB)	(± dB)	Limit
STD Setting	(dB) (dB) (dB)	(± dB)	(± dB)
63 Hz	0.2 0.1 0.1	0.2	1.0
125 Hz	0.2 0.1 0.1	0.2	1.0
250 Hz	0.1 0.1 0.0	0.2	1.0
500 Hz	0.1 0.0 0.0	0.2	1.0
1000 Hz	0.0 0.0 0.0	0.2	0.7
2000 Hz	-0.1 0.0 0.0	0.2	1.0
4000 Hz	-0.3 -0.1 0.0	0.2	1.0
8000 Hz	-0.3 -0.2 -0.1	0.2	+1.5 -2.5
16000 Hz	0.1 0.2 -0.1	0.2	+2.5 -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
FAST / 20-140	REF	UUC	ERR	Limit
UUC Weighting	(dB)	(dB)	(dB)	(± dB)
A	114.00	114.0	0.0	0.2
C	114.00	114.0	0.0	0.2
Z	114.00	114.0	0.0	0.2

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
20-140 / A	REF	UUC	ERR	Limit
UUC Time Response	(dB)	(dB)	(dB)	(± dB)
Fast	114.00	114.0	0.0	0.1
Slow	114.00	114.0	0.0	0.1
Log	114.00	114.0	0.0	0.1

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PI4-708-SLM-01 Rev.0 Issue Date 01/07/19

Certificate No : 23-SLM-021

Request No : Req-2023-0114

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 20-140	UUC	(± dB)	Limit
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance
FAST / A / 20-140	REF	UUC	ERR	Limit
STD dB	(dB)	(dB)	(dB)	(± dB)
130.00	130	130.0	0.0	0.8
134.00	134	134.0	0.0	0.8
128.00	128	128.0	0.0	0.8
124.00	124	124.0	0.0	0.8
119.00	119	119.0	0.0	0.8
114.00	114	114.0	0.0	0.8
109.00	109	109.0	0.0	0.8
104.00	104	104.0	0.0	0.8
99.00	99	99.0	0.0	0.8
94.00	94	94.0	0.0	0.8
89.00	89	89.0	0.0	0.8
84.00	84	84.0	0.0	0.8
79.00	79	79.1	0.1	0.8
74.00	74	74.1	0.1	0.8
69.00	69	69.1	0.1	0.8
64.00	64	64.1	0.1	0.8
59.00	59	59.1	0.1	0.8
54.00	54	54.1	0.1	0.8
49.00	49	49.1	0.1	0.8
44.00	44	44.1	0.1	0.8
39.00	39	39.2	0.2	0.8
34.00	34	34.3	0.3	0.8
29.00	29	29.3	0.3	0.8
24.00	24	24.5	0.5	0.8

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PI4-708-SLM-01 Rev.0 Issue Date 01/07/19

Certificate No : 23-SLM-021

Request No : Req-2023-0114

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR	Limit
UUC Range	(dB)	(dB)	(dB)	(± dB)
20-140	28.3	28.5	0.2	0.8
	114	114.0	0.0	0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance
A / 20-140	Toneburst	Ref	UUC	ERR	Limit
UUC Time Response	(ms)	(dB)	(dB)	(dB)	(± dB)
Fast	200	136.0	136.0	0.0	0.5
	2	119.0	118.9	-0.1	+1.0, -1.3
	0.25	110.0	109.9	-0.1	+1.0, -3.0
Slow	200	129.6	129.5	-0.1	0.5
	2	110.0	109.8	-0.2	+1.0, -3.0
SEL	200	130.0	129.9	-0.1	0.5
	2	110.0	109.8	-0.2	+1.0, -1.5
	0.25	101.0	100.8	-0.2	+1.0, -3.0

11. Peak C sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance
FAST / C / 20-140	REF	UUC	ERR	Limit
STD Setting	(dB)	(dB)	(dB)	(± dB)
Complete cycle	135.4	135.6	+0.20	2.0
Positive half cycle	134.4	134.4	0.00	1.0
Negative half cycle	134.4	134.4	0.00	1.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd

PI4-708-SLM-01 Rev.0 Issue Date 01/07/19

Certificate No : 23-SL-M-021

Request No : Req-2023-0114

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC		
STD Setting	(dB)	(\pm dB)	(\pm dB)
Positive one-half cycle	144.6		
Negative one-half cycle	144.3		
Deviated	0.3	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC		
STD Setting	(dB)	(\pm dB)	(\pm dB)
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	0.1

End of Certificate



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

81 Moo 11 Bangkruai - Sainoi Rd., Sainoi, Nonthaburi 11150 Tel. (662) 436-8789 Ext. 6155



Certificate of Calibration

Issued by : Vibration Laboratory

Certificate No. : 24V029

Reference No. : CBLUE01V004

Received Date : 14 March 2024

Calibrated Date : 19 March 2024

Page 1 of 5

Client : SGS (Thailand) Limited

Address : 100 Nanglinchee Rd., Chongnonsi, Yannawa Bangkok 10120

Equipment : VIBRATION METER

Manufacture /Brand : INSTANTEL

Model : Micromate

Serial No./ ID No. : UM7002 / ENSL 16117

Authorised Signatory

Issue Date 26 / Mar. / 2024

This certificate is issued in accordance with the conditions of accreditation granted by The National Accreditation Council of Thailand which has assessed the measurement capability of the laboratory and its traceability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration services and environmental analysis department. This reported measurement result relates only the measurand and applies only at the time of measurement.



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 24V029

Page 2 of 5

Standard Used

The table below is described the calibrator through the International System of Unit.

Description	Manufacture/Model	Serial No.	Traceable No.	Due Date
Conditioning Amplifier Type 2626	Brue! & Kjaer	1242376	AV-0003-23	23 January 2025
Accelerometer Type 8305	Brue! & Kjaer	1262817	AV-0014-23	28 March 2025
Digital Multimeter /8846A	FLUKE	4330020	23E531	02 October 2024

Ambient Environment :

The Calibration was performed in an environment of $(23 \pm 2) ^{\circ} \text{C}$ and $(50 \pm 10) \%$ relative humidity.

Measurement Method :

The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on ISO 16063-21 : 2003(E) by comparison with reference accelerometer standard .

Measurement Results

The measurement results, labeled in the following pages give the calibration results and associated with measurement uncertainties.

Measurement Uncertainty

The Measurement Uncertainty are labeled on the following pages Completed the expanded uncertainty, that was calculated in accordance with the method in M3003, using coverage factor $k = 2$. The value of the measured lies within the assigned ranges of values of confidence level of approximately 95%.

Traceability :

The measurement is traceable to the International System of Unit through

- The National Institute of Metrology (Thailand)
- Metrology and Calibration Department



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 24V029

Page 3 of 5

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Vertical			
Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.15	0.15
*30	10.00	10.17	0.15
40	10.00	10.17	0.15
80	10.00	10.13	0.15

* Calibration maked "Not TISI Accredited" in this Certificate have been included for completeness.

Tranducer Part : ENAB 16144

Condition : Installation by vertical direction



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 24V029

Page 4 of 5

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Transverse			
Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.19	0.15
*30	10.00	10.02	0.15
40	10.00	9.97	0.14
80	10.00	9.88	0.14

* Calibration made "Not TISI Accredited" in this Certificate have been included for completeness.

Tranducer Part : ENAB 16144

Condition : Installation by Transverse direction



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Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 24V029

Page 5 of 5

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Longitude			
Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.15	0.15
*30	10.00	10.04	0.15
40	10.00	10.01	0.15
80	10.00	9.95	0.14

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Tranducer Part : ENAB 16144

Condition : Installation by Longitude direction

**** End Certificate of Calibration ****



Certificate of Calibration 5835759

Date : 19-Mar-2024

Page 1 of 5

Client : SGS (Thailand) Limited - Laboratory (Bangkok)
10,10/1 - 4 and 12 Soi Rama III S. 59,
Chong Nonsi, Yan Nawa, Bangkok 10120 Thailand

Equipment : INCUBATOR
Reference No. : 6143626
Lab Owner : MI LAB
Manufacturer : Memmert
Model : IF 750
Serial Number : D818.0369
Resolution : 0.1 Degree C
Identification Number : I2019002
Calibration Date : 15-Mar-2024
Ambient Temperature : (23.9 to 25.4) Degree C
Humidity : (50 to 63) %RH
Line Voltage : (220 to 221) VAC
Place of Calibration : SGS (Thailand) Limited
MI Lab
10, 10/1-4 and 12 Soi Rama III S.59, Chong Nonsi, Yan Nawa, Bangkok 10120
Date Received : 15-Mar-2024

CALIBRATE RESULTS Please see the attached sheet.

Signed for and on behalf of
SGS (Thailand) Ltd.

Asst. Technical & Operation manager

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Date : 19-Mar-2024

Page 2 of 5

CALIBRATE RESULTS

Calibration Method

Calibration were conducted according to direct measurement method with datalogger which connected with nine sensors and performed using documented calibration procedure number TLAS G-20.
The temperature scale used was based on ITS-90.

Reference Standard Instrument

This certification is traceable to International System of Units (SI) through the certificate as follow

Instrument	Id.No.	Cert. No.	Due Date	Traceability
Data Acquisition with RTD	D2016011	5766306	26-Dec-2024	SGS (Calibration No. 0100)
Digital Thermo - Hygrometer	T2015003	23H1554	11-Jul-2024	TPA (Calibration No. 0008)
Digital Multimeter	E2022007	23E1336	20-Apr-2024	TPA (Calibration No. 0008)

Probe Installation Detail (Pic. 1)

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of Chamber (Pic. 1)

D = 0.60 m
W = 1.04 m
H = 1.20 m

Capacity of Chamber = 0.75 cubic meter

Parameter of Calibration

Cal 1 35.0 C : 0.0 k
Cal 2 40.0 C : -0.1 k
Cal 3 70.0 C : 0.0 k

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Certificate of Calibration 5835759

Date : 19-Mar-2024

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CALIBRATE RESULTS

Calibration Data (Without Adjustment)

Calibration Point : 35.0 Degree C

UUC* Setting (degree C)	UUC* Reading (degree C)	Position (point)	Average* Reference Reading (degree C)
35.0	35.0	1	35.14
35.0	35.0	2	35.07
35.0	35.0	3	35.07
35.0	35.0	4	35.07
35.0	35.0	5	35.11
35.0	35.0	6	35.10
35.0	35.0	7	34.94
35.0	35.0	8	35.02
35.0	35.0	9	35.00

UUC* : Unit Under Calibration.

Average* : The average of 180 value in each position.

Uniformity : 0.16 degree C (The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location (Probe No. 9) at the same time).

Stability : 0.02 degree C (Maximum of [Maximum temperature value - Minimum temperature value]/2) in each position.

Overall Variation : 0.23 degree C (Maximum Temperature Value - Minimum Temperature Value) all data.

Uncertainty of measurement was +/- 0.30 degree C.

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Certificate of Calibration 5835759

Date : 19-Mar-2024

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CALIBRATE RESULTS

Calibration Data (Without Adjustment)

Calibration Point : 35.0 Degree C

UUC* Setting (degree C)	UUC* Reading (degree C)	Position (point)	Average* Reference Reading (degree C)
35.0	35.0	1	36.18
35.0	35.0	2	36.10
35.0	35.0	3	36.11
35.0	35.0	4	36.11
35.0	35.0	5	36.15
35.0	35.0	6	36.13
35.0	35.0	7	35.98
35.0	35.0	8	36.06
35.0	35.0	9	36.04

UUC* : Unit Under Calibration.

Average* : The average of 180 value in each position.

Uniformity : 0.16 degree C (The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location (Probe No. 9) at the same time).

Stability : 0.02 degree C (Maximum of [Maximum temperature value - Minimum temperature value]/2) in each position.

Overall Variation : 0.22 degree C (Maximum Temperature Value - Minimum Temperature Value) all data.

Uncertainty of measurement was +/- 0.30 degree C.

- Fan Speed : 100%

- Condition of calibrated item : Good

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

- The above results of calibration were found as shown on date and place of calibration only.

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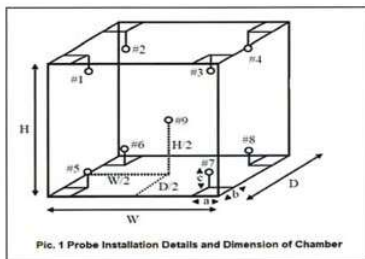
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SAMPLE/ATTACHMENT PICTURE



Pic. 1 Probe Installation Details and Dimension of Chamber

***** End of Report *****

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Evaluation of Calibration/Verification Certificate

Equipment Name : INCUBATOR Serial No : D818.0369
Equipment ID : I2019002 Model : IF 750
Manufacturer : Memmert Resolution : 0.1 °C
Certificate No. : 5835759 Calibration Date : 15-Mar-2024
Function : Temperature (°C) Tolerance Type : ±

Cal. Position (°C) (1)	Tolerance/ Specification ± (°C) (2)	Reference Standard Reading (°C) (3)	Cal. Point (°C) (4)	Uncertainty ± (°C) (5)	Error (°C) (6)	Status	
						Pass (7)	Fail (8)
1	0.5	35.14	35.0	0.30	-0.14	✓	
2	0.5	35.07	35.0	0.30	-0.07	✓	
3	0.5	35.07	35.0	0.30	-0.07	✓	
4	0.5	35.07	35.0	0.30	-0.07	✓	
5	0.5	35.11	35.0	0.30	-0.11	✓	
6	0.5	35.10	35.0	0.30	-0.10	✓	
7	0.5	34.94	35.0	0.30	0.06	✓	
8	0.5	35.02	35.0	0.30	-0.02	✓	
9	0.5	35.00	35.0	0.30	0.00	✓	

Conclusion : **Pass** Evaluation of the significance : **Do not need the action taken**

Action Taken :

(if failed)

Remark : ที่อุณหภูมิ 35 ± 0.5 °C ค่า Reference reading = 35.06 °C
ค่า Correction = + 0.06 °C

Note : Tolerance type (s)

Error (6) = (4) - (3)
Pass (7) = (5) + ABS(6) ≤ (2)
Fail (8) = (5) + ABS(6) > (2)

Tolerance type (s)

Error (6) = (4) - (3)
Pass (7) = (3) + (5) ≤ (2)
Fail (8) = (3) + (5) > (2)

Tolerance type (MAX Limit)

Pass (7) = (3)+(5) ≤ (2)+(4) and (3)-(5) ≥ (4)
Fail (8) = (3)+(5) > (2)+(4) or (3)-(5) < (4)

Tolerance type (MIN Limit)

Pass (7) = (3)-(5) ≥ (2)+(4) and (3)+(5) ≤ (4)
Fail (8) = (3)-(5) < (2)+(4) or (3)+(5) > (4)

Verified By

Approved By

Verified Date:

Approved Date:

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SGS Form No LBQA-18006/3, Rev 0, Date : 30/11/18

Page 1 of 1

Evaluation of Calibration/Verification Certificate

Equipment Name : INCUBATOR Serial No : D818.0369
Equipment ID : I2019002 Model : IF 750
Manufacturer : Memmert Resolution : 0.1 °C
Certificate No. : 5835759 Calibration Date : 15-Mar-2024
Function : Temperature (°C) Tolerance Type : ±

Cal. Position (°C) (1)	Tolerance/ Specification ± (°C) (2)	Reference Standard Reading (°C) (3)	Cal. Point (°C) (4)	Uncertainty ± (°C) (5)	Error (°C) (6)	Status	
						Pass (7)	Fail (8)
1	1.0	36.18	36.0	0.30	-0.18	✓	
2	1.0	36.10	36.0	0.30	-0.10	✓	
3	1.0	36.11	36.0	0.30	-0.11	✓	
4	1.0	36.11	36.0	0.30	-0.11	✓	
5	1.0	36.15	36.0	0.30	-0.15	✓	
6	1.0	36.13	36.0	0.30	-0.13	✓	
7	1.0	35.98	36.0	0.30	0.02	✓	
8	1.0	36.06	36.0	0.30	-0.06	✓	
9	1.0	36.04	36.0	0.30	-0.04	✓	

Conclusion : **Pass** Evaluation of the significance : **Do not need the action taken**

Action Taken :

(if failed)

Remark : ที่อุณหภูมิ 36 ± 1 °C ค่า Reference reading = 36.10 °C
ค่า Correction = + 0.10 °C

Note : Tolerance type (s)

Error (6) = (4) - (3)
Pass (7) = (5) + ABS(6) ≤ (2)
Fail (8) = (5) + ABS(6) > (2)

Tolerance type (MAX Limit)

Pass (7) = (3)+(5) ≤ (2)+(4) and (3)-(5) ≥ (4)
Fail (8) = (3)+(5) > (2)+(4) or (3)-(5) < (4)

Tolerance type (s)

Error (6) = (4) - (3)
Pass (7) = (3) + (5) ≤ (2)
Fail (8) = (3) + (5) > (2)

Tolerance type (MIN Limit)

Pass (7) = (3)-(5) ≥ (2)+(4) and (3)+(5) ≤ (4)
Fail (8) = (3)-(5) < (2)+(4) or (3)+(5) > (4)

Verified By :

Approved By :

Verified Date: 15/03/2024

Approved Date: 25/03/24

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Page 1 of 1

6850 and 6890 GC
Preventive Maintenance Checklist - Standard

Agilent Preventive Maintenance provides factory recommended service for your analytical systems to assure reliable operation and the accuracy of your results. Delivered by highly-trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak.

