

**Temporary Sewage Pumping Station  
Ancillary to Tung Chung Area 56 Public Housing Development**

**Monthly Environmental Audit Report No. 35  
(Covering the Period from 1 September 2017 to 30 September 2017)**

9 November 2017

Revision 00

Main Contractor



**HSIN新昌  
CHONG**





Independent Checker

**ATKINS**



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## **Executive Summary**

This monthly Environmental Audit Report is prepared for Temporary Sewage Pumping Station Ancillary to Tung Chung Area 56 Public Housing Development (hereafter referred to as “the Project”) for the Hong Kong Housing Authority (HA) of Hong Kong Special Administrative Region. The Project was awarded to Hsin Chong Construction Company Ltd. (hereafter referred to as “the Contractor”) and Atkins China Limited was appointed as the Independent Checker (IC) by the Contractor.

The Project is classified as a “Designated Project”, under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap 499). A Project Profile (Register No. PP-481/2013) was submitted for direct application of an Environmental Permit (EP) for the Project. The current EP (EP No: EP-452/2013) was issued on 6 June 2013. These documents are available through the EIA Ordinance Register. Site preparation works of the Project started on 14 November 2014. The construction works of the Project commenced on 19 November 2014 and completed on 11 September 2017.

This is the 35<sup>th</sup> and the last monthly Environmental Audit Report for construction phase of the Project which summarizes the audit findings during the reporting period from 1 to 30 September 2017.

## **Complaint Log**

There were no environmental complaints received during the reporting period.

## **Notifications of Summons and Successful Prosecutions**

There were no notifications of summons or prosecutions received during this reporting period.

## 1 INTRODUCTION

### 1.1 Basic Project Information

- 1.1.1 This monthly Environmental Audit Report is prepared for Temporary Sewage Pumping Station Ancillary to Tung Chung Area 56 (hereafter referred to as “the Project”) for the Hong Kong Housing Authority (HA) of Hong Kong Special Administrative Region. The Project was awarded to Hsin Chong Construction Company Ltd. (hereafter referred to as “the Contractor”) and Atkins China Limited was appointed as the Independent Checker (IC) by the Contractor.
- 1.1.2 The Project is classified as a “Designated Project”, under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap 499). A Project Profile (Register No. PP-481/2013) was submitted for direct application of Environmental Permit (EP). The current EP (EP No: EP-452/2013) was issued on 6 June 2013. These documents are available through the EIA Ordinance Register. Site preparation works of the Project started on 14 November 2014. The construction works of the Project commenced on 19 November 2014 and completed on 11 September 2017. The works areas of the Project and the Contract are shown in **Appendix A**.
- 1.1.3 This Temporary Sewage Pumping Station (TSPS) is an ancillary facility to Tung Chung Area 56 Public Housing Development to collect the sewage solely from the Tung Chung Area 56 Public Housing Development only and discharge it to the existing public sewer at Ying Hei Road until the permanent sewerage infrastructure is available and ready to service.
- 1.1.4 The proposed TSPS is an un-manned facility and is not considered as a sensitive use susceptible to the influence of to external potential environmentally polluting uses.
- 1.1.5 According to Planning Department’s Tung Chung Town Centre Area Layout Plan No. L/I-TCTC/1E, a permanent sewage pumping station (SPS) will be provided in Tung Chung Area 104 located to the northeast of Tung Chung Area 56 upon the intake of the population of Tung Chung Area 56 Public Housing Development. The TSPS is expected to provide a few years of service to the public housing development. Upon the commissioning of the permanent sewage pumping station in Tung Chung Area 104, sewage generated in Tung Chung Area 56 Public Housing Development will be conveyed to SPS in Tung Chung Area 104 and the operation of the subject TSPS in Area 56 will be terminated.
- 1.1.6 This is the 35<sup>th</sup> and the last monthly Environmental Audit Report for construction phase of the Project which summarizes the audit findings during the reporting period from 1 to 30 September 2017 and the status of the TSPS upon its construction completion.

