

## Appendix F Water Quality Equipment Calibration Certificate



## REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION

<b>CONTACT:</b>	MR NELSON TSUI	<b>WORK ORDER:</b>	HK1835956
<b>CLIENT:</b>	ACUMEN ENVIRONMENTAL ENG & TECH CO LTD		
<b>ADDRESS:</b>	LOT 11, TAM KON SHAN ROAD, TSING YI (NORTH), N.T. HONG KONG	<b>SUB-BATCH:</b>	0
		<b>LABORATORY:</b>	HONG KONG
		<b>DATE RECEIVED:</b>	26-Jun-2018
		<b>DATE OF ISSUE:</b>	13-Aug-2018

### 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 Water Quality Monitor
Model No.:	U-5000
Serial No.:	BGYP9CKD
Equipment No.:	--
Date of Calibration:	04 July, 2018

### 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.

Ms. Lin Wai Yu  
Assistant Manager - Inorganic

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



**WORK ORDER:** HK1835956  
**SUB-BATCH:** 0  
**DATE OF ISSUE:** 13-Aug-2018  
**CLIENT:** ACUMEN ENVIRONMENTAL ENG & TECH CO LTD

**Equipment Type:** Multifunctional Meter  
**Brand Name:** HORIBA Water Quality Monitor  
**Model No.:** U-5000  
**Serial No.:** BGY99CKD  
**Equipment No.:** --  
**Date of Calibration:** 25 July, 2018      **Date of Next Calibration:** 04 October, 2018

**PARAMETERS:**

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (mg/L)
2.90	3.09	+0.19
5.35	5.51	+0.16
7.56	7.62	+0.06
	Tolerance Limit (mg/L)	±0.20

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

Ms. Lin Wai Yu  
Assistant Manager - Inorganic

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



**WORK ORDER:** HK1835956  
**SUB-BATCH:** 0  
**DATE OF ISSUE:** 13-Aug-2018  
**CLIENT:** ACUMEN ENVIRONMENTAL ENG & TECH CO LTD

**Equipment Type:** Multifunctional Meter  
**Brand Name:** HORIBA Water Quality Monitor  
**Model No.:** U-5000  
**Serial No.:** BGY99CKD  
**Equipment No.:** --  
**Date of Calibration:** 04 July, 2018                      **Date of Next Calibration:** 04 October, 2018

## PARAMETERS:

### pH Value

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

Expected Reading (pH unit)	Displayed Reading (pH unit)	Tolerance (pH unit)
4.0	3.95	-0.05
7.0	6.84	-0.16
10.0	10.08	+0.08
	Tolerance Limit (pH unit)	±0.20

### Turbidity

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.78	--
4	4.06	+1.5
40	36.1	-9.8
80	78.9	-1.4
400	409	+2.3
800	809	+1.1
	Tolerance Limit (%)	±10.0

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

Ms. Lin Wai Yu  
Assistant Manager - Inorganic

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



**WORK ORDER:** HK1835956  
**SUB-BATCH:** 0  
**DATE OF ISSUE:** 13-Aug-2018  
**CLIENT:** ACUMEN ENVIRONMENTAL ENG & TECH CO LTD

Equipment Type: Multifunctional Meter  
Brand Name: HORIBA Water Quality Monitor  
Model No.: U-5000  
Serial No.: BGY9CKD  
Equipment No.: --  
Date of Calibration: 04 July, 2018      Date of Next Calibration: 04 October, 2018

## PARAMETERS:

### Salinity

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.00	--
10	9.90	-1.0
20	19.50	-2.5
30	28.30	-5.7
	Tolerance Limit (%)	±10.0

### Redox Potential

Method Ref: APHA (21st edition), 2580B

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)	188	
Solution B (~300mV)	272	+84
	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.