For more information about Agilent Technologies services please visit our web site using the following URL: <http://www.chem.agilent.com/en-us/products/services/pages/default.aspx>

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of additional or special procedures and/or parts for the instrument service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Service Engineer's Responsibilities

- Only complete/printout pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a "X" or tick mark "✓" in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service. Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

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6850 and 6890 GC
Preventive Maintenance Checklist – Standard



System Information

Guidance

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument system name and ID	CN10621014
Instrument system site and location	SGS, Bangkok
List system component product numbers	List the serial numbers of each component
1. G1530N	1. CN10621014
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

Preparation

- ✓ Discuss any specific issues with the customer prior to starting.
- ✓ Review the instrument logbook.
- ✓ Save instrument control settings before starting the procedure.
- ✓ Perform general inspection of system for cleanliness.
- ✓ Check for proper installation of safety-related parts, assemblies, sensors etc.
- ✓ Check for required firmware updates and verify with customers if they would like it installed.
- ✓ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

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6850 and 6890 GC
Preventive Maintenance Checklist – Standard



Clean and inspect GC

- ✓ Unplug power cord from the power source.
- ✓ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ✓ Inspect internal connectors for proper contact and placement.
- ✓ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ✓ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ✓ Verify operation of all other fans - the inlet and EPC cooling fans.
- ✓ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

Inlet and detector consumable replacement

- ✓ For the inlets installed, perform inlet maintenance as defined in the 6850 or 6890 manual – "Maintaining Your GC" - for the inlet(s) installed.
- ✓ Replace the split vent trap on units with these inlets: Split/Splitless Capillary (SSL), Programmable Temperature Vaporization (PTV), Volatiles Interface (VI).
- ☐ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any build up of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination – clean as necessary.

Zero Sensors and Leak test

- ✓ Zero all pressure sensors per the procedure in the 6890 Service Manual.
- ✓ Perform inlet pressure decay test(s) as defined in the 6890 Service Manual. If the PM is done in preparation for an OQ/PV, then the pressure decay test defined within that protocol can be used for the PM.
- ✓ Record if test passed or failed in the results table.

ALS Maintenance

- ✓ Section NOT applicable
- ☐ Check all cabling and configuration settings between GC, tray, and injectors.
- ☐ Vacuum or removed any dust, especially around fans.
- ☐ Check operation of all fans.
- ☐ Check syringe for smooth plunger operation.
- ☐ Check for smooth operation of the needle support rod – clean if necessary
- ☐ Check for correct operation of syringe volume stops.

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6850 and 6890 GC
Preventive Maintenance Checklist – Standard



Restore Instrument

- ✓ Restore the normal operating conditions using the Keyboard or Data System.
- ✓ Check and record detector offset. Results should be similar to offset test conducted prior to PM.
- ✓ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Guidance

If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

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6850 and 6890 GC
Preventive Maintenance Checklist – Standard



Service Review

- ✓ Attach available reports/printouts of all tests to this documentation.
- ✓ Record the PM service activity in the customer's instrument records/logbook.
- ✓ Update/reset instrument maintenance counters as appropriate
- ✓ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ✓ Complete the Service Review Comments section below if there are additional comments
- ✓ Review the service and any test results with the customer.
- ☐ If the Instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.

6850 and 6890 GC Test Results Table

Signal Output test	Before PM service	After PM service
Front detector output	N/A	N/A
Back detector output (6890 Only)	N/A	N/A
Pressure decay test	Expected result	Actual result or N/A
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test (6890 Only)	Pass	N/A

6890 and 6850 GC Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part Description	Part Number	Model# where used	Quantity Consumed
SSL Capillary Inlet PM kit, splitless	5188-6497	G1530/G1540/G2630	1
SSL Capillary Inlet PM kit, split	5188-6496	G1530/G1540/G2630	1
Larger O.D. Liner O-Rings for SS Flip Top - 10/pkg.	5188-6366	G1530/G1540/G2630	N/A
PT Inlet PM kit	5188-6498	G1530/G1540/G2630	N/A
Split vent trap PM kit, single cartridge (for PTV & VI)	5188-6495	G1530/G1540/G2630	N/A
Ignitor (glow plug) assembly with O-ring	19231-00080	G1530/G1540/G2630	N/A
.011-inch Jet for capillary FID base	G1531-80560*	G1530/G1540/G2630	N/A
.018-inch Jet for packed column with packed FID base	18710-20119*	G1530/G1540/G2630	N/A
.011-inch Jet for capillary column with packed FID base	19244-80560*	G1530/G1540/G2630	N/A

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Agilent Preventive Maintenance Services

Agilent GCMS Preventive Maintenance

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Important notice for customers

The customer should complete the following before the Support Provider arrives on site:

- ☐ Perform an autotune and retain the printed tune report just prior to the start of the PM to verify performance of the equipment.

Note: It is recommended to have the customer run the autotune and tune evaluation prior to the PM and then start the vent cycle so that the instrument will be ready for the service representative.

Important Customer Web Links

- To access Agilent training and education, visit <http://www.agilent.com/chem/training> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- **Need to place a service call?** Flexible Repair Options | Agilent

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.

6850 and 6890 GC Preventive Maintenance Checklist - Standard

* The jets (G1531-80560, 18710-20119 and 19244-80560) are recommended for 6850/6890 PM. Please refer to the service note "COLUMNS/SUPPLIES-197A" for detailed information.

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write in this box.

Other Important Customer Web Links

- ☐ How to get information on your product: Literature Library - <http://www.agilent.com/chem/library>
- ☐ Need to know more? - www.agilent.com/chem/education
- ☐ Need technical support, FAQs? - www.agilent.com/chem/techsupp
- ☐ Need supplies? - www.agilent.com/chem/supplies

Service Completion

Service request number: _____ Date service completed: **5 Apr 2024**

Agilent signature: _____ Customer signature: _____

Document part number: G2630-90130

Introduction

This checklist covers the following model(s):

Type	Model
SQ	5973 Series MSD
SQ	5975 Series MSD
SQ	5977 Series MSD
TQ	7000 Series MS/MS
TQ	7010 Series MS/MS
QTOF	7200 Series QTOF
QTOF	7250 Series QTOF

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Customer Responsibilities

Customers should ensure that all necessary operating supplies, consumables, and usage-dependent items such as gases, vials, syringes, calibrant solution and solvents required for successful preventive maintenance are available. A customer representative should be available while the preventive maintenance is being performed.

Interim / Major Preventive Maintenance – Cleaning System and Filters

☐ Service Not Applicable

Cleaning System and Filters	
Yes/No Interim/Major	Description
Fans	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Remove dust from fans and vent covers.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Verify fans are functional and that there is enough space around the instrument for proper cooling.
Source cleaning (all sources except HydroInert)	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Open analyzer and remove the source.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Disassemble, Clean, Re-assemble source. (7200, also, remove and clean entrance lens).
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Re-install source and close analyzer.
HydroInert Source	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Source NOT to be abrasively cleaned. No cleaning required at PM. If a decrease in performance is observed, recommend to the customer that filaments, insulators (repeller and extractor), extractor lens, and repeller lens may need to be replaced to restore performance. HydroInert source should not be run with helium carrier.
Filters	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Replace RMSH-2 Helium gas filter (collision cell gas) – if applicable.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Replace RMSN-2 Nitrogen gas filter (collision cell gas) – if applicable.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Replace RMSHV-2 Hydrogen gas filter (HydroInert and JetClean) – if applicable.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	CP17973 – Gas Clean GS/MS Filter (for He, N2 or H2 carrier) – if required
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	S190-9071 – Methane Gas Filter (CI systems) – if applicable

Guidance: Gas filters need to be changed only if required (ie indicating traps show color change, or if Big Universal Trap are approaching saturation based on time installed or number of gas cylinders changed for that trap)

Interim / Major Preventive Maintenance – System Post Check

☐ Service Not Applicable

System post-check	
Yes/No Interim/Major	Description
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Pump system back down. Wait until system stability has been achieved.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Verify system vacuum reading(s) via the gauge controller.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Leak Check
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Verify system in manual tune
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Compare against previous tune file report(s)
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Change to Tune and verify that all temperatures, pressures, and gas flows reach method set points
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Check manually that you have calibration peaks.
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	EI Autotune Performed

Guidance: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument setup and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete Signature Page and attach Signature Page to Service Order.

Test Results

Test Description	Expected Test Result	Actual Test Result
------------------	----------------------	--------------------

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the service review or other items of interest for the customer, please write in this box.

Service Verification

Service Request Number:

Date of Service Completion:

5 Apr 2024

Customer Name:

Parts for consumption during PM

Common Oil and MS Gas Filters – 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
Agilent AVF Platinum, 1 quart	5191-5851	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Helium gas filter* (collision cell gas) – if required	RMSH-2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nitrogen gas filter* (collision cell gas) – if required	RMSN-2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Hydrogen gas filter** (HydroInert and JetClean) – if required	RMSHV-2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Chemical Ionization Gas Purifier (CI systems) (Methane) – if required	S190-9071	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Gas Clean GS/MS Filter (for He, N2 or H2) – if required	CP17973	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
# Gas Clean Filter Kit GC/MS 1/8 in (complete replacement kit - bench mounted) – if required	CP17974	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
# Gas Clean Carrier Gas Kit for 7890 for He, N2 or H2, Bracket, Mount and Filter – if required	CP17988	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
# Gas Clean Carrier Gas Kit for 8890 & 8960 for He, N2 or H2, Bracket, Mount and Filter – if required	CP17988	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Gas filters need to be changed only if required (ie indicating traps show color change, or if Big Universal Trap are approaching saturation based on time installed or number of gas cylinders changed for that trap)

* Big Universal Trap (BUT), 1/8" fittings

** HydroInert and JetClean Systems

Alternate Gas Clean kit part numbers. A Gas Clean filter is included in the kits. They are only necessary if replacing carrier gas Big Universal Traps with indicating traps

MS Maintenance Supplies for 5973/5975/5977 Series

Part Description	Part Number	Interim	Major	As Needed
Diffusion pump fluid (Diffusion Pump Models)	6040-0809	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Exhaust oil mist trap (threaded) Edwards/Pfeiffer	G1099-80039	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
DS42 Oil Mist Eliminator 3/4G & 3/8	SR03706556	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
IDP-3 Tip Seal Replacement Kit (IDP-3 Dry Scroll Pump Models – includes tip seal, 60mm filter element, tools, mask and cleaning supplies)	G7077-67018	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
IDP-3 Tip Seal Replacement Kit (no tools – CSD P/N)	S190-9561	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
IDP-3 Tip Seal Replacement Kit (no tools – VPD P/N)	IDP3TS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Filter element for IDP-3 (diameter: 60mm)	REPLSLRFILTER2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

MS Maintenance Supplies for 7000/7010 Series

Part Description	Part Number	Interim	Major	As Needed
Oil Mist Filter RV5	G6600-60043	✓	✓	✓
IDP-10 Tip Seal Replacement Kit (IDP-10 Dry Scroll Pump Models - Includes tip seal, 102mm filter element, tools, mask and cleaning supplies)	G7004-67023	✓	✓	✓
IDP-10 Tip Seal Replacement Kit (no tools etc. - VPD P/N)	X3807-67000	✓	✓	✓
Filter element for IDP-10/IDP15 (diameter: 102mm)	REPLSLRFILTER	✓	✓	✓
Filter element for IDP-10/IDP15 (diameter: 79mm)	REPLSLRFILTER1	✓	✓	✓

MS Maintenance Supplies for 7200/7250 Series

Part Description	Part Number	Interim	Major	As Needed
RIS Probe Maintenance Kit (7200 Series only)	G7005-60170	✓	✓	✓
DS202 Oil Mist Eliminator	SR03706800	✓	✓	✓
DS202 3/8" Magnetic Plug and Gasket	SR03701824	✓	✓	✓
IDP-15 Tip Seal Replacement Kit (IDP-15 Dry Scroll Pump Models - Includes tip seal, 102mm filter element, tools, mask and cleaning supplies)	S190-9613	✓	✓	✓
IDP-15 Tip Seal Replacement Kit (no tools etc. - VPD P/N)	X3815-67000	✓	✓	✓
Filter element for IDP-10/IDP15 (diameter: 102mm)	REPLSLRFILTER	✓	✓	✓
Filter element for IDP-10/IDP15 (diameter: 79mm)	REPLSLRFILTER1	✓	✓	✓

HydroInert Source Supplies

To determine if replacement of HydroInert parts is required, please review tune history and sample signal intensity performance. If performance is decreasing, the below parts may be used to restore performance as part of the PM.

One way to determine if the source performance on SQ is being affected is to review the gain factor history in autotune reports or tune history csv file. If the gain factor is increasing the source performance may be degrading. Since TQ tunes to a fixed gain factor, review PFTBA abundance. If PFTBA abundance is decreasing over time, the source performance may be degrading. Real sample/standard area counts are another way to determine the performance, there could also be other factors that affect compounds abundance such as inlet and column status.