## 1.2 Project Organisation

1.2.1 The project organization structure and lines of communication with respect to the on-site environmental management structure is shown in **Appendix B**. The key personnel contact names and numbers are summarized in **Table 1.1**.

**Table 1.1 Contact Information of Key Personnel**

Party	Position	Name	Telephone	Fax
Engineer or Engineer's Representative (Hong Kong Housing Authority)	Civil Engineer	Rachel Fung	2129 3709	2129 3095
Contractor (Hsin Chong Construction Company Ltd.)	Site Agent	Ivan Ho	9383 8280	3480 1791
	Environmental Manager	Siu Hon Wing	9139 5367	
	Environmental Supervisor	Ryan Wong	6198 0730	
Independent Checker (Atkins China Limited)	Independent Checker	Heidi Yeung	2972 1893	2890 6343

## 1.3 Construction Programme

1.3.1 All major construction works were completed in July 2016 and the remaining minor works for the TSPS were completed in September 2017. A copy of the Contractor's construction programme is provided in **Appendix C**.

## 1.4 Construction Works Undertaken During the Reporting Period

1.4.1 A summary of the construction activities undertaken during the reporting period is shown below:

- Plant and mechanical & electrical installation and commissioning of the TSPS; and
- Façade wall painting.

## 2 ENVIRONMENTAL SITE AUDIT

### 2.1 Site Inspection

2.1.1 Site Inspections were carried out on a weekly basis to monitor the implementation of proper environmental protection and pollution control mitigation measures for the Project. During the reporting period, site inspections were carried out on 5, 13, 20 and 29 September 2017.

2.1.2 No particular issues were identified during the regular environmental weekly site inspections conducted on 5, 13, 20 and 29 September 2017 during the reporting period. The Contractor has carried out mitigation measures recommended in the Project Profile and EP.

### 2.2 Advice on the Solid and Liquid Waste Management Status

2.2.1 The Contractor registered as a chemical waste producer for the Project. Sufficient numbers of receptacles were available for general refuse collection and sorting.

2.2.2 The monthly summary of waste flow table is detailed in **Appendix F**.

- 2.2.3 The Contractor was reminded to store the chemical waste containers properly on site in accordance with the Code of Practice on the Packaging, Labelling and Storage of Chemical Wastes.

## 2.3 Environmental Licenses and Permits

- 2.3.1 The valid environmental licenses and permits during the reporting period are summarized in **Appendix G**.

## 2.4 Implementation Status of Environmental Mitigation Measures

- 2.4.1 The Contractor has carried out mitigation measures recommended in the Project Profile and EP.

- 2.4.2 Based on the weekly site inspections and confirmations from the Contractor during the reporting month. The following were recorded:

- The inlet chamber, wet well and screening facilities were installed within a reinforced concrete structure (EP Specific Condition 2.2);
- The deodorizer with forced ventilation equipment was installed (EP Specific Condition 2.3);
- Odour removal rate of the deodorizer of at least 99.5% will be verified by the TSPS's operator through an odour commissioning test. The odour commissioning test will be conducted by Jardine Engineering Corporation Limited (JEC) (Sub-contractor of Hsin Chong) in December 2017. JEC will conduct regular maintenance works for the deodorizer during the 2 years of Defects Liability Period. After the 2 years Defects Liability Period, Drainage Services Department will be responsible for operation and maintenance works of the TSPS until its operation is terminated. The specification of the odour removal system provided by JEC is provided in **Appendix D** (EP Specific Condition 2.3);
- All pump sets and the mechanically raked screens were provided within a reinforced concrete structure (EP Specification Condition 2.4);
- As advised by the Contractor, metal door and louvers were provided for the TSPS. In compliance with minimization of noise impact during operation of the TSPS under EP Specification Condition 2.4, noise measurements were conducted to identify the noise impact due to the normal operation of the TSPS. The noise impact results reveal that both daytime and night-time noise levels at the representative Noise Sensitive Receiver comply with the relevant noise criteria as stated in the Project Profile (Register No. PP-481/2013). The Noise Measurement Report prepared by the Contractor is provided in **Appendix E** (EP Specification Condition 2.4);
- Silencers with louvers were installed at all exits of the provided ventilation exhaust fans (EP Specific Condition 2.4);
- A standby pump was provided (EP Specific Condition 2.5);
- Dual power supply was provided by CLP (EP Specific Condition 2.5);
- A wet well with 2-hour storage capacity of average dry weather flow was provided (EP Specific Condition 2.5);
- Roof greening will be implemented into two parts (i.e. green roof tray system and soft landscape). The green roof tray system and soft landscape will be implemented tentatively at the end of October 2017 by the Contractor and first quarter of 2018 by Housing Department (EP Specific Condition 2.6); and
- The exterior of the building was painted to blend the TSPS into surroundings on 11 September 2017 (Project Profile (Register No. PP-481/2013)).