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
10.5	11.27	+0.8
21.0	21.64	+0.6
40.0	39.43	-0.6
	Tolerance Limit (°C)	±2.0

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

Ms. Lin Wai Yu  
Assistant Manager - Inorganic

# REPORT OF EQUIPMENT PERFORMANCE CHECK / CALIBRATION



**WORK ORDER:** HK1835956  
**SUB-BATCH:** 0  
**DATE OF ISSUE:** 13-Aug-2018  
**CLIENT:** ACUMEN ENVIRONMENTAL ENG & TECH CO LTD

**Equipment Type:** Multifunctional Meter  
**Brand Name:** HORIBA Water Quality Monitor  
**Model No.:** U-5000  
**Serial No.:** BGY99CKD  
**Equipment No.:** --  
**Date of Calibration:** 04 July, 2018

**PARAMETERS:**

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

Expected Reading (mg/L)	Displayed Reading (mg/L)	Tolerance (%)
3.30	no readable reading	N/A
5.49	no readable reading	N/A
7.80	no readable reading	N/A
	Tolerance Limit (mg/L)	±0.20

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

Ms. Lin Wai Yu  
Assistant Manager - Inorganic



## REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION

CONTACT:	MR EARTH WONG	WORK ORDER:	HK1831444
CLIENT:	ACUMEN ENVIRONMENTAL ENG & TECH CO LTD		
ADDRESS:	LOT 11, TAM KON SHAN ROAD, TSING YI (NORTH), N.T. HONG KONG	SUB-BATCH:	0
		LABORATORY:	HONG KONG
		DATE RECEIVED:	25-May-2018
		DATE OF ISSUE:	08-Jun-2018

### 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:	YSI
Model No.:	ProDSS
Serial No.:	15M101091
Equipment No.:	--
Date of Calibration:	25 May, 2018

### 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.

Mr Chan Siu Ming, Vico  
Manager - Inorganic

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# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1831444  
 SUB-BATCH: 0  
 DATE OF ISSUE: 08-Jun-2018  
 CLIENT: ACUMEN ENVIRONMENTAL ENG & TECH CO LTD

Equipment Type: Multifunctional Meter  
 Brand Name: YSI  
 Model No.: ProDSS  
 Serial No.: 15M101091  
 Equipment No.: --  
 Date of Calibration: 25 May, 2018                      Date of Next Calibration: 25 August, 2018

**PARAMETERS:**

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

Expected Reading (NTU)	Displayed Reading (NTU)	Tolerance (%)
0	0.06	--
4	4.34	+8.5
40	39.04	-2.4
80	80.17	+0.2
400	399.65	-0.1
800	786.96	-1.6
	Tolerance Limit (%)	±10.0

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

Expected Reading (ppt)	Displayed Reading (ppt)	Tolerance (%)
0	0.01	--
10	9.96	-0.4
20	18.78	-6.1
30	28.80	-4.0
	Tolerance Limit (%)	±10.0

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

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Mr Chan Siu Ming, Vico  
Manager - Inorganic

# REPORT OF EQUIPMENT PERFORMANCE CHECK/CALIBRATION



WORK ORDER: HK1831444  
 SUB-BATCH: 0  
 DATE OF ISSUE: 08-Jun-2018  
 CLIENT: ACUMEN ENVIRONMENTAL ENG & TECH CO LTD

Equipment Type: Multifunctional Meter  
 Brand Name: YSI  
 Model No.: ProDSS  
 Serial No.: 15M101091  
 Equipment No.: --  
 Date of Calibration: 25 May, 2018                      Date of Next Calibration: 25 August, 2018

**PARAMETERS:**

Redox Potential            Method Ref: APHA (21st edition), 2580B  
                                   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)	221.3	
Solution B (-300mV)	293.6	+72.3
	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.

Expected Reading (°C)	Displayed Reading (°C)	Tolerance (°C)
9.5	10.3	+0.8
22.0	21.3	-0.7
39.0	37.6	-1.4
	Tolerance Limit (°C)	±2.0

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

Mr Chan Siu Ming, Vico  
 Manager - Inorganic