Part Description	Part Number	Interim	Major	As Needed
Repeller Insulator (qty 2)	G1099-20133			✓
Lens insulator for Extractor (ring insulator)	G3870-20445			✓
HydroInert Extractor lens (9mm)	G7078-20909			✓
HydroInert Repeller	G7078-20902			✓

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Common Parts Reference

(Purchased by customer, not included as part of PM)

Filaments and Calibrant Supplies 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QTOF
EI High Temperature Filaments Qty 2	G7005-60061	597X	7000x	N/A
HES EI Filaments	G7002-60001	5977B/C	7010x	N/A
LE EI Filaments (7250 QTOF)	G3850-60021	N/A	N/A	7250
CI High Temperature Filament - SQ, TQ, 7200 QTOF	G7005-60072	N/A	N/A	7200A/B
Axial CI Filament, W/Re Straight (7250 QTOF)	G7250-60095	N/A	N/A	7250
PFTBA GC/MS Tuning Standard calibrant	05971-60571	597X	7000	7200
PFTD calibrant, 1 mL	8500-8510	597X	7000	7200
PFTET, RM calibrant for GC QTOF 0.5 mL (7200)	S190-0531	N/A	N/A	7200A/B

Transfer line seals and springs 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QTOF
CI Interface tip seal (ceramic tip and spring combo) (non-captured CI tip seal interface) (5973, 5975, 7000)	G1999-60412	5973, 5975	7000B	N/A
CI Interface tip seal (ceramic tip and spring low/non-magnetic spring combo) (non-captured CI tip seal interface) (7010A)	G7002-60412	N/A	7010A	N/A
CI Interface tip seal spring (spring only)	G1999-20023	597X	7000	7200
CI Interface tip seal (tip only) (captured style)	G3870-20542	5977x	7000	7200
Transfer-Line Tip Base, Threaded (captured style)	G3870-20548	5977x	7000	7200
Transfer-Line Tip Cap, Threaded (captured style)	G3870-20547	5977x	7000	7200
RIS Xler Tip (7200)	G7005-20542	N/A	N/A	7200A/B
RIS Xler Tip Spring (7200)	G7005-20024	N/A	N/A	7200A/B

MS Maintenance Supplies for Intuvo 9000 MS Series

Part Description	Part Number	SQ	TQ	QTOF
Swaged MS Tail - Packaged	G4590-60009	5977x	7000	N/A
Swaged MS Tail (HES) - Packaged	G4590-60109	5977x	7010x	N/A

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Ion source insulators for 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QTOF
Repeller insulator (SQ, TQ)	G1099-20133 Qty 2	597X	7000x	N/A
Lens insulator for extractor lens (ceramic ring insulator) (Extractor source)	G3870-20445	5977x	7000C/D/E	N/A
Lens insulator for Extractor lens (Vespel ring insulator) (7200B extractor ion source)	G7000-20445	N/A	7000B only	N/A
Lens stack insulator for SS, Inert, Extractor sources (captures ion focus and entrance lens) (Vespel)	G3170-20530	597X	7000x	N/A
Lens insulator for Extractor lens for HES/LEEI (ceramic ring insulator)	G7002-20064	5977B/C	7010x	7250
Lens stack insulator/holder for HES/LEEI (Vespel)	G7002-20074	5977B/C	7010x	7250
CI Repeller Lens Insulator (SQ, TQ)	G1999-20433	597X	7000x	N/A
CI Lens stack insulator (SQ, TQ) (Vespel)	G3170-20540	597X	7000x	N/A
Repeller insulator (7200 RIS) (Ceramic)	G7005-20447	N/A	N/A	7200A/B
Extractor Lens Insulator (7200 RIS) (Vespel)	G7005-20133	N/A	N/A	7200A/B
Ion Focus Insulator (7200 RIS) (Vespel)	G7005-20442	N/A	N/A	7200A/B
CI Repeller Insulator/bushing (7200 RIS) (Ceramic)	G7005-20030	N/A	N/A	7200A/B

HydroInert coated lenses for 5977/7000 Series

Part Description	Part Number	SQ	TQ	QTOF
HydroInert Repeller	G7078-20902	5977x	7000C/D/E	N/A
Ext Source Body - HydroInert	G7078-20903	5977x	7000C/D/E	N/A
HydroInert Extractor lens (9mm)	G7078-20909	5977x	7000C/D/E	N/A
Ion Focus Lens - HydroInert	G7078-20905	5977x	7000C/D/E	N/A
Entrance Lens - HydroInert	G7078-20904	5977x	7000C/D/E	N/A

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Heater/Sensor assemblies for 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QTOF
Stainless Steel Heater/Sensor assembly (SST EI 350)	G3870-67180	597X	N/A	N/A
Inert Heater/Sensor assembly (Inert EI 350)	G3870-67179	597X	7000A/B	N/A
Extractor Heater/Sensor assembly (Xtr EI 350)	G3870-67177	5977x	7000C/D/E	N/A
H2 EI Heater/Sensor Assembly - HydroInert (H2 EI 350)	G7078-67910	5977x	7000C/D/E	N/A
CI 350 Heater/Sensor Assembly (CI 350)	G3870-67415	597X	7000x	N/A
Ring heater/sensor assembly (HES, RIS and LEEI) (ceramic ring)	G7002-60058	5977B/C	7010x	7200

Rough pump hoses 5973/5975/5977/7000/7010/7200/7250 Series

Part Description	Part Number	SQ	TQ	QTOF
Foreline Hose - imbedded spring	G7077-60119	597X	7000x	7200

Common MS Maintenance Supplies

Part Description	Part Number	SQ	TQ	QTOF
Abrasive paper, 30 µm	5061-5896	597X	7000	7200
Alumina powder	393706201	597X	7000	7200
Cloths, clean (pkg of 15)	05980-60051	597X	7000	7200
Cloths, cleaning (pkg of 300)	9310-4828	597X	7000	7200
Cotton swabs (pkg of 100)	5080-5400	597X	7000	7200
Gloves, clean, large	8650-0030	597X	7000	7200
Gloves, clean, small	8650-0029	597X	7000	7200

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Page ____ of ____



Agilent CrossLab Start Up Services

Agilent G8160A Teledyne Tekmar Atomx XYZ Preventive Maintenance

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- Need to place a service call?** Flexible Repair Options | Agilent

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Completion section
- Ask the customer to sign the Service Verification section including the customer's and your signature.

Preparation

- ✓ Discuss any specific issues with the customer before starting.
- ✓ Review the instrument logbook for recorded problems and comments.
- ✓ Save instrument control settings before starting the procedure.
- ✓ Perform a general inspection of the system for cleanliness.
- ✓ Check for proper installation of parts, assemblies, sensors etc.
- ✓ Check system for required installation of components and implementation of Service Notes
- ✓ Check for required firmware updates and verify with customers if they would like them installed. Firmware update(s) are strongly recommended.

Instrument Maintenance

Select the appropriate service to be performed.

- ☐ Interim Preventive Maintenance (when available, is typically 6 months or at the request of the customer)
- ☒ Major Preventive Maintenance (Yearly)
- ☐ Enhanced Preventive Maintenance (when available, is provided "As needed")

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	
Instrument System Site and Location	SGS, Bangkok

List System Component Product Numbers	List the Serial Numbers of each Component
1. G8160A	US18005018
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

Preventive Maintenance Procedures

- ☐ Service Not Applicable

Preventive Maintenance Task Section #1 - Verify and adjust functionality of Atomx XYZ

- ☐ Service Not Applicable.
- ✓ Verify 5V and 24VDC supplies with multimeter and LEDs
- ✓ Verify electronic performance in diagnostics
- ✓ Ensure flow rate 10 mL/min
- ✓ Perform syringe initialization
- ✓ Adjust arm tilt and cantor, if needed
- ✓ Adjust gripper tilt and pads, if needed. Replace pads if needed.
- ✓ Verify unhindered movement of vial sensor flag
- ✓ Perform arm/origin alignment, if necessary
- ✓ Check IS pressure and adjust if necessary
- ✓ Check system history for proper purge and bake pressures
- ✓ Check system history for errors
- ✓ Leak check system
- ☐ Perform benchmark test

Interim Preventive Maintenance Task Section #2 – Clean Atomx XYZ

- ☐ Service Not Applicable.
- ✓ Clean system and fans
 - Remove dust from electronics and boards
 - Remove any dirt or dust that is present on fans
 - Remove dust from sensors
- ✓ Remove front sparger and clean glassware. Inspect glassware, ferrule, 3-port valve. Replace if necessary.
- ✓ Clean tray of debris
- ✓ Clean sample cup of debris
- ✓ Clean waste container and water reservoir, and ensure no debris is clogging waste lines

Restore Instrument

- ☐ Service Not Applicable.
- ☒ Restore customer's method setpoints.
- ☒ Run a standard to ensure functionality of Atomx XYZ.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☒ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☒ Complete the Signature Page with both Service Engineer and Customer signatures.

Test Results

Test Description	Expected Test Result	Actual Test Result
Leak Test	Less than 1 PSI	Fail, Call for Repair
Benchmark	All Pass	N/A

Consumed PM Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
Sparger, 5mL, fritted	5182-0852	P&T	N/A
Sparger, 25mL, fritted	5182-0851	P&T	1
Sparger, 5mL, fritless	5182-0850	P&T	N/A
Sparger, 25mL, fritless	5182-0849	P&T	N/A
Gripper Finger Caps	G8160-60089	G8160A	1

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

Service Verification

Service Request Number:

Date Service Completed:

5 Apr 2024

Customer Name:

Maintenance Protocol

PlasmaQuant® MS (Elite) ICP-MS



Maintenance Protocol

1 Customer and service data

Customer data

Company	SGS
Department	Rayong
Name	
Address (Street, Number, ZIP code, City)	Sukhumvit 2 Rd, Ban Chang, Ban Chang District, Rayong 21150
Telephone	
E-Mail	
Customer no.	
Order no.	

Device data

Device Type	PQMS Elite
Serial number	10-5000-030-26-AR109

Data of the authorized person for the Maintenance

Name, Company	Analytik Jena Instruments Thailand Ltd.	
Date of the Maintenance	24 April 2024	
	yes	no
Maintenance with following Operational Qualification OQ (requires a separate OQ protocol)	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Maintenance Protocol

2 Maintenance Checklist

Tick each checkbox as the steps are completed.

Parts required

<input checked="" type="checkbox"/>	10-5000-220-20	Kit preventative maintenance ICP-MS
<input checked="" type="checkbox"/>	13-410-540	Cooling Water Additives
Choose one of the following oil types as it is important for rotary pump type:		
<input type="checkbox"/>	418-88089-0	Vacuum Pump Oil (Esther Oil LVO 200) N/A
<input checked="" type="checkbox"/>	418-10-406-251	Vacuum Pump Oil (PFPE Oil LVO 420)

Initial performance tests

<input checked="" type="checkbox"/>	Print out Details, Plasma Align (Time Scan mode), Res & Trim, Mass Call, Detector Setup, Mass Scan (after new scan with tuning solution), Vacuum (Gate Valve opened and closed), ICR, Ion Optics and Stepper pages from the instrument setup
<input checked="" type="checkbox"/>	Verify performance (sensitivity/oxides/double charges) of system before starting maintenance

Vacuum system

<input checked="" type="checkbox"/>	Drain and replace oil in rotary pump. Inspected
<input checked="" type="checkbox"/>	Clean exterior of pump.
<input checked="" type="checkbox"/>	Test vacuum interlock by attempting to start vacuum with Turbo pump #1 dismounted. Verify that appropriate error message is displayed.

Mass spectrometer system

<input checked="" type="checkbox"/>	Check/adjust gate valve.
<input checked="" type="checkbox"/>	Clean sampler/skimmer cones/replace O-rings.
<input checked="" type="checkbox"/>	Check quadrupole resolution and check Quad Controller resonance. Resonance peak voltage is 2.74 V.
<input checked="" type="checkbox"/>	Clean entrance lens and entrance plate Detector voltage is: 3113 v.

Maintenance Protocol

Sample introduction system

<input checked="" type="checkbox"/>	Inspect torch.
<input checked="" type="checkbox"/>	Inspect/replace torch gas tubing.
<input checked="" type="checkbox"/>	Inspect/clean/adjust RF coil.
<input checked="" type="checkbox"/>	Inspect igniter/replace ignitor cable.
<input checked="" type="checkbox"/>	Clean sampler/skimmer cones/replace O-rings.
<input checked="" type="checkbox"/>	Clean extraction lenses #1 and #2.
<input checked="" type="checkbox"/>	Remove nebulizer from spray chamber. Turn on the peristaltic pump (15 rpm) and nebulizer gas flow (1.0 L/min) and aspirate de-ionized water. Check that the aerosol produced by the nebulizer is normal and uniform.
<input checked="" type="checkbox"/>	Check spray chamber and replace all O-rings and water tubing.
<input checked="" type="checkbox"/>	Inspect sample introduction system electrical connections.

Water cooling system

<input checked="" type="checkbox"/>	Drain water reservoir.
<input checked="" type="checkbox"/>	Clean air intake filters & heat exchange fins as needed.
<input checked="" type="checkbox"/>	Inspect all water hoses for cracks/leaks.
<input checked="" type="checkbox"/>	Disassemble inline water filter & clean cartridge.
<input checked="" type="checkbox"/>	Fill water reservoir with additives and check the water conductivity according to instruction. Conductivity = 99 μ S/cm.
<input checked="" type="checkbox"/>	Inspect mains cable and plug.
<input checked="" type="checkbox"/>	Turn on and re-check water level.
<input checked="" type="checkbox"/>	Check pressure (440 \pm 40 kPa) and temperature set point (20 °C); adjust if necessary.
<input checked="" type="checkbox"/>	Verify operation of the water solenoid.

Basic instrument

<input checked="" type="checkbox"/>	Inspect condition of argon supply hose.
<input checked="" type="checkbox"/>	Inspect mains power cable and plug.
<input checked="" type="checkbox"/>	Check operation of exhaust system and inspect airflow sensor; if necessary clean according to instruction.
<input checked="" type="checkbox"/>	Inspect USB and serial cables/connections.
<input checked="" type="checkbox"/>	Clean all external covers and fans.
<input checked="" type="checkbox"/>	Check argon inlet pressure if it is at recommended pressure of 700 kPa (100 psi) (allowed range is 600 to 830 kPa, 90 to 120 psi) Actual setting is 105 kPa/psi.
<input checked="" type="checkbox"/>	Check ICR for leakage and blockage according to service info. Check gas pressures: He ~150 kPa (22 psi), H ₂ ~100 kPa (16 psi)

Maintenance Protocol

Interlock Tests

<input checked="" type="checkbox"/>	Turn off argon supply and ignite plasma. Verify if low argon error message is displayed.
<input checked="" type="checkbox"/>	Ignite plasma and press emergency stop button. Verify that plasma goes out and appropriate error message is displayed.
<input checked="" type="checkbox"/>	Ignite plasma and unlatch plasma compartment/main RF door. Verify that plasma goes out and appropriate error message is displayed.
<input checked="" type="checkbox"/>	Ignite plasma and turn off argon supply. Check if plasma is turned off and appropriate low argon flow message is displayed.
<input checked="" type="checkbox"/>	Turn off water cooler and light plasma. Verify if appropriate error message is displayed.

Accessories

<input checked="" type="checkbox"/>	Verify initialization and operation of auto sampler. Check belts and wheels etc.
<input checked="" type="checkbox"/>	Check all other accessories.

Performance tests

<input checked="" type="checkbox"/>	Update entries in Details page of Instrument Setup window as required.
<input checked="" type="checkbox"/>	Print out every section of the Instrument Setup (service mode) and put it into the logbook.
<input checked="" type="checkbox"/>	Tune up instrument and run performance test. Perform any corrective action necessary if results do not meet specifications. Add performance test results to logbook.