## 2.5 Summary of Complaints, Notification of Summons and Successful Prosecution

- 2.5.1 There were no complaints received during the reporting period.
- 2.5.2 No notification of summons and prosecution was received during the reporting period.
- 2.5.3 Statistics on environmental complaints, notifications of summons and successful prosecutions are summarized in **Appendix H**.



## 3 CONCLUSION

### 3.1 Conclusions

- 3.1.1 This is the 35<sup>th</sup> and the last monthly Environmental Audit Report for the construction phase of the TSPS Project.
- 3.1.2 Site preparation works of the Project started on 14 November 2014. The construction works of the Project commenced on 19 November 2014 and completed on 11 September 2017.
- 3.1.3 No particular issues were identified during the regular environmental weekly site inspections conducted on 5, 13, 20 and 29 September 2017 during the reporting period. The Contractor has carried out mitigation measures recommended in the Project Profile and EP.
- 3.1.4 The Contractor has provided/ installed the respective mitigation measures recommended for the TSPS according to the Project profile and EP. A commissioning test for the installed deodorizer has been scheduled to be conducted by the JEC (Sub-contractor) tentatively in December 2017 to verify the odour removal rate. Roof greening will be implemented into two parts (i.e. green roof tray system and soft landscape). The green roof tray system and soft landscape will be implemented tentatively at the end of October 2017 by the Contractor and first quarter of 2018 by Housing Department.
- 3.1.5 There were no environmental complaints received during the reporting period.
- 3.1.6 No notification of summons and successful prosecution were received during the reporting period.

## **APPENDIX A**

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### Location of the Project and the Contract



