Appendix F Water Quality Equipment Calibration Certificate



ALS Technichem (HK) Pty Ltd 11/F, Chung Shun Knitting Centre 1-3 Wing Yip Street, Kwai Chung N.T., Hong Kong T: +852 2610 1044 | F: +852 2610 2021

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: CLIENT:	MR NELSON TSUI ACUITY SUSTAINABILITY CONSULTING LIMITED	WORK ORDER:	HK1917914
ADDRESS:	1908, IPLACE,	SUB-BATCH:	0
	NOS. 301-305 CASTLE PEAK ROAD,	LABORATORY:	HONG KONG
	KWAI CHUNG, NEW TERRITORIES,	DATE RECEIVED:	30-Apr-2019
	HONG KONG	DATE OF ISSUE:	09-May-2019

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principle as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test: Dissolved Oxygen, pH Value, Turbidity, Salinity, Redox Potential and Temperature

Multifunctional Meter
HORIBA
U-5000 Multiparameter Water Quality Meter
BGYP9CKD
09-May-2019

<u>NOTES</u>

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Ma Si

Mr Chan Siu Ming, Vico Manager - Inorganic

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WORK ORDER:	HK1917914			ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 09-May-2019 ACUITY SUSTAINABILITY CONS	ULTING LIMITED		
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter HORIBA U-5000 Multiparameter Water BGYP9CKD 09-May-2019	Quality Meter Date of Next Calibration:	09-Aug-2019	

PARAMETERS:

Dissolved Oxygen

ygen Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
8.10	8.11	+0.01
5.57	5.42	-0.15
3.15	3.06	-0.09
	Tolerance Limit (mg/L)	±0.20

pH Value

Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.94	-0.06
7.0	7.06	+0.06
10.0	9.87	-0.13
	Tolerance Limit (pH unit)	±0.20

Ma Sing

Mr Chan Siu Ming, Vico Manager - Inorganic

WORK ORDER:	HK1917914			ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 09-May-2019 ACUITY SUSTAINABILITY CONS	SULTING LIMITED		
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter HORIBA U-5000 Multiparameter Water BGYP9CKD 09-May-2019	[•] Quality Meter Date of Next Calibration:	09-Aug-2019	

PARAMETERS:

Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)	
0	0.33		
4	4.21	+5.3	
40	42.3	+5.7	
80	81.3	+1.6	
400	402	+0.5	
800	845	+5.6	
	Tolerance Limit (%)	±10.0	
	()		

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.0	
10	9.8	-2.0
20	19.7	-1.5
30	29.9	-0.3
	Tolerance Limit (%)	±10.0

Ma Li

Mr Chan Siu Ming, Vico Manager - Inorganic

WORK ORDER:	HK1917914			ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 09-May-2019 ACUITY SUSTAINABILITY	CONSULTING LIMITED		
Equipment Type: Brand Name: Model No.: Serial No.:	Multifunctional Meter HORIBA U-5000 Multiparameter	Water Quality Meter		
Equipment No.: Date of Calibration:	BGYP9CKD 09-May-2019	Date of Next Calibration:	09-Aug-2019	
PARAMETERS.				

PARAMETERS:

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical

Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (^o C)
9.5	10.11	+0.6
19.0	19.45	+ O. 4
38.5	39.05	+0.5
	Tolerance Limit (°C)	±2.0

Ma Sin

Mr Chan Siu Ming, Vico Manager - Inorganic

WORK ORDER:	HK1917914		ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 09-May-2019 ACUITY SUSTAINABILITY CONSL	JLTING LIMITED	
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter HORIBA U-5000 Multiparameter Water Quality Meter BGYP9CKD : 09-May-2019 Date of Next Calibration: 09-Aug-2019		09-Aug-2019
PARAMETERS:	-		-
Redox Potential	Method Ref: APHA (21st edition),	2580B	
	Method Ref: Orion Research Inst	ruction Manual and the Laboratory	y Manual
	the Environmental of Water, Was	tewater and Soil (2nd edition), Rui	mp & Krist (1992)
	Expected Reading (mV)	Displayed Reading (mV)	Difference of A and B (mV)
	Solution A (~234mV)	68	
	Solution B (~300mV)	115	+47.0
		Tolerance Limit (mV)	>66

Ma Sig

Mr Chan Siu Ming, Vico Manager - Inorganic



ALS Technichem (HK) Pty Ltd 11/F, Chung Shun Knitting Centre 1-3 Wing Yip Street, Kwai Chung N.T., Hong Kong T: +852 2610 1044 | F: +852 2610 2021

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT: CLIENT:	MR NELSON TSUI	WORK ORDER:	HK1913288
	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	1908, IPLACE, NOS. 301-305 CASTLE PEAK ROAD, KWAI CHUNG, NEW TERRITORIES, HONG KONG	SUB-BATCH: LABORATORY: DATE RECEIVED: DATE OF ISSUE:	0 HONG KONG 29-Mar-2019 24-Apr-2019