Instrument condition

<input checked="" type="checkbox"/>	Assess and comment on condition of ICP-MS system
<input checked="" type="checkbox"/>	Discuss condition, preventative maintenance results and instrument performance with the customer.
<input checked="" type="checkbox"/>	Sign and date this checklist after obtaining customer's signature.

Instrument and environmental conditions

<input checked="" type="checkbox"/>	Good	<input type="checkbox"/>	Fair	<input type="checkbox"/>	Poor
-------------------------------------	------	--------------------------	------	--------------------------	------

Maintenance Protocol

Comments and recommendations:

Place, date (DD/MM/YYYY)

Place, date (DD/MM/YYYY)

Service Report

Customer's address :		Customer's Ref. No.:	
SGS Rayong Sukhumvit 2 Rd, Ban Chang, Ban Chang District, Rayong 21150			
E-mail :	Phone:	Fax :	
Job No. : 2404173PM	User:	Date: 23-24/04/2024	Page: 1/1
Instrument model :	Serial:	Software Version No. : 4.3.3	
<input type="checkbox"/> Repair (RE)	<input checked="" type="checkbox"/> Maintenance (PM)	<input type="checkbox"/> Installation (IN)	<input type="checkbox"/> Warranty
<input type="checkbox"/> Application (AP)	<input type="checkbox"/> Site Prep (SP)	<input type="checkbox"/> Visit (VI)	<input type="checkbox"/> Error Code
Fault / Claim : PM 1-2024			
Action taken : Clean cooling system , replaces DI water, adjust conductivity to 99 uS/cm, Clean water filter Clean sample introduction system, torch, spray chamber, nebulizer, replace quick lock and clamp. Clean extraction lenses #1 and #2. Check spray chamber and replace all O-rings and water tubing. Clean sampler/skimmer cones/replace O-rings. Inspect/clean/adjust RF coil/ igniter/replace ignitor cable. Clean all external covers and fans. Interlock Tests all passed. Tune up instrument, res and trim, mass calibration and run performance test with 1 ppb tuning standard. Instrument working properly.			
Action Pending / Recommendation : * internal std tubing made/black marks			
<input type="checkbox"/> Spare Part		<input type="checkbox"/> Instrument Configuration	
Item No.		No.	
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Herewith the undersigned confirm the time devoted, the work performed, the perfect function of the device, and the receipt/delivery of the specified spare parts. *Traveled hours and kilometers can only be entered after the return of the service engineer.			
		Work completed? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	

Services are subject to the General Terms and Conditions of our company. Any necessary work will be carried out on request.

analytikjena ASPECT MS Worksheet Report

Report Date 2024-04-23 16:49:27 GMT+07:00
Worksheet System Test 2024-04-23.msws
Analyst

Page 1 of 4

Worksheet Summary

Worksheet: System Test 2024-04-23.msws
Client: 2024-04-23 07:36:54
Analyst:
Computer: APPLICATION/PCP
Last Saved: 2024-04-23 16:47:39 GMT+07:00
Software Ver.: 4.3.110995
Firmware Ver.: 5.69
Samples: 1
Comment:

Chemistry

Matrix:
Acids Used:
Keywords:
CRM:

Measurement Parameters

Analysis Modes: Analysis Type: Quantitative, Acquisition Mode: Steady State, Scan Mode: Peak Hopping
Spacing: Coarse, Points/Peak: 1, Scans/Replicate: 50, Replicates/Sample: 10

Plasma

Plasma flow: 9.00 L/min Auxiliary flow: 1.35 L/min Sheath Gas Flow: 0.00 L/min Nebulizer flow: 1.00 L/min
Sampling depth: 0.00 mm
Power: 1.20 kW Pump rate: 20 rpm Stabilization delay: 0 sec Nitrox Flow: 0.00 mL/min

Ion Optics

(Volt)
Skimmer Bias: 0.00
First Extraction Lens: -99.00 Second Extraction Lens: -625.00 Third Extraction Lens: -499.00
Left Mirror Lens: 72.00 Right Mirror Lens: 65.00 Bottom Mirror Lens: 47.00
Corner Lens: -446.00 Entrance Lens: 4.00
Fringe Bias: -5.50 Entrance Plate: -60.00
Detector Focus: True Pole Bias: 0.00

iCRC

Skimmer Cone: Off iCRC Skimmer Gas Flow: 0 mL/min

Nitrox

0 mL/min

Sampling

Aerosol generation: Nebulizer, Source: Manual
Fast pump during sample delay/time: On, Enable device control: Off
Spray Chamber Cooling: On Spray Chamber Temp: 3.00 °C
Sample uptake delay: 30 sec, Smart Rinse: No, Switch Delay: OFF
Scan time: 1407 msec, Replicate time: 70.35 sec

Analyses (6)

Be9, Co59, In115, Ce140, Pb208, Th232

SemiQuant Analyses (0)

Internal Standards (0)

No. of Isotope ratio standards: 0

Isotope Ratio (2)

Ce3/Ce(Ce140/Ce140), Ba+/Ba(Ba138+/Ba138)

Default exclusions (7)

Ar40, Ar40/Ar40, N14, N14H1, O16, O16H1, Ar40H1

User-specified exclusions (0)

Scan Segments (11)

Start (m/z)	Stop (m/z)	Dwell (µsec)	Attenuation mode	Norm-Med	Med-High
5	5	60000	None		
8	10	60000	None		
58	60	60000	None		
69	69	60000	None		
114	116	60000	None		
138	140	60000	None		
156	156	60000	None		
207	209	60000	None		
220	220	60000	None		
228	228	60000	None		

analytikjena ASPECT MS Worksheet Report

Report Date 2024-04-23 16:49:27 GMT+07:00
Worksheet System Test 2024-04-23.msws
Analyst

Page 2 of 4

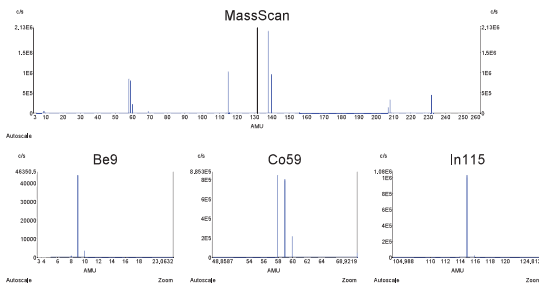
Start (m/z)	Stop (m/z)	Dwell (µsec)	Attenuation mode	Norm-Med	Med-High
231	233	60000	None		

1 ppb Tuning solution (1 ppb Tuning solution)

Tube 2, Replicates: 10, Auto Dilutions factor: - Cal Set 1, Time measured: 2024-04-23 16:09:18
Actual weight: 1.0000 g, Actual volume: 1.00 mL, Dilution Factor: 1.00
Position Horizontal: <10 mm Position Vertical: 0.00 mm Detector Voltage: 3113.30 volt

Analyte	Soln Conc	Unit	QC	Mean c/s	%RSD	SD	Replicates (c/s)	
Be9	1.0000	ppb	-	43867.70	0.47	208.2	44143 43889 44044 43517 43910 44047 43709 43687 43681 44050	
Co59	1.0000	ppb	-	787170.5	0.69	5456.5	799814 782206 780629 788317 782167 790316 787948 785791 786284 788233	
In115	1.0000	ppb	-	1004006	0.95	9514.9	1028361 999055 998535 1000829 995308 1005416 1000919 999047 998816 1005577	
Ce140	1.0000	ppb	-	956260.5	0.95	8927.7	952179 926117 924893 938286 927966 937473 937972 941506 950735 948538	
Pb208	1.0000	ppb	-	319209.9	0.67	2129.3	324379 318410 316210 318117 320081 318597 320199 319093 318245 318768	
Th232	1.0000	ppb	-	444418.4	0.65	2906.3	450213 440004 448896 445450 443618 442334 446336 441872 442732 445729	

Isotope Ratio	Ratio	%RSD	SD	Replicates (ratio)	
Ce140/Ce140	0.018	2.19	0.000	0.019 0.019 0.018 0.019 0.018 0.019 0.018	
Ba138+/Ba138	0.022	0.88	0.000	0.021 0.022 0.022 0.022 0.021 0.022 0.022	





Blank [Blank]
Tube: 1, Replicates: 10, Auto Dilutions factor: -, Cal Set 2, Time measured: 2024-04-23 16:47:39
Actual weight: 1.0000 g, Actual volume: 1.00 mL, Dilution Factor: 1.00
Position Horizontal: -0.10 mm Position Vertical: 0.00 mm Detector Voltage: 3113.30 volt



Last calibration: 2024-04-23 15:27:44
 [Worksheet: C:\ProgramData\Analytik Jena\ASpect MS\Supplied Worksheets\System Setup 2024 Apr 23.msws]

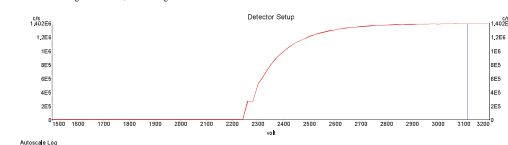
Resolution and Trim
Last modified: 2024-04-23 15:27:44
[Worksheet: C:\ProgramData\Analytik Jena\ASpect MS\Supplied Worksheets\System Setup 2024 Apr 23.msws]

Last modified: 2024-04-23 15:17:24
 [Worksheet: C:\ProgramData\Analytik Jena\ASPECT MS\Supplied Worksheets\System Setup 2024 Apr 23.msws]

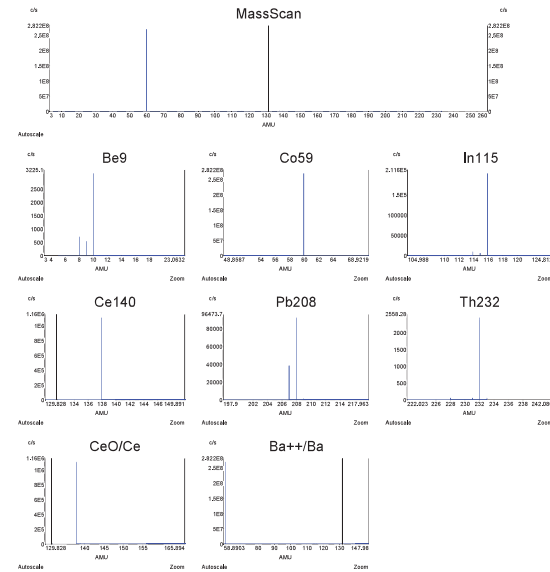
Horizontal (x) alignment: -0.10 mm, Vertical (y) alignment: 0.00 mm

[Worksheet: C:\ProgramData\Analytik Jena\ASPECT MS\Supplied Worksheets\System Setup 2024 Apr 23.msws]

Detector Voltage: 3113 volt, Scan Range From: 1500 - 3200 volt



Analyte	Solo Conc	Unit	QC	Mean c/s	%RSD	SD	Replicates (c/s)		
Pb208	0.0000	ppb		91426.60	0.45	414.6	91880 91092 91634 90966 91626 91983 91800 91299 91203 90781		
Th232	0.0000	ppb		1941.900	18.65	362.1	2361 2436 2198 2080 2230 1831 1678 1601 1564 1440		
Isotope Ratio	Ratio	%RSD	SD	Replicates (ratio)					
Ce140/Ce140	0.042	3.77	0.002	0.044 0.041 0.043 0.042	0.039	0.042	0.043	0.040	0.043
Ba138++/Ba138	0.023	0.65	0.000	0.023 0.023 0.023 0.023	0.023	0.023	0.023	0.023	0.023



Certificate of Calibration

Cert.No.: 24CH568
Page.: 1 of 3

Equipment : pH / Conductivity Meter
Manufacturer : Mettler Toledo
Model : S213
Serial No. : B902060027
ID No. : P2019019
Condition As-Received: Used Item
Received Date : 14 May 2024
Calibration Date : 15 May 2024
Reference : 2405-0423WSC-1
Submitted by : SGS (Thailand) Limited
1/209, 1/211 Moo 1, T.Ban Chang,
A.Ban Chang, Rayong 21130
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Calibrated by : 
Approved by : 
Approved Signatory

17 May 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Cert.No.: 24CH568
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4982054	110RC044	23I908	26 July 2024

This certification is traceable to the International System of Unit maintained through:-
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials

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

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 1.679	CPA chem	823319	20 Jun 2024
pH 4.008	CPA chem	970851	25 Apr 2026
pH 6.986	CPA chem	970852	25 Apr 2026
pH 9.997	CPA chem	970853	25 Apr 2025

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

Calibration Results

Function : mV Measurement

Performing standard curve by Document Process Calibrator at pH (1.7,4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
	pH	mV	mV	pH		
pH Meter S/N.: B902060027	1.680	314.73	314.6	1.680	0.058	2.00
	4.000	177.48	177.4	4.000	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	10.000	-177.48	-177.4	10.000	0.058	2.00



Cert.No.: 24CH568
Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing four buffers standard curve by using buffer nominal pH (1.7,4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode S/N.: 8512743	1.679	1.682	316.0	0.0050	2.05
	4.008	4.008	181.2	0.0048	2.05
	6.986	6.989	7.8	0.0084	2.00
	9.997	9.997	-166.0	0.0070	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab®Expert Pro-ISM

- Serial No. : 8512743

Dimension of probe

- Length : 120 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	25.1	0.098	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 %.

Gas Chromatography Preventive Maintenance Checklist

PM 2004001 2021

SGS

Service Engineer's Responsibilities

- Only complete sections that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using a 'X' or tick mark '✓' in the checkbox.
- Complete Not Applicable check boxes to indicate services not delivered, as needed.
- Complete the PM Service in the order of the tasks listed.
- Complete the Service Review section together with the customer.

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable 'Safety' or 'Modification Recommended' Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

Gas Chromatography Preventive Maintenance Checklist

SGS

System Information

- Check this box if an instrument configuration report is attached instead of completing the table.

Instrument ID	G 2004001
Instrument location	GC 8001
List system component product numbers	List the serial numbers of each component
1. 01040N	1. US 1040 9014
2. 01041S	2. CN 01041 9460
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

Preparation

- Discuss any specific issues with the customer prior to starting.
- Review the instrument logbook.
- Save instrument control settings before starting the procedure.
- Perform general inspection of system for cleanliness.
- Check for proper installation of safety-related parts, assemblies, sensors etc.
- Check for required firmware updates and verify with customers if they would like it installed.
- Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

Gas Chromatography Preventive Maintenance Checklist

SGS

Clean and inspect GC

- Unplug power cord from the power source.
- Open GC covers and vacuum/remove any dust. Pay particular attention to cooling fans.
- Inspect internal connectors for proper contact and placement.
- Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- Verify oven motor spins freely and turns on with the oven door closed, off when the door is opened.
- Verify operation of all other fans - the inlet and EPC cooling fans.
- Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven.

Inlet and detector consumable replacement

- For the inlets installed, perform inlet maintenance as defined in the 6890/7890 manual - 'Maintaining Your GC' - for the inlet(s) installed.
- Replace the split vent trap cartridge filter on units with these inlets.
- If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination - clean as necessary.

Zero Sensors and Leak test

- Zero all pressure sensors per the procedure in the 6890/7890 'Advanced User Guide'.
- Perform inlet pressure decay test(s) as defined in the 6890/7890 'Troubleshooting Manual'.
- If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- Record if test passed or failed in the results table.

ALS Maintenance

- Section NOT applicable.
- Check all cabling and configuration settings between GC, tray, and injectors.
- Vacuum or removed any dust, especially around fans.
- Check operation of all fans.
- Check syringe for smooth plunger operation.
- Check for smooth operation of the needle support - clean if necessary.
- Check for correct operation of syringe volume settings.