0 50 100 150 Meters

Tung Chung Bay

TEMPORARY SEWAGE PUMPING STATION

Area 104

Area 89

Tung Chung Area 56


Area 55b

Ying Hei Road

North Lantau Expressway

Man Tung Road

**LEGEND**

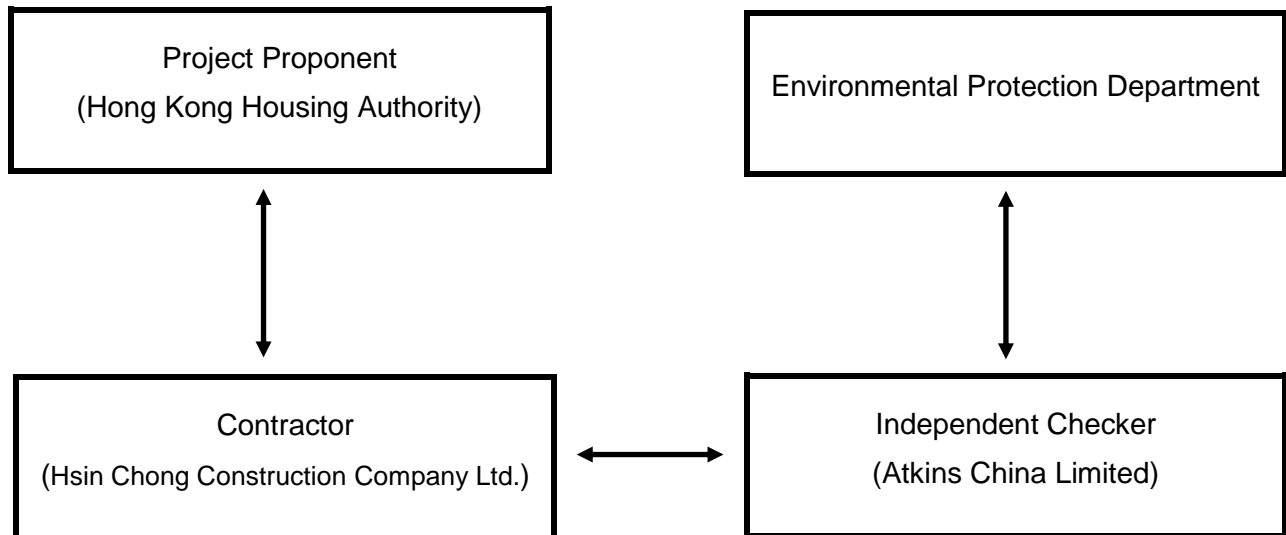
-  Temporary Sewage Pumping Station
-  Site Boundary of Tung Chung Area 56 Public Housing Development
-  500 m from Temporary Sewage Pumping Station

## **APPENDIX B**

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### Project Organization for Environmental Works