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test:	Dissolved Oxygen, pH Value, Turbidity, Salinity and Temperature
Equipment Type: Brand Name:	Multifunctional Meter YSI
Model No.:	Professional DSS
Serial No.:	
Equipment No.:	15M101091
Date of Calibration:	29-Mar-2019, 11-Apr-2019 and 18-Apr-2019

NOTES

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Cha Ai

Mr Chan Siu Ming, Vico Manager - Inorganic

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WORK ORDER:	HK1913288			ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 24-Apr-2019 ACUITY SUSTAINABILITY CONS	SULTING LIMITED		
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter YSI Professional DSS 15M101091 29-Mar-2019	Date of Next Calibration:	29-Jun-2019	

PARAMETERS:

Dissolved Oxygen Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.85	2.74	-0.11
5.99	5.99	+0.00
8.54	8.50	-0.04
	Tolerance Limit (mg/L)	±0.20

Salinity

Method Ref: APHA (21st edition), 2520B

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	
10	9.94	-0.6
20	19.84	-0.8
30	29.70	-1.0
	Tolerance Limit (%)	±10.0

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical

Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.				
Expected Reading (°C)	xpected Reading (°C) Displayed Reading (°C) Tolerance (°C)			
9.0	10.4	+ 1.4		
23.0	22.5	-0.5		
40.0	38.0	-2.0		
Tolerance Limit (°C) ±2.0				

Ma Ain

Mr Chan Siu Ming, Vico Manager - Inorganic

REPORT OF EQUIPMENT CALIBRATION

WORK ORDER:	HK1913288			ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 24-Apr-2019 ACUITY SUSTAINABILITY CON	SULTING LIMITED		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter YSI Professional DSS 15M101091 11-Apr-2019	Date of Next Calibration:	29-Jun-2019	
PARAMETERS: Turbidity	Method Ref: APHA (21st edition	n), 2130B		

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.03	
4	3.78	-5.5
40	39.77	-0.6
80	79.08	-1.2
400	412.13	+3.0
800	842.98	+5.4
	Tolerance Limit (%)	±10.0

Remark: "Displayed Reading" presents the figures shown on item under calibration / checking regardless of equipment precision or significant figures.

Ma Sin

Mr Chan Siu Ming, Vico Manager - Inorganic

WORK ORDER:	HK1913288		ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 24-Apr-2019 ACUITY SUSTAINABILITY CONSI	JLTING LIMITED	
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter YSI Professional DSS 15M101091 18 April, 2019	Date of Next Calibration:	29-Jun-2019
PARAMETERS: pH Value	Method Ref: APHA (21st edition)	, 4500H:B	
	Expected Reading (pH unit)		Tolerance (pH unit)

Expected Reading (pH unit)	ted Reading (pH unit) Displayed Reading (pH unit)	
4.0	3.98	-0.02
7.0	7.03	+0.03
10.0	9.99	-0.01
	Tolerance Limit (pH unit)	±0.20

Ma Alin

Mr Chan Siu Ming, Vico Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK

WORK ORDER:	HK1913288
SUB-BATCH:	0
DATE OF ISSUE:	24-Apr-2019
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED
Equipment Type:	Multifunctional Meter
Brand Name:	YSI
Model No.:	Professional DSS
Serial No.:	
Equipment No.:	15M101091
Date of Calibration:	29-Mar-2019

PARAMETERS: Turbidity

Method Ref: APHA (21st edition), 2130B

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	-0.54	
4	4.24	+6.0
40	43.30	+8.2
80	87.60	+9.5
400	372.26	-6.9
800	562.73	-29.7
	Tolerance Limit (%)	±10.0

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ALS Technichem (HK) Pty Ltd 11/F, Chung Shun Knitting Centre 1-3 Wing Yip Street, Kwai Chung N.T., Hong Kong T: +852 2610 1044 | F: +852 2610 2021

REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR NELSON TSUI	WORK ORDER:	HK1923178
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED		
ADDRESS:	1908, IPLACE, NOS. 301-305 CASTLE PEAK ROAD, KWAI CHUNG, NEW TERRITORIES, HONG KONG	SUB-BATCH: LABORATORY: DATE RECEIVED: DATE OF ISSUE:	0 HONG KONG 05-Jun-2019 21-Jun-2019

COMMENTS

The performance of the equipment stated in this report is checked with independent reference material and results compared against a calibrated secondary source.

The "Tolerance Limit" quoted is the acceptance criteria applicable for similar equipment used by the ALS Hong Kong laboratory or quoted from relevant international standards.

The "Next Calibration Date" is recommended according to best practice principle as practised by the ALS Hong Kong laboratory or quoted from relevant international standards.