Gas Chromatography Preventive Maintenance Checklist

SGS

Restore Instrument

- Restore the normal operating conditions or customer method using the Keyboard or Data System.
- Purge the system with carrier flow for 15 minutes.
- Bake out the system, then restore the normal operating conditions.
- After equilibration, check and record the post PM detector signal output values. Results should be similar or lower than the detector outputs recorded prior to PM.
- Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Gas Chromatography
Preventive Maintenance Checklist

SGS

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the PM service activity in the customer's instrument records/logbook
- ☒ Update/reset instrument maintenance counters as appropriate
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Review Comments section below if there are additional comments
- ☒ Review the service and any test results with the customer.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box below or if necessary, in the customer's IQ records.
- ☐ Please ask the customer if they would like to have Smart Alerts installed on their computer.

GC Test Results Table

Detector Signal Outputs	Before PM service	After PM service
Front detector output	N/A	Not used
Back detector output	N/A	IS-1
AUX detector output	N/A	N/A
Pressure decay test	Expected result	Actual result or N/A
Front inlet pressure decay test	Pass	PASS
Back inlet pressure decay test	Pass	Not used

Gas Chromatography
Preventive Maintenance Checklist

SGS

GC Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part Description	Part Number	Model# where used	Quantity Consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	6890,7890	—
SSL Capillary Inlet PM kit, split	5188-6496	6890,7890	1
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	6890,7890	—
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	6890,7890	—
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	6890,7890	—
PP Inlet PM kit	5188-6498	6890,7890	—
Split vent trap PM kit, single cartridge (for MML PTV & VI)	5188-6495	6890,7890	—
MML Cleaning Kit	G3510-60820	6890,7890	—
PTV Septumless Head Rebuild Kit	5182-9747	6890,7890	—
PTV Septumless Head Teflon Guide	5182-9748	6890,7890	—
Ignitor (glow plug) assembly with O-ring	19231-60680	6890,7890	—
PID Collector Rebuild/Cleaning Kit	G1531-67000	6890,7890	—
PID Collector Replacement Kit	G1531-67001	6890,7890	—
FID Jet, universal fit, 0.011 inch ID*	5200-0176	6890,7890	—
FID Jet, universal fit, 0.018 inch ID*	5200-0177	6890,7890	—
Jet, Adapt, wide bore packed, 0.76mm ID*	18789-80070	6890,7890	—

Gas Chromatography
Preventive Maintenance Checklist

SGS

Maintenance Engineer Comments

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write in this box.

Service Completion

Service request number: [redacted] Date service completed: 31-May-2024

Engineer signature: [redacted] Operator signature: [redacted]

SGS (Thailand) limited

Automatic Mercury Analyzer

Model RA-4500

Preventive Maintenance Report

Serial No. : 14780131

Date : 31 January 2024

Next due date : 31 January 2025

PM by : [redacted]

Approved by : [redacted]



Coax Group Corporation Ltd.
1131/62,64,325-331 Nakornchaisri road,
Kwang Thanon Nakornchaisri, Dusit, Bangkok 10300 Thailand
Tel. 02-2435263, 02-6682436 Fax. 02-2437386

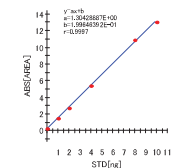
Inspection result

ITEM	STANDARD	RESULT	JUDGE
1. Self Check			
1.1 Heating		PASS	OK
1.2 Cooling		PASS	OK
1.3 Leak		PASS	OK
1.4 Optical system		PASS	OK
1.5 Drift		PASS	OK
2. Analytical curve inspection(AREA)			
2.1 No Pretreatment (Low Conc.)	Correlation coefficient	0.9997	OK
	(r) ≥ 0.9990		
3. Repeatability(AREA)			
3.1 No Pretreatment 100ppb, n=5			
	1. 101.35	ppb	
	2. 98.67	ppb	
	3. 98.85	ppb	
	4. 96.42	ppb	
	5. 95.62	ppb	
	C.V. ≤ 5%	2.30%	OK
4. Blank	Below 1.0(AREA)	0.1950	OK

Parameter	Value	Unit	Parameter	Value	Unit
Measurement Count	481225	(6.76)	P1 NaOH(0.000)	0.000	(0.00)
Mercury Filter Activator(40/100mg)	90101	(0.76)	P2 NaOH(0.000)	0.000	(0.00)
Long Active NaOH(0.000)	100000	(0.76)	P3 NaOH(0.000)	0.000	(0.00)
Mercury Filter (Long) (0.000)	90100	(0.76)	P4 NaOH(0.000)	0.000	(0.00)
Mercury Filter (Long) (0.000)	90100	(0.76)	P5 NaOH(0.000)	0.000	(0.00)
Mercury Filter (Long) (0.000)	90100	(0.76)	P6 NaOH(0.000)	0.000	(0.00)
Mercury Filter (Long) (0.000)	90100	(0.76)	P7 NaOH(0.000)	0.000	(0.00)
Mercury Filter (Long) (0.000)	90100	(0.76)	P8 NaOH(0.000)	0.000	(0.00)

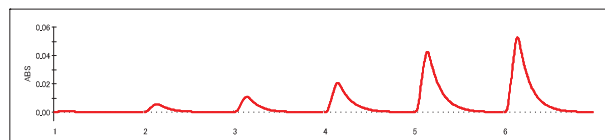
Title : Preventive Maintenance RA-4500 SN14780131
Date : 1/31/2024
Name : Coax Group
Memo : Calibration Curve 0-10 ng

Calib



STD

No.	STD [ppb]	SVOL [mL]	CVOL [mL]	DVOL [mL]	STD [ng]	AREA [ON]	MEAS [ng]	Dev [%]	Note
1	100,000	0,000	5,000	5,000	0,000	0,2019	0,0017	-	
2	100,000	0,010	5,000	5,000	1,000	1,5130	1,0069	0,7	
3	100,000	0,020	5,000	5,000	2,000	2,7372	1,9495	2,7	
4	100,000	0,040	5,000	5,000	4,000	5,4247	4,0061	0,2	
5	100,000	0,080	5,000	5,000	8,000	10,8423	8,1597	2,0	
6	100,000	0,100	5,000	5,000	10,000	13,0860	9,8800	1,2	

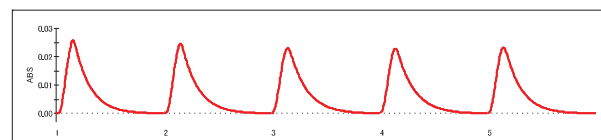


SMP

No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Note
1	100ppb	0,050	5,000	5,000	6,8092	5,0676	101,352	
2	100ppb	0,050	5,000	5,000	6,8344	4,9335	98,670	
3	100ppb	0,050	5,000	5,000	6,8460	4,9424	98,848	
4	100ppb	0,050	5,000	5,000	6,4873	4,8208	96,416	
5	100ppb	0,050	5,000	5,000	6,4352	4,7808	95,616	

Statistics

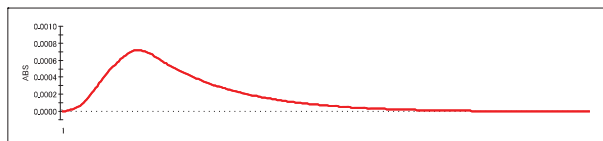
No.	NAME	TRY	AV [ug/L]	SD [ug/L]	Cv [%]
1	100ppb	5	98,1804	2,260182	2,30



Title : Preventive Maintenance RA-4500 SN14780131
Date : 1/31/2024
Name : Coax Group
Memo : Blank

SMP

No.	NAME	SVOL [mL]	CVOL [mL]	DVOL [mL]	AREA [ON]	MEAS [ng]	CONC [ug/L]	Note
1	blank				0.1950	-0.0036		



Self Check

Heat check: PASS!! (29.6degC[05:00] -> 33.6degC[02:51])
Sensor check: PASS!! (74- 33- 51)
Leak check: PASS!! (0.16L/min)
Sig/Ref check: PASS!! (Sig: 4.07V, Ref: 4.03V)
Drift check: PASS!! (-0.000090 - -0.0000781 = 0.0000641)

NIC NIPPON INSTRUMENTS CORPORATION

20240001 PM 2024

Agilent
CrossLab
From Insight to Outcome

Agilent Preventive Maintenance Services Agilent InfinityLab LC Series Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides what you need to reduce unplanned downtime and keep your systems operating at their peak performance.

This checklist is used as a guide for completing the preventive maintenance tasks. A signed copy of this checklist is provided for your records.

Revision: C.04, Issued: 8-Feb-2024
Document Number: 50-29001763
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Agilent

Agilent InfinityLab LC Series Preventive Maintenance Checklist

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Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer (HPLC grade water, 2-propanol).
- Installed columns and remaining samples have to be removed from the system by the customer and the system has to be thoroughly flushed with appropriate storage solvent or water prior preventive maintenance starts.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.
- Any chemicals, which will be needed to prepare the Multi-Angle Light Scattering (MALS) cleaning agents/solutions must be provided by the customer. Consult the MALS detector manual for details and/or contact your local Agilent representative.

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Agilent InfinityLab LC Series Preventive Maintenance Checklist

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Important Customer Web Links

- To access Agilent training and education, visit <https://www.agilent.com/chem/training> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- To access the **Agilent Resource Center** web page, visit <https://www.agilent.com/en-us/agilentresources>. The following information topics are available:
 - Sample Prep and Containment
 - Chemical Standards
 - Analysis
 - Service and Support
 - Application Workflows
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>
- Videos about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>
- Need to place a service call?**
<https://www.agilent.com/en/promotions/flexible-repair-options>

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Document Number: 50-29001763
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Agilent

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark ✓.
- Check "Service not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Complete the fields for page numbers at the foot of each selected page.
- Add relevant page numbers to selected pages and complete the total number of pages field in the Service Verification section.
- Complete Signature Page and attach Signature Page to Service Order.

Instrument Maintenance**System Information**

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	2070007
Instrument System Site and Location	Laboratory

System Components

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

List System Component Product Numbers	List the Serial Numbers of Each Component
1. 67111B	DEAF90113
2. 67115A 67116A	DEAC63775 DEAD21627
3. 67119A	DEAF638358
4. 67115A	DEAC 67173
5.	
6.	
7.	
8.	
9.	
10.	

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and implementation of Service Notes.
- ☐ Check for required firmware updates and verify with customers if they would like them installed. Firmware update(s) are strongly recommended.

G7112B Binary Pump**☐ Section NOT Applicable**

- ☒ Power off the pump.
- ☒ Remove pump heads.
- ☒ Disassemble pump heads.
- ☒ Remove and clean pistons.
- ☒ Clean support rings.
- ☒ Replace piston seals.
- ☒ Replace wash seals and gaskets (if applicable).
- ☒ Reassemble and install pump heads.
- ☒ Reconnect the Active Inlet Valves to the connectors.
- ☒ Replace the seal wash peristaltic pump (if applicable).
- ☒ Power on the pump.
- ☒ Perform the seal wear-in procedure, for details see the respective manual.
- ☒ Replace the PTFE frit in the purge valve.
- ☒ Replace the seal cap in the purge valve.
- ☐ If seal wash option is installed, review the correct installation of seal wash function in non-recycle mode. Manually activate the seal wash and check if there is flow (if applicable).
- ☒ Perform Pump Leak Rate Test.
- ☐ Perform Pump Elasticity Calibration using the Calibration capillary assembly (G1312-67500).
- ☒ Reset EMF counters.

G7129A/B/C Vialsampler☐ **Section NOT Applicable**

- ☐ Replace the rotor seal.
- ☒ Replace the needle assembly.
- ☒ Replace the needle seat assembly.
- ☒ Replace the peristaltic pump cartridge of the needle wash.
- ☒ Replace the finger caps of the gripper arm.
- ☒ Replace the metering seal in the analytical head.
- ☒ Verify the proper installation of the sample loop and check if it gets blocked by the safety cover while the needle is moving to the seat.
- ☒ Verify the proper functioning of the needle wash function and the proper installation of the waste drainage tubings.
- ☒ Clean the exterior and interior of the Vialsampler, having special focus on the ventilation outlets and the transposition rods of the transport assembly.
- ☒ Clean the Integrated Column Compartment (ICC) (if applicable).
- ☐ Clean the Sample Cooler, especially the ventilation openings, and verify the proper installation and routing of the condensate drainage tubings (if applicable).
- ☐ Clean the Sample Thermostat, especially the ventilation openings, and verify the proper installation and routing of the condensate drainage tubings (if applicable).
- ☐ Replace the dust filter kit (if applicable).
- ☒ Purge the Vialsampler and, if installed, the ICC with isopropanol for 5 min after finishing the above maintenance steps.
- ☒ Perform System Pressure Test while port 6 of the injection valve is blocked with a blank nut.
- ☒ Reset EMF counters.

G7116A/B MCT☐ **Section NOT Applicable**

- ☐ Make a note of valve plumbing, column connections and locations as a reference for re-installation.
- ☐ Remove installed column(s).
- ☐ Disconnect capillaries from the valve head (if applicable).
- ☐ Replace the rotor seal of the installed valve (if applicable).
- ☐ Connect capillaries and Quick Connect Heat Exchanger(s), but do not connect the column(s) to the flow path (if applicable).
- ☐ Purge the system with HPLC grade isopropanol for 10 min.
- ☒ Perform System Pressure Test. If no valve is installed, install the blank nut in the outlet of the Quick Connect Heat Exchanger. If there is a valve installed, perform the test for any two valve positions using one of the appropriate connection schemes:
 - When a 2 position/6 port or 2 position/10 port Quick Change Valve Head is installed, use a blank nut to block the valve outlet.
 - When a 4-, 6-, or 8-column selector Quick Change Valve Head is installed, mount a ZDV union on the outlet capillary of the valve and block it with a blank nut.
- ☒ Perform Thermostat Test.
- ☐ Reset EMF counter (if applicable).

G7115A DAD WR, G7165A MWD

The maintenance procedure requires NO consumables.

☐ **Section NOT Applicable**

- ☒ Inspect flow cell for leaks.
- ☒ Perform Filter Test.
- ☒ Perform Dark Current Test.
- ☒ Perform Holmium Oxide Test.
- ☒ Perform Intensity Test.
- ☒ Perform Slit Test.
- ☒ Perform Wavelength Verification Test.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Make sure that the complete flow path is flushed with appropriate solvent after the service.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box. Systems in a compliant environment may need additional documentation.
- ☐ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.
- ☒ Complete Signature Page and attach Signature Page to Service Order.