## Project Organization for Environmental Works



## **APPENDIX C**

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### Construction Programme

**Construction of Public Rental Housing Development at Tung Chung Area 56**

ID	Task Name	Start	Finish	Duration	2014												2015			2016			2017		
					1st Quarter			4th Quarter			3rd Quarter			2nd Quarter			1st Quarter			4th Qua					
					Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Jan	May	Sep	Jan	May	Sep						
1	<b>Construct Particulars</b>	18-12-13	31-08-17	997 days																					
2	Contract commencement of all sections of works	18-12-13	18-12-13	0 days																					
3	Possession of Site	18-12-13	18-12-13	0 days																					
4	Original Project Completion Date	17-08-16	17-08-16	0 days																					
5	<b>Extended Project Completion Date with Granted EOT (Up to 17 Dec 2016)</b>	09-12-16	05-01-17	21 days																					
6	Section 1	02-01-17	02-01-17	0 days																					
7	Section 2	31-12-16	31-12-16	0 days																					
8	Section 3	04-01-17	04-01-17	0 days																					
9	Section 4	05-01-17	05-01-17	0 days																					
10	Section 5 - Section 9	09-12-16	09-12-16	0 days																					
11	<b>Anticipated completion Date</b>	22-02-17	31-08-17	135 days																					
12	Section 1-4	31-07-17	31-07-17	0 days																					
13	Section 5 - 7 & 9	31-08-17	31-08-17	0 days																					
14	Section 8	22-02-17	22-02-17	0 days																					
15	<b>Preliminaries</b>	18-12-13	25-08-17	994 days																					
16	<b>Site Establishment</b>	18-12-13	25-08-17	994 days																					
17	Mobilization and Temp Power / Water Supply Setup	18-12-13	17-01-14	30 edays																					
18	Installation of Temp TxRm & Temp Elect Connection	02-01-14	02-04-14	90 edays																					
19	Setup Temporary Container Site Office	18-12-13	25-12-13	7 edays																					
20	Design Drawing and Calculation of Site Office to CM Approval	27-12-13	22-02-14	45 edays																					
21	Setup Site Office	22-02-14	23-04-14	60 edays																					
22	Setup of Curing Rooms & STC Office	18-12-13	17-01-14	30 edays																					
23	Preconstruction condition survey	18-12-13	17-01-14	30 edays																					
24	Submit Method Statement for New Covered Walk for CM Approval	24-12-13	21-02-14	45 edays																					
25	New Covered Walkway erection along the Northern Boundary	22-02-14	25-10-14	180 days																					
26	Correctness Survey of Previous Works	18-12-13	25-12-13	7 edays																					
27	Submission & Approval of Method Statement of Tower Crane 1st Setup (Block 1, 3 & 4)	19-12-13	17-02-14	60 edays																					
28	Erection of Tower Cranes (Block 1, 3 and 4)	17-02-14	29-03-14	40 edays																					
29	Footing for Tower Cranes (Block 2)	25-03-14	14-04-14	13 days																					
30	Erection of Tower Cranes (Block 2)	15-04-14	05-05-14	14 days																					
31	Dismantling of Tower Cranes (Block 1)	19-08-16	26-08-16	7 days																					
32	Dismantling of Tower Cranes (Block 2)	26-05-16	03-06-16	7 days																					
33	Dismantling of Tower Cranes (Block 3)	27-08-16	03-09-16	7 days																					
34	Dismantling of Tower Cranes (Block 4)	05-09-16	12-09-16	7 days																					
35	1st Erection of Material Hoists Starting from Ground Level (Block 1)	14-02-15	28-03-15	32 days																					
36	1st Erection of Material Hoists Starting from Ground Level (Block 2)	26-03-15	15-04-15	14 days																					
37	1st Erection of Material Hoists Starting from Ground Level (Block 3)	30-03-15	18-04-15	14 days																					
38	1st Erection of Material Hoists Starting from Ground Level (Block 4)	28-02-15	30-03-15	26 days																					
39	Dismantling of Material Hoists (Block 1 - 4)	13-09-16	18-10-16	28 days																					
40	1st Erection of Passenger Hoists (Block 1 - 4)	10-04-15	04-07-15	62 days																					
41	Dismantling of Passenger Hoists	17-03-17	25-04-17	28 days																					
42	1st Erection of Temporary Refuse Chutes (Block 1 - 4)	07-03-15	15-04-15	30 days																					
43	Dismantling of Temporary Refuse Chutes	05-09-16	07-10-16	26 days																					
44	Dismantle of Temp. Tx. Room (after notification from CLP)	24-12-16	12-01-17	14 days																					
45	Latest dismantle of Scaffold for Annex Building	30-06-17	21-07-17	16 days																					
46	Erection of Mid-way Gondola for Block 1, 3 and 4	08-10-15	24-10-15	14 days																					
47	1st Erection of Gondola at Roof for Block 2	27-02-16	20-05-16	60 days																					
48	Erection of Gondola at Roof for Block 1, 3 and 4 (High Zone)	06-02-16	09-03-16	24 days																					
49	Dismantle of Gondola (Block 1 - 4)	19-07-17	25-08-17	28 days																					
50	<b>Relocation of Site Office</b>	24-08-15	10-09-15	14 days																					
51	To 2/F of Block 2 for HA	01-09-15	10-09-15	7 days																					
52	To 1/F of Block 2 for HCC	24-08-15	31-08-15	7 days																					