Scope of Test:	Dissolved Oxygen, pH Value, Turbidity, Salinity, Redox Potential and Temperature
Equipment Type:	Multifunctional Meter
Brand Name:	HORIBA
Model No.:	U-53
Serial No .:	UHB5F2BB
Equipment No.:	
Date of Calibration:	14-Jun-2019

<u>NOTES</u>

This is the Final Report and supersedes any preliminary report with this batch number.

Results apply to sample(s) as submitted. All pages of this report have been checked and approved for release.

Ma Si

Mr Chan Siu Ming, Vico Manager - Inorganic

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SUB-BATCH:	0
DATE OF ISSUE:	21-Jun-2019
CLIENT:	ACUITY SUSTAINABILITY CONSULTING LIMITED
F 1 1 T	

HK1923178

Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.:	Multifunctional Meter HORIBA U-53 UHB5F2BB		
Date of Calibration:	14-Jun-2019	Date of Next Calibration:	14-Sep-2019

PARAMETERS:

WORK ORDER:

Dissolved Oxygen Method Ref: APHA (21st edition), 4500-O: G

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.46	2.63	+0.17
5.46	5.51	+0.05
7.56	7.57	+0.01
	Tolerance Limit (mg/L)	±0.20

pH Value

Method Ref: APHA (21st edition), 4500H:B

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.96	-0.04
7.0	7.06	+0.06
10.0	10.06	+0.06
	Tolerance Limit (pH unit)	±0.20

Ma Sing

Mr Chan Siu Ming, Vico Manager - Inorganic

	WORK ORDER:	HK1923178		
	SUB-BATCH: DATE OF ISSUE: CLIENT:	0 21-Jun-2019 ACUITY SUSTAINABILITY CONS	ULTING LIMITED	(ALS)
	Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter HORIBA U-53 UHB5F2BB 14-Jun-2019	Date of Next Calibration:	14-Sep-2019
	PARAMETERS: Salinity	Method Ref: APHA (21st edition)) 2520B	
	Samity	Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
		0	0.00	
		10	9.82	-1.8
		20	19.06	-4.7
		30	30.62	+2.1
			Tolerance Limit (%)	±10.0
	Redox Potential	Method Ref: APHA (21st edition)		ry Manual
Method Ref: Orion Research Instruction Manual and the Laboratory Manual the Environmental of Water, Wastewater and Soil (2nd edition), Rump & Krist (1992)			•	
		Expected Reading (mV)	Displayed Reading (mV)	Difference of A and B (mV)
		Solution A (~234mV)	226	
		Solution B (~300mV)	293	+67.0
			Tolerance Limit (mV)	>66

Temperature

Method Ref: Section 6 of International Accreditation New Zealand Technical Guide No. 3 Second edition March 2008: Working Thermometer Calibration Procedure.

	Survey No. 9 Second Cattorn March 2000. Working Thermometer Cambration Procedure.				
	Expected Reading (°C)	Displayed Reading (°C)	Tolerance (^o C)		
Γ	11.5	13.42	+ 1.9		
	23.0	24.94	+ 1.9		
	40.0	40.18	+0.2		
		Tolerance Limit (°C)	±2.0		

Ma Ain

Mr Chan Siu Ming, Vico Manager - Inorganic

REPORT OF EQUIPMENT CALIBRATION

WORK ORDER:	HK1923178		ALS
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 21-Jun-2019 ACUITY SUSTAINABILITY CONSU	JLTING LIMITED	
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter HORIBA U-53 UHB5F2BB 20-Jun-2019	Date of Next Calibration:	14-Sep-2019
PARAMETERS: Turbidity	Method Ref: APHA (21st edition)	2130B	
raibiaity	Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.00	
4	3.92	-2.0
40	39.1	-2.3
80	79.3	-0.9
400	392	-2.0
800	798	-0.3
	Tolerance Limit (%)	±10.0

Ma Ling

Mr Chan Siu Ming, Vico Manager - Inorganic

REPORT OF EQUIPMENT PERFORMANCE CHECK

WORK ORDER:	HK1923178	
SUB-BATCH: DATE OF ISSUE: CLIENT:	0 21-Jun-2019 ACUITY SUSTAINABILITY CONSU	JLTING LIMITED
Equipment Type: Brand Name: Model No.: Serial No.: Equipment No.: Date of Calibration:	Multifunctional Meter HORIBA U-53 UHB5F2BB 14-lun-2019	
PARAMETERS: Turbidity	Method Ref: APHA (21st edition),	, 2130B
	Expected Reading (NTU)	Displayed Reading (NTL
	0	0 / 7

U) Tolerance (%) 0 0.67 - -4 23.8 +495.0 40 150 +275.080 222 +177.5 729 +82.3 400 800 0.00 -100.0 ± 10.0 Tolerance Limit (%)

Ma Ain

Mr Chan Siu Ming, Vico Manager - Inorganic