Test Results

Pump Test Results Table

☐ Section NOT Applicable

Test Description	Expected Test Result	Actual Test Result
System Pressure Test	Pass	Pass
Pump Leak Rate Test	Pass	N/A
Pump Self Test (if applicable)	Pass	
Pump Elasticity Calibration (G71126) (if applicable)	Pass	N/A

G7129A/B/C Vialsampler Test Results Table

☐ Section NOT Applicable

Test Description	Expected Test Result	Actual Test Result
System Pressure Test	Pass	Pass

G7116A/B MCT Test Results Table

☐ Section NOT Applicable

Test Description	Expected Test Result	Actual Test Result
System Pressure Test	Pass	Pass
Thermostat Test	Pass	Pass

Detector Test Results Table

☐ Section NOT Applicable

Test Description	Product/Model # where used	Expected Test Result	Actual Test Result
Holmium Oxide Test	G7114A/B G7115A G7165A	Pass	Pass
Intensity Test	G7114A/B G7115A G7117A/B/C G7121A/B G7165A	Pass	Pass
Wavelength Verification/Calibration	G7114A/B G7115A G7117A/B/C G7165A	Pass	Pass
Wavelength Verification Excitation Dev.	G7121A/B	± 3 nm	N/A
Wavelength Verification Emission Dev.	G7121A/B	± 3 nm	N/A
Dark Current Test	G7114A/B G7115A G7117A/B/C G7165A	Pass	Pass
Slit Test	G7115A G7117B G7165A	Pass	Pass
Filter Test	G7114A/B G7115A G7165A	Pass	Pass

**G7110B Isocratic Pump, G7111A Quaternary Pump VL,
G7111B Quaternary Pump, G7112B Binary Pump,
G5654A Bio-inert Quaternary Pump Parts List Table**☐ Section NOT Applicable

Part Description	Product/Model # where used	Part Number	Quantity consumed or N/A
1260 Iso/Quat/1220 Pump PM kit includes seal cap assemblies, standard piston seals, film washers and PTFE frits (use this kit for reversed phase applications)	G7110B G7111A/B	G1310-68741	N/A
1260 Binary Pump PM kit includes seal cap assemblies, standard piston seals, film washers and PTFE frits (use this kit for reversed phase applications)	G7112B	G1312-68741	1
PM Kit for Bio-inert Quaternary Pump includes bio-inert piston seals, seal cap assemblies, film washers, bio-inert wash seals, PTFE frits and the peristaltic pump.	G5654A	G5611-68741	N/A
Seal Wash PM kit for 1260 Pumps includes film washers and standard wash seals.	G7110B G7111A/B G7112B	G1310-68742	N/A
Peristaltic pump with PharMed tubing	InfinityLab LC Series Pumps	5065-4445	N/A
PE seals (pack of 2)	InfinityLab LC Series Pumps	0905-1420	N/A
Wash Seal PE	InfinityLab LC Series Pumps	0905-1718	N/A

G7129A/B/C Vialsampler Parts List Table☐ Section NOT Applicable

Part Description	Product/Model # where used	Part Number	Quantity consumed or N/A
PM Kit 1290 Inf. II Vialsampler includes needle, seat assembly, peristaltic pump cartridge, rotor seal, metering seal (40 µL), and finger caps.	G7129B	G7129-68730	N/A
PM Kit 1260 Inf. II Vialsampler includes needle, seat assembly, peristaltic pump cartridge, rotor seal, metering seal (100 µL), and finger caps.	G7129A/C	G7129-68740	1
Needle assembly, 1260 Vialsampler	G7129A/C	G7129-87200	N/A
Needle assembly, 1290 Vialsampler	G7129B	G7129-87201	N/A
Needle assembly, slotted, for high injection volumes	G7129A	G7129-87202	N/A
Seat Assembly, 1260 Vialsampler, PEEK, 0.17 mm	G7129A/C	G7129-87017	N/A
Seat Assembly, 1290 Vialsampler, PEEK, 0.12 mm	G7129B	G7129-87012	N/A
Rotor Seal, PEEK, 600/800 bar	G7129A/C	0101-1416	N/A
Rotor Seal, Vespel, 1300 bar	G7129B	5068-0007	N/A
Peristaltic pump with PharMed tubing	InfinityLab LC Series Samplers	5065-4445	N/A
Metering Seal, 40 µL	G7129A G7129B G7129C	0905-1717	N/A
Metering Seal, 100 µL	G7129A/C G7129B	0905-1503	N/A
Metering Seal, 900 µL	G7129A	0905-1294	N/A
Dust filter kit	G7129A/B/C	5720-0026	N/A

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the service review or other items of interest for the customer, please write in this box.

Firmware was changed (Y/N):

Client was consulted and agreed prior to firmware change (Y/N):

Service Verification

Date of Service Completion:

07 Mar 2024

Total number of pages in this document:

Revision: C.04, Issued: 8-Feb-2024
Document Number: SD-29001763
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Agilent InfinityLab LC/MSD Series Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results. Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the installation.

Introduction

Customer Information

- 1 Customers should provide all necessary operating supplies upon request of the engineer.
- 2 A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- 3 Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- 4 If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about Agilent Technologies services, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- To access Agilent University, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful Agilent Resource Center web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>

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Document part number: 00005986
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- Need technical support, FAQs, supplies? – visit our *Support Home page* at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections:
Join the *Agilent Community* at <https://community.agilent.com/welcome>

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check "Section not applicable" check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page.
- Complete the total number of pages field in the Service Completion section.
- Ask the customer to sign the Service Completion section including the customer's and your signature.

Additional Instruction Notes

- Two PM's per year are recommended; the Major PM service will be performed annually with an Interim PM performed 6 months after the Major PM.
- This checklist documents the Major PM service for the Agilent InfinityLab LC/MSD Series Instruments.

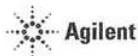
This checklist documents the Major PM service for the Agilent InfinityLab LC/MSD Series Instrument Maintenance

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

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Instrument System Name and ID	7070007
Instrument System Site and Location	Laboratory

List System Component Product Numbers	List the Serial Numbers of each Component
1. 641350	J91149117
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes.
- ☐ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Perform a dual polarity Autotune. If the Autotune does not complete successfully, do not proceed with the Preventive Maintenance Procedures before discussing the system with the customer.
- ☒ Record current vacuum readings:
Rough Vacuum: 5x10⁻⁶ Torr 2.0

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High Vacuum: 5x10⁻⁶

Main Preventive Maintenance Task Section #1 - General System Tasks

- ☐ Section not applicable.
- ☒ Vent the instrument and turn the front power switch off.
- ☒ Perform general system inspection:
- ☒ Inspect vacuum hoses pump exhaust tubing and power cords for excessive wear.
- ☒ Look for any obvious external damage or problems.
- ☒ Note any obvious external damage or problems in the Service Engineer Comments section.
- ☒ Verify system line voltage meets instrument specifications:
- ☒ Measured voltage (VAC):

Main PM Task Section #2 - Foreline Pump Service

- ☐ Section not applicable
- ☒ Drain and replace foreline pump oil:
- ☒ MSD with MS40+ - p/n 6040-1444 (AVF60M Oil)
- ☒ Replace on the Oil Mist Filter/Cartridge element
- ☒ MSD with MS40+ - p/n G1960-80039

Main PM Task Section #3 - LC/MS Instrument Service

- ☐ Section not applicable
- ☒ Replace the nitrogen gas filter(s):
- ☒ (1) RMSN-4 -MSD.
- ☐ (2) RMSN-4-MSD with AJS source.
- ☒ Replace the rotor seal on the MS Selection Valve, p/n 0101-1409

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- ☒ Remove the desolvation assembly and then remove the capillary from the desolvation assembly.
- ☒ Remove the ion optics assembly from the vacuum manifold. Disassemble and clean the ion optics assembly following the documented ion optics cleaning procedure.
- ☒ Remove the spray shield, end plate, and capillary cap from the desolvation assembly and clean all.
- ☒ Replace the 4 canted coil springs, p/n 1460-2571, in the end (exit) capillary cap, rear of the desolvation assembly, front of the desolvation assembly, and front (entrance) capillary cap.
- ☒ Clean the capillary following the documented procedure using Alconox in solution.
- ☒ Reinstall the spray shield, end plate, capillary and capillary cap.
- ☒ Reinstall the ion optics and desolvation assembly.
- ☒ Inspect the quad driver fan filter condition and replace.
- ☒ Pump the system down.

Main PM Task Section #4 - Ionization Sources

Notes: Perform source maintenance on currently installed source ONLY!!!

G1948B API-Electrospray Source

- ☐ Section not applicable
- ☒ Perform general inspection of the API-Electrospray source:
- ☒ Inspect Standoffs for chemical deposits or physical damage.
- ☒ Inspect nebulizer and needle for physical damage (dents or corrosion).
- Note any obvious external damage or problems in the Service Engineer Comments section.
- ☒ Remove the mesh assembly and clean it with an abrasive cloth, followed by wiping with a lint-free cloth and methanol. Clean the standoffs with a lint-free cloth and methanol.
- ☒ Clean all other interior surfaces of the spray chamber, including the window, with a lint-free cloth and methanol.
- ☒ Reinstall the mesh assembly.
- ☒ Replace and properly adjust the nebulizer needle, p/n G1958-60137
- ☒ Reinstall the spray chamber on the MSD.

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G1947B Atmospheric Pressure Chemical Ionization (APCI) Source

☐ Section not applicable☒ Perform general inspection of the APCI source:

- ☒ Inspect corona needle holder for oxidation or physical damage.
- ☒ Inspect needle receptacle for oxidation or physical damage.
- ☒ Inspect nebulizer and needle for physical damage (dents or corrosion).

Note any obvious external damage or problems in the Service Engineer Comments section.

- ☒ Using the abrasive cloth, abrasively clean the bottom of the vaporizer heater can, and then wipe with a lint-free cloth and methanol.
- ☒ Clean all other interior surfaces of the spray chamber, including the window, with a lint-free cloth and methanol.
- ☒ Replace the APCI corona needle, p/n G1947-20029.
- ☒ Replace and properly adjust the nebulizer needle, p/n G1946-68704.
- ☒ Install the spray chamber on the MSD.

G1971C Atmospheric Pressure Photo Ionization (APPI) Source

☒ Section not applicable☐ Perform general inspection of the APPI source:

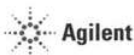
- ☐ Inspect nebulizer and needle for physical damage (dents or corrosion).

Note any obvious external damage or problems in the Service Engineer Comments section.

- ☐ Allow the source to cool completely.
- ☐ Using the abrasive cloth, abrasively clean the bottom of the vaporizer heater can, and then wipe with a lint-free cloth and methanol.
- ☐ Clean all other interior surfaces of the spray chamber with a lint-free cloth and methanol.
- ☐ Clean the lamp window with a lint-free cloth and methanol.
- ☐ Replace and properly adjust the nebulizer needle, p/n G1946-68704.
- ☐ Install the spray chamber on the MSD.
- ☐ Check that the lamp lights.

Note: Replacement of the APPI lamp is not covered during the PM procedure.Revision A1.2, Issued Dec 15, 2020
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G1978B MultiMode (MM) Source

☒ Section not applicable☐ Perform general inspection of the MM source:

- ☐ Inspect corona needle holder for oxidation or physical damage.
- ☐ Inspect needle receptacle for oxidation or physical damage.
- ☐ Inspect nebulizer and needle for physical damage (dents or corrosion).

Note any obvious external damage or problems in the Service Engineer Comments section.

- ☐ Clean all other interior surfaces of the spray chamber with a lint-free cloth and methanol.
- ☐ Replace the corona needle, p/n G1947-20029.
- ☐ Replace and properly adjust the nebulizer needle, p/n G1958-60137.
- ☐ Install the spray chamber on the MSD.

G1958B Agilent Jet Stream Technology (AJS)

☒ Section not applicable

- ☐ Perform general inspection of the API-Electrospray with Agilent Jet Stream Technology.
- ☐ Inspect nebulizer and needle for physical damage (dents or corrosion).

Note any obvious external damage or problems in the Service Engineer Comments section.

- ☐ Clean all other interior surfaces of the spray chamber with a lint-free cloth and methanol.
- ☐ Replace and properly adjust the nebulizer needle, p/n G1958-60137.
- ☐ Install the spray chamber on the MSD.

Restore Instrument

☒ Verify that the system is pumped down.☒ Record current vacuum readings:Rough Vacuum: 2.04
High Vacuum: 6x10⁻⁶Revision A1.2, Issued Dec 15, 2020
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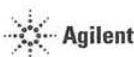
☒ Verify that all temperature, pressures, and gas flows reach tune file set points.☒ Check manually that there are tune peaks in positive and negative mode.☒ Generate tune reports in positive and negative mode. The purpose of generating tune reports after preventive maintenance is to verify that the system is functional in positive and negative modes. Autotune should NOT be performed at this time.☒ An Autotune should be run by the customer after the system has been allowed to thermally equilibrate for at least 11 hours following a system vent. During this time, it is not unusual for the instrument to exhibit mass assignment shifts, poor peak shapes and/or poor resolution.

Guidance:

If the PM service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

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Signature Page

Service Review

- ☐ Attach available reports/printouts of all tests to this documentation.
- ☐ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☐ Update/reset instrument maintenance counters as appropriate.
- ☐ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☐ Complete the Service Engineer Comments section if there are additional comments.
- ☐ Review this service, parts replaced, and test results obtained with the customer.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.

InfinityLab LC/MSD Series Test Results Table

Test Description	Expected Test Result	Actual Test Result
Manual Tune Peaks - Positive Ionization Mode	Peaks Present	Peak Present
Manual Tune Peaks - Negative Ionization Mode	Peaks Present	Peak Present

InfinityLab LC/MSD Series Parts List Table Consumed Parts

Part Description	Part Number	Product or Model# where used	Quantity consumed
AVF60M Oil	6040-1444	InfinityLab LC/MSD Series-	N/A
Cartridge Filter Element	G1960-80039	LC/MSD Series- Agilent MS40+ equipped	N/A
LC/MS PM Kit - with MS40+	S190-9007	InfinityLab LC/MSD Series-	1
Nitrogen Gas Filter (Universal trap)	RMSN-4	InfinityLab LC/MS	N/A
Coiled coil spring qty 4	G2571-67001	InfinityLab LC/MSD Series-	N/A
Rotor seal, 3 Grooves, Max 600 bar	0101-1409	InfinityLab LC/MSD Series-	N/A
Quad Driver Fan Filter	3160-4235	InfinityLab LC/MSD Series-	N/A
Nitrogen Gas Filter, (2 required for AJS)	RMSN-4	LC/MSD XT	(2/1)

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Part Description	Part Number	Product or Model# where used	Quantity consumed
systems)			1/1
Nebulizer Needle Kit, ES	G1958-60137	G1948B, G1978B, G1958B	1/1
Nebulizer Needle Kit, APCI	G1946-68704	G1947B, G1971B	1/1
Corona Needle, APCI	G1947-20029	G1947B, G1978B	1/1
The following required parts are supplied with the instrument in the shipping kit:			
Abrasive cloth, 4000 grit	8660-0827	InfinityLab LC/MSD Series N/A	1/1
Lint-free cloth, 1 pack	05980-60051	InfinityLab LC/MSD Series N/A	1/1
Cotton swabs, 1 pack	5080-5400	InfinityLab LC/MSD Series N/A	1/1
Alconox	5190-1401	InfinityLab LC/MSD Series N/A	1/1

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

Service Completion

Service request number

Date service completed 07 Dec 2020

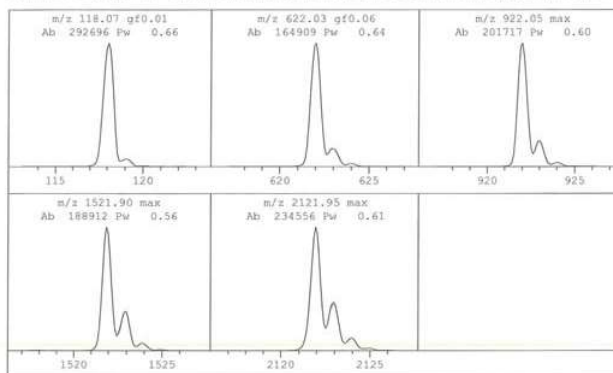
Agilent signature

Customer signature

Total number of pages in this document 11

2020 PM

MSD Check Tune G6135B: API_ES Positive Mode - Standard Scan
Instrument : LC/MSD, 2020007 Rev. C.01.10 [287]
02-May-24 10:06:22 AM C:\Users\Public\Documents\ChemStation\1\MS\tune\6135B\TUN\ATUNES.TUN

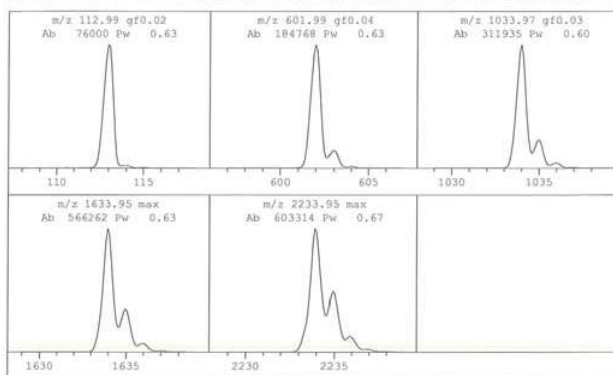


Mass Axis Calibration				Resolution Setting		Signal Intensity	
Target	Tune	P/F	Target	Peak	P/F		Signal
Mass	Mass						
118.08	118.07	pass	1	0.65	0.66	pass	308288
622.03	622.02	pass	1	0.65	0.64	pass	169770
922.01	922.05	pass	1	0.65	0.59	pass	199146
1521.97	1521.90	pass	1	0.65	0.57	pass	189440
2121.93	2121.95	pass	1	0.71	0.61	pass	217813

Results Summary		
Allowed Diff.	Mass Axis	Peak Width
Actual Diff.	<=0.13 amu	<=0.1 amu
Mass 1	pass	pass
Mass 2	pass	pass
Mass 3	pass	pass
Mass 4	pass	pass
Mass 5	pass	pass

Before PM

M05 Check Tune G6135B: API_ES Negative Mode - Standard Scan
Instrument : LCH00 2020007 Rev. C.01.10 [287]
02-May-24 10:08:36 AM C:\Users\Public\Documents\ChemStation\1\MStune\6135B\TUNES.TUN



Mass Axis Calibration				Resolution Setting		Signal Intensity	
Target	Tune	P/F	(Target	Peak	P/F	Signal	
Mass	Mass			Width			
112.99	113.00	pass	0.65	0.62	pass	76554	
601.99	601.99	pass	0.65	0.63	pass	188757	
1033.99	1033.97	pass	0.65	0.60	pass	317034	
1633.95	1633.95	pass	0.65	0.63	pass	559978	
2233.91	2233.95	pass	0.74	0.68	pass	599658	

Results Summary

Allowed Diff.	Mass Axis	Peak Width
Actual Diff.	<=0.13 amu	<=0.1 amu
Mass 1	pass	pass
Mass 2	pass	pass
Mass 3	pass	pass
Mass 4	pass	pass
Mass 5	pass	pass

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Lab Advisor Diagnostic Result

LC1260

G7112B

System Pressure Test

Passed

DEAE901250
D.07.30[0005]
1260 Bin Pump

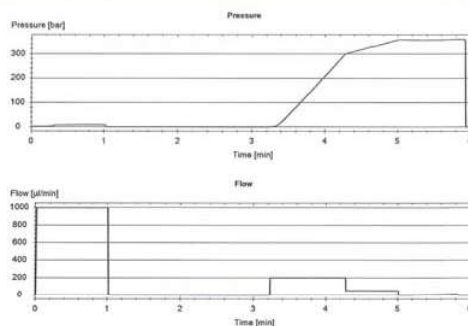
The test determines the leak tightness of the system between pump and blank nut.
Mandatory for G7167A/B Multisamplers: use 'Blank nut, long' (part number 5067-6127).

Started at 02-May-24 12:08:05 PM by DESKTOP-DCCT8QF\ladmin on DESKTOP-DCCT8QF using Agilent Lab Advisor - Version 2.15.386 - Basic

Item	Value	Result
Maximum system pressure	400 bar	Done
Selected sampler	G7129A/DEAEQ38397	Done
Selected sampler flow path	Mainpass	Done
Blank nut location	Sampler outlet	Done
Purge Channel A1	Done	Done
Remaining purge time	0 min 0 sec of total 1 min	Done
Resulting flow value	4.42 µl/min	
System leak	5 µl/min	Passed

Finished at 02-May-24 12:14:26 PM

Signals



Signature: _____

LC1260

Pump Leak Rate Test

Failed

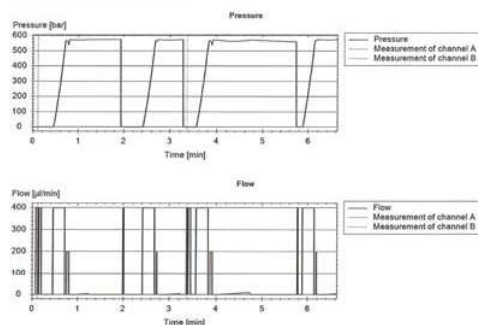
The test determines the leak rates in the primary and the secondary pump chambers for component level diagnostic.

Started at 02-May-24 3:27:12 PM by DESKTOP-DCCT8QF\admin on DESKTOP-DCCT8QF using Agilent Lab Advisor - Version 2.15.386 - Basic

Item	Value	Result
Maximum system pressure	600 bar	Done
Channel A primary leak	1.73 $\mu\text{l/min}$	Passed
Leak rate limit	3 $\mu\text{l/min}$	
Channel A secondary leak	1.68 $\mu\text{l/min}$	Passed
Leak rate limit	3 $\mu\text{l/min}$	
Channel B primary leak	4.80 $\mu\text{l/min}$	Failed
Leak rate limit	3 $\mu\text{l/min}$	
Channel B secondary leak	1.44 $\mu\text{l/min}$	Passed
Leak rate limit	3 $\mu\text{l/min}$	

Finished at 02-May-24 3:34:41 PM

Signals



Signature: _____

Agilent Technologies

Printed at: 02-May-24 3:34:49 PM

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LC1260

Thermostat Test

Passed

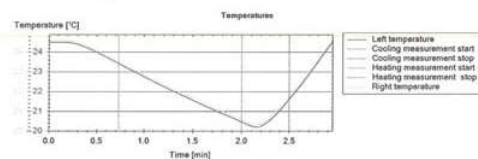
Evaluates the cooling and heating performance of the two peltier elements

Started at 02-May-24 12:15:03 PM by DESKTOP-DCCT8QFadmin on DESKTOP-DCCT8QF using Agilent Lab Advisor - Version 2.15.386 - Basic

Item	Value	Result
Start temperature left	24.516	Done
Start temperature right	24.592	Done
Cool rate of left heat exchanger	2.35	Passed
Cool rate of right heat exchanger	2.33	Passed
Heat rate of left heat exchanger	6.49	Passed
Heat rate of right heat exchanger	6.43	Passed

Finished at 02-May-24 12:18:02 PM

Signals



Limits

Name	Limit
Minimum heating rate	3 °C/min
Minimum cooling rate	1.3 °C/min

Signature:

Agilent Technologies

Printed at: 02-May-24 3:36:06 PM

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DEAC613173
D.07.30(0005)
1260 DAD WR

This procedure performs a wavelength verification.

Started at 02-May-24 12:37:46 PM by TH-HPLC23admin on TH-HPLC23 using Agilent Lab Advisor - Version 2.15.386 - Advanced

Results	Item	Value	Result
	Accumulated UV Lamp On-Time	1831.75 h	Done
	UV Lamp On-Time	0.52 h	
	Minimum Lamp On-Time	0.17 h	Passed
	D2 Alpha Line Deviation	-0.083 nm	
	Wt. Calibration Limit for Alpha Line	-0.5 ... 0.5 nm	Passed
	D2 Beta Line Deviation	-0.072 nm	
	Wt. Calibration Limit for Beta Line	-0.5 ... 0.5 nm	Passed

Finished at 02-May-24 12:38:15 PM

Signature: 

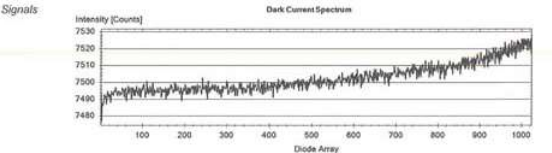
DEAC613173
D.07.30(0005)
1260 DAD WR

The test measures the dark current from the detector optic.

Started at 02-May-24 12:35:33 PM by TH-HPLC23admin on TH-HPLC23 using Agilent Lab Advisor - Version 2.15.386 - Advanced

Results	Item	Value	Result
	Dark Current Minimum	7477 Counts	
	Dark Current Range	1 ... 12000 Counts	Passed
	Dark Current Average	7502 Counts	Done
	Dark Current Maximum	7529 Counts	
	Dark Current Range	1 ... 12000 Counts	Passed

Finished at 02-May-24 12:35:53 PM



Signature: 

Lab Advisor Diagnostic Result

LC1260

G7115A

Filter Test

Passed

DEAC613173
D.07.30(0005)
1260 DAD WR

The test moves the filter into the light path and measures the relative absorbance in the filter position.

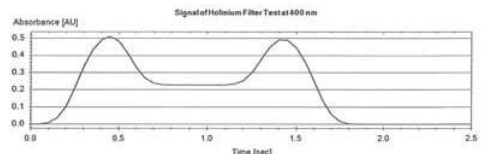
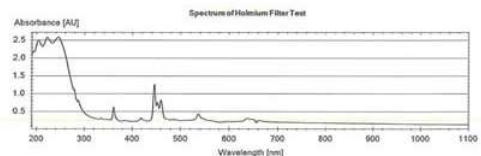
Started at 02-May-24 12:34:09 PM by TH-HPLC23admin on TH-HPLC23 using Agilent Lab Advisor - Version 2.15.386 - Advanced

Results

Item	Value	Result
Holmium Filter Absorbance at 400 nm	0.23 AU	
Filter Test Limit	0.005 ... 0.5 AU	Passed

Finished at 02-May-24 12:34:54 PM

Signals



Signature: _____

Lab Advisor Diagnostic Result

LC1260

G7115A

Holmium Oxide Test

Passed

DEAC613173
D.07.30(0005)
1260 DAD WR

The test measures the Holmium spectrum from the built-in Holmium filter. The spectrum is evaluated for peaks at different wavelengths.

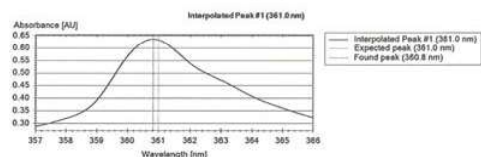
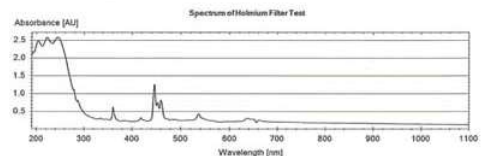
Started at 02-May-24 12:31:08 PM by TH-HPLC23admin on TH-HPLC23 using Agilent Lab Advisor - Version 2.15.386 - Advanced

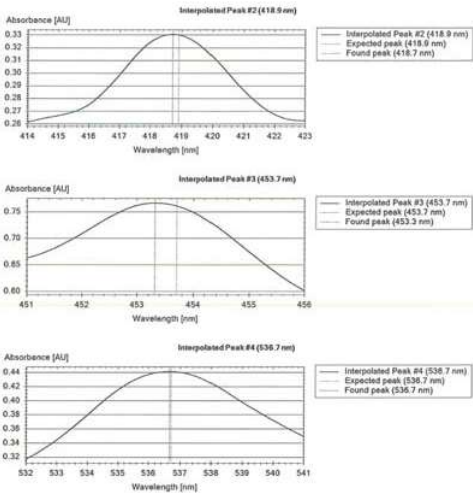
Results

Item	Value	Result
Accumulated UV Lamp On-Time	1831.64 h	Done
UV Lamp On-Time	0.41 h	Done
Accumulated Vis Lamp On-Time	934.94 h	Done
Vis Lamp On-Time	0.41 h	Done
Holmium Deviation to 361.0 nm	-0.17 nm	
Holmium Deviation Limit	-1 ... 1 nm	Passed
Holmium Deviation to 418.9 nm	-0.20 nm	
Holmium Deviation Limit	-1 ... 1 nm	Passed
Holmium Deviation to 453.7 nm	-0.38 nm	
Holmium Deviation Limit	-1 ... 1 nm	Passed
Holmium Deviation to 536.7 nm	-0.05 nm	
Holmium Deviation Limit	-1 ... 1 nm	Passed

Finished at 02-May-24 12:31:49 PM

Signals





Signature: _____

G7115A

Intensity Test

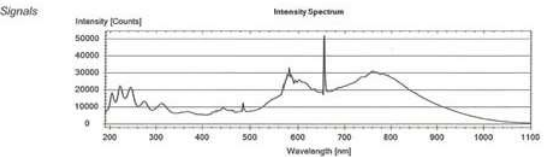
Passed

The test scans the Intensity spectrum generated by the UV and VIS Lamp.

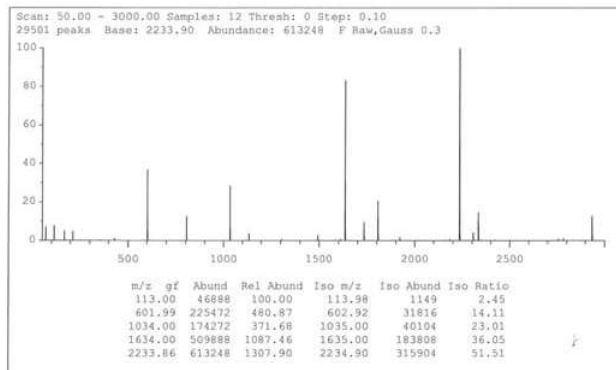
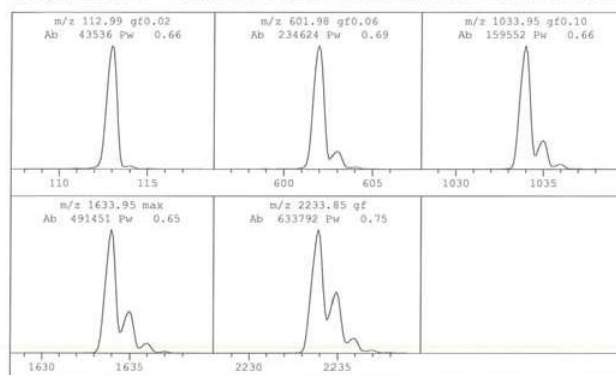
Started at 02-May-24 12:30:29 PM by TH-HPLC23admin on TH-HPLC23 using Agilent Lab Advisor - Version 2.15.386 - Advanced

Item	Value	Result
Accumulated UV Lamp On-Time	1831.63 h	Done
UV Lamp On-Time	0.40 h	Done
Accumulated Vis Lamp On-Time	934.93 h	Done
Vis Lamp On-Time	0.40 h	Done
Lowest Intensity in Range 190 - 220 nm	6696 Counts	
Lowest Intensity in Range 190 - 220 nm	2000 Counts	Passed
Lowest Intensity in Range 221 - 350 nm	6380 Counts	
Lowest Intensity in Range 221 - 350 nm	5000 Counts	Passed
Lowest Intensity in Range 351 - 500 nm	5305 Counts	
Lowest Intensity in Range 351 - 500 nm	2000 Counts	Passed
Lowest Intensity in Range 501 - 950 nm	6633 Counts	
Lowest Intensity in Range 501 - 950 nm	2000 Counts	Passed
Spectrum Integral	12402148	
UV Integral (190 - 349 nm)	1969646	Done

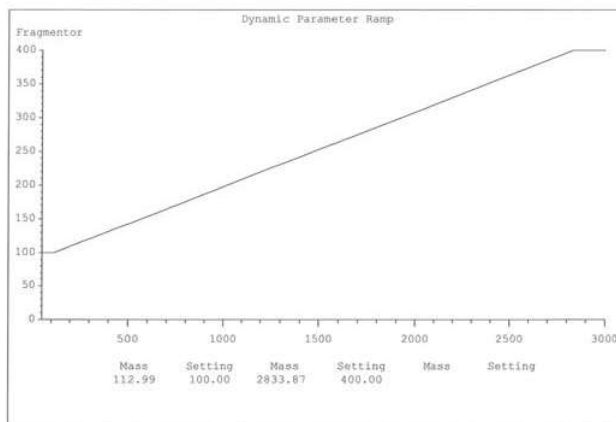
Finished at 02-May-24 12:31:02 PM

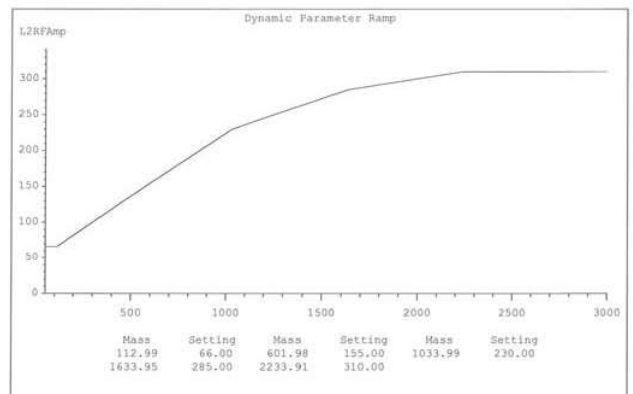
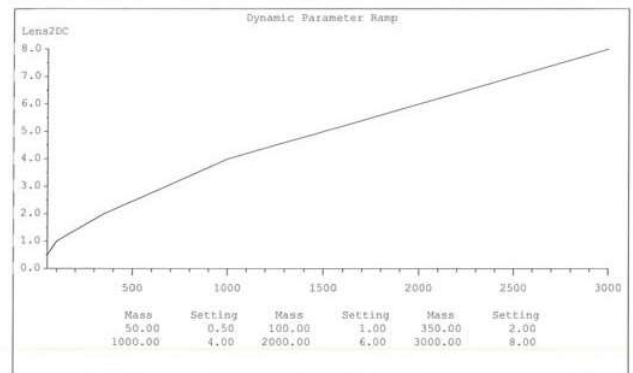
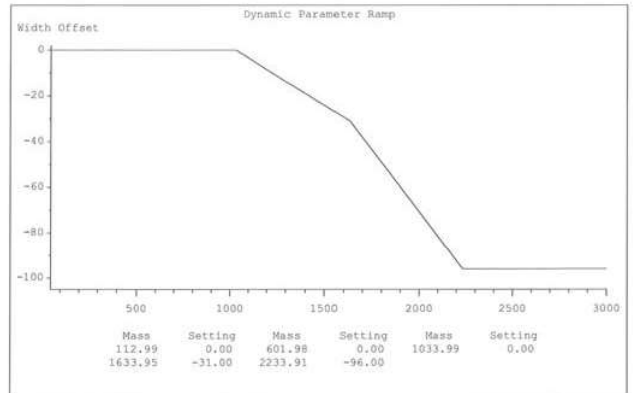
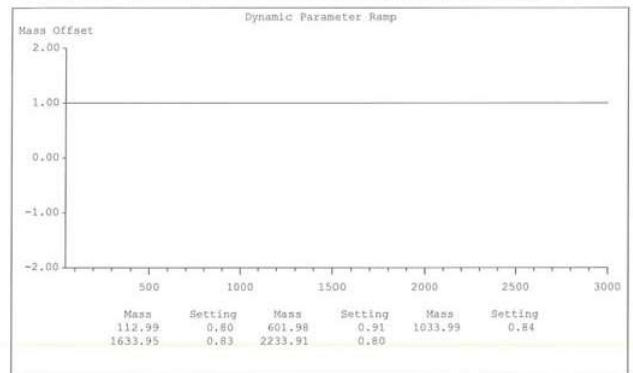


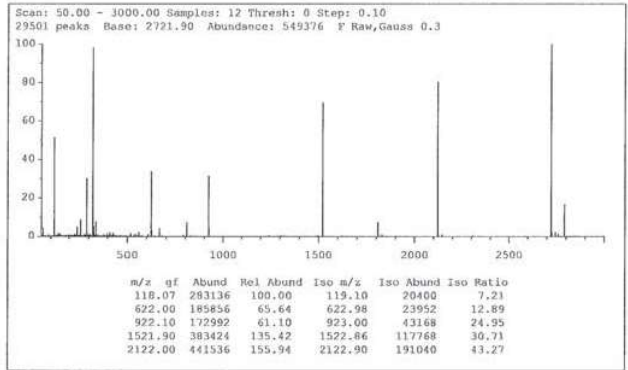
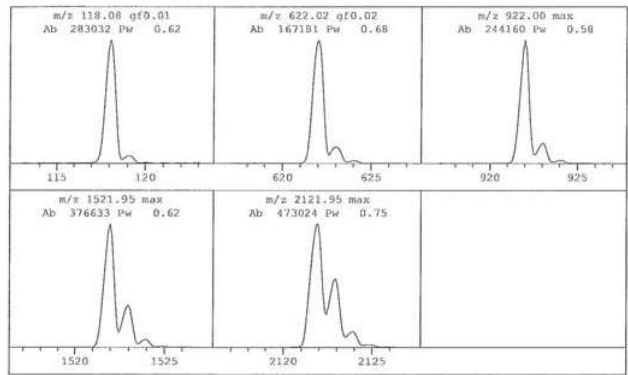
Signature: _____



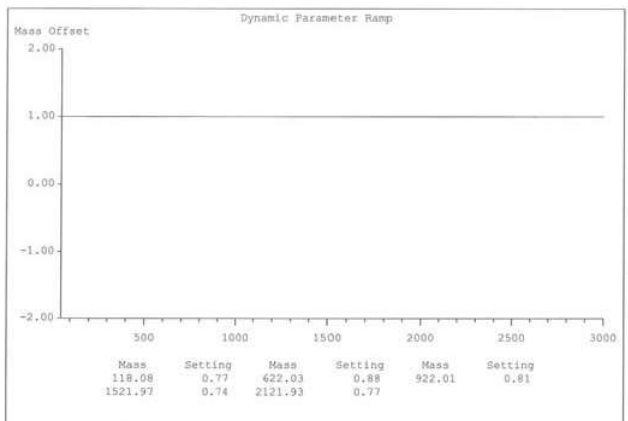
Mode:API-ES		Polarity: NEG	
Fragment	VAR	WidthGain	-433
Skim1	35	WidthOffs	VAR
Len1	-2.8	MassGain	-13.60
Len2DC	VAR	MassOffs	VAR
L2RFEn	1		
L2RFPh	162	Energy	5.0
L2RFamp	VAR	OpolPeak	650
Iris	400		
Gain	1.00	QuadDC	0.00
ENV	2069	Samples	12
VCap	4000	Averages	1
		StepSize	0.10
StepSize	0.10		
ChamCur	0.99	DryingGas	7.0
		Gas Temp	300
Quad Temp	100	Neb Pres	15
RoughVac	1.65	HighVac	4.4e-6

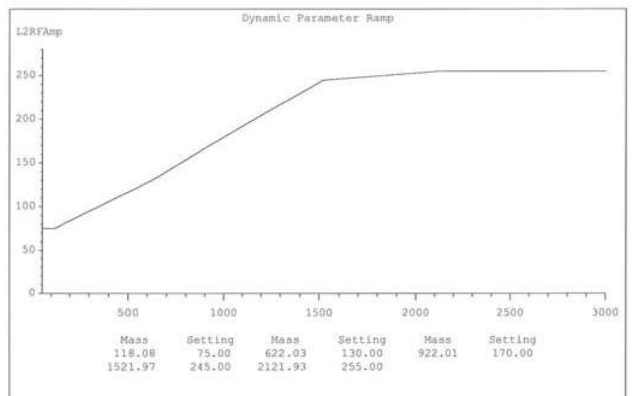
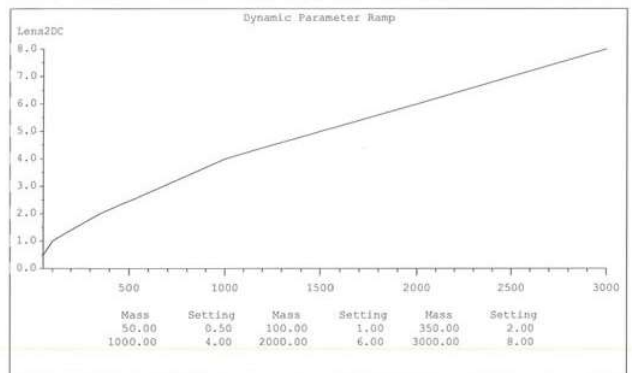
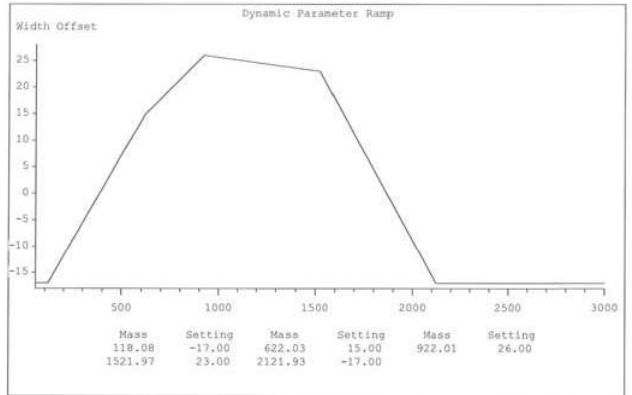
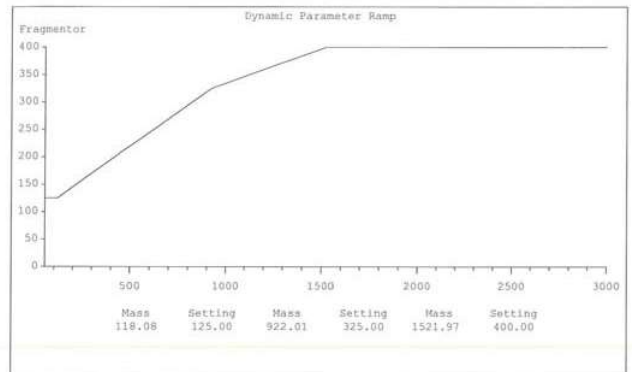






Mode:	API-ES	Polarity:	POS
Fragment	VAR	WidthGain	-437
Skim1	35	WidthOffs	VAR
Lens1	2.8	MassGain	-13.60
Lens2DC	VAR	MassOffs	VAR
L2RFEn	1		
L2RFTh	180	Energy	5.0
L2RFamp	VAR	OpolPeak	650
Iris	-400		
Gain	1.00	QuadDC	0.00
EMV	2250	Samples	12
VCap	4000	Averages	1
		StepSize	0.10
StepSize	0.10		
		DryingGas	7.0
ChamCur	0.78	Gas Temp	300
Quad Temp	100	Neb Pres	15
RoughVac	1.65	HighVac	4.6e-6





G7115A

Slit Test

Passed

DEAC613173

D:07.30[0005]

1260 DAD WR

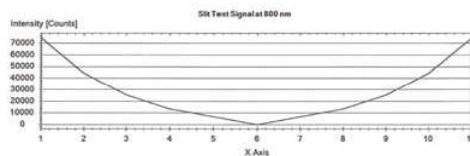
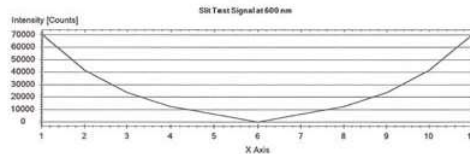
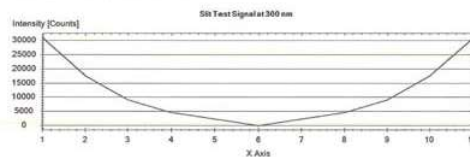
The slit test verifies correct operation of the micromechanical slit.

Started at 02-May-24 12:37:02 PM by TH-HPLC23\admin on TH-HPLC23 using Agilent Lab Advisor - Version 2.15.386 - Advanced

Results	Item	Value	Result
	Slit Test Result	0.91	
	Slit Test Limit	0.7 ... 1.3	Passed

Finished at 02-May-24 12:37:38 PM

Signals



Signature:



Cert.No.: 23CHO566
Page: 1 of 3

Certificate of Calibration

Equipment : Spectrophotometer
Manufacturer : Hach
Model : DR5000
Serial No. : 1215327
ID No. : S2020021
Condition As-Received: Used Item
Received Date : 21 September 2023
Calibration Date : 22 September 2023
Reference : 2309-0483OC-3
Submitted by : SGS (Thailand) Limited
1/209, 1/211 Moo 1, Ban Chang,
Ban Chang, Rayong 21130
Calibration Place : Hot Room
Ambient Temperature : (23.5 - 23.9) °C (On-Site)
Relative Humidity : (59.1 - 65.2) % (On-Site)
Calibration Procedure : In - house method :
CP-0CH4 based on ASTM E 275-01
Calibrated by :
Approved by :
Issue Date : 27 September 2023

The Uncertainties are for a confidence probability of approximately 95%

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

A 0058781



Cert. No. : 23CHO566
Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

Material	Serial No.	Certificate No.	Due date
1. Absorbance Standard set	39130	106269	10 Oct 2024
2. Wavelength Standard set	36730	98330	19 Jan 2024
3. Wavelength Standard set	36730	98331	19 Jan 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 maintained through :
- Starna Scientific Ltd.

4. Spectral BandWidth : 2 nm
Scan Speed : - nm/min

Calibration Results : without adjustment

Wavelength Accuracy

Certified Values of Reference Material (nm)	UUC Reading (nm)	Uncertainty of Measurement (± nm)	Coverage Factor k
418.61	417.9	0.13	2.00
513.41	512.9	0.14	2.00
536.66	536.2	0.13	2.00
637.98	637.5	0.14	2.00
879.27	878.6	0.13	2.00

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Cert. No. : 23CHO566
Page : 3 of 3

Calibration Results : without adjustment

Photometric Accuracy

Wavelength (nm)	Certified Values of Reference Material (Abs)	UUC Reading (Abs)	Uncertainty of Measurement (± Abs)	Coverage Factor k
440.0	Zero	0.000	0.0028	2.00
	0.5645	0.565	0.0028	2.00
	0.6988	0.701	0.0028	2.00
	1.0017	1.006	0.0028	2.00
546.1	Zero	0.000	0.0028	2.00
	0.5281	0.528	0.0028	2.00
	0.6962	0.699	0.0028	2.00
	0.9984	1.002	0.0028	2.00
635.0	Zero	0.000	0.0028	2.00
	0.5699	0.571	0.0028	2.00
	0.7606	0.764	0.0028	2.00
	1.0927	1.098	0.0028	2.00

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer

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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