**Construction of Public Rental Housing Development at Tung Chung Area 56**

ID	Task Name	Start	Finish	Duration	2014		2015			2016			2017				
					1st Quarter		4th Quarter		3rd Quarter			2nd Quarter			1st Quarter		4th Qua
					Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep
53	Submission of Technical Document	18-12-13	20-08-16	716 days													
225	Section 1 - Section 4 (Blk 1 to Blk 4)	09-01-14	31-07-17	959 days													
226	Timber Mock Up for the Kitchen & VPB & Approval	15-02-14	31-07-14	123 days													
227	Precast Element Fabrication	24-03-14	26-09-15	408 days													
228	Steel Mould Fabrication	24-03-14	20-11-14	177 days													
229	Fabrication of Mock-up Precast Elements	06-06-14	05-07-14	21 days													
230	Study Mock Up for the VPB & Trial Panel and Approval	07-07-14	05-11-14	90 days													
231	Mass Production of Precast Elements	30-10-14	26-09-15	250 days													
232	1st Delivery of P.C. Elements	01-11-14	01-11-14	0 days													
233	Latest issuance date of R.C. details R/F slab & UR/F	17-06-14	17-06-14	0 days													
234	RC Structure	09-01-14	31-07-17	959 days													
235	Domestic Blocks	09-01-14	18-06-16	660 days													
236	Block 1	09-01-14	13-06-16	655 days													
237	Pile Cap - G/F (Slab)	09-01-14	10-06-14	116 days													
238	Under Ground Drainage and Tanking	15-02-14	07-05-14	60 days													
239	Water Test for Drainage Works	28-03-14	13-05-14	30 days													
240	Construction of Precast Water Tank	26-04-14	06-06-14	33 days													
241	Installation of P.C. Water Tank	01-09-14	13-09-14	10 days													
242	G/F - 1/F slab	26-05-14	19-09-14	82 days													
243	1/F - Level 16.75 (Transfer Structure)	09-08-14	13-11-14	74 days													
244	Level 16.75 - 2/F slab	31-10-14	03-12-14	29 days													
245	2/F to 3/F Slab	26-11-14	19-01-15	43 days													
246	3/F to 4/F Slab	09-01-15	13-02-15	30 days													
247	4/F to 5/F Slab	04-02-15	10-03-15	25 days													
248	5/F to 6/F Slab	07-03-15	30-03-15	20 days													
249	6/F to 7/F Slab	27-03-15	17-04-15	15 days													
250	7/F to 8/F Slab	15-04-15	30-04-15	14 days													
251	8/F to 9/F Slab	06-05-15	27-05-15	14 days													
252	9/F to 39/F (30 Floors x 6 days cycle) details shown in 90days programme	21-05-15	04-02-16	192 days													
283	39/F - Main Roof slab	02-02-16	24-02-16	16 days													
284	Main Roof - LMR - Upper Roof (Detailed Programmed to be Submitted Separately)	20-02-16	13-06-16	79 days													
285	Parapet Wall	22-02-16	15-04-16	40 days													
286	Lift Machine Room	20-02-16	27-04-16	50 days													
287	Water Tank	20-02-16	13-06-16	79 days													
288	Generator Room	25-02-16	04-05-16	50 days													
289	Block 2	09-01-14	16-05-16	638 days													
290	Pile Cap - G/F (Slab)	09-01-14	10-06-14	116 days													
291	Under Ground Drainage and Tanking	15-02-14	07-05-14	60 days													
292	Water Test for Drainage Works	28-03-14	13-05-14	30 days													
293	Construction of Precast Water Tank	26-04-14	06-06-14	33 days													
294	Installation of P.C. Water Tank	27-08-14	06-09-14	10 days													
295	G/F - 1/F slab	29-05-14	13-09-14	75 days													
296	1/F - 2/F slab	03-09-14	07-11-14	52 days													
297	2/F - Level 22.10 (Transfer Structure)	06-11-14	06-02-15	76 days													
298	Level 22.10 - 3/F slab	27-01-15	25-02-15	21 days													
299	3/F to 4/F Slab	13-02-15	25-03-15	30 days													
300	4/F to 5/F Slab	17-03-15	13-04-15	20 days													
301	5/F to 6/F Slab	01-04-15	21-04-15	14 days													
302	6/F to 7/F Slab	18-04-15	02-05-15	12 days													
303	7/F to 8/F Slab	29-04-15	12-05-15	10 days													
304	8/F to 9/F Slab	13-05-15	28-05-15	10 days													
305	9/F to 10/F Slab	22-05-15	04-06-15	9 days													







Construction of Public Rental Housing Development at Tung Chung Area 56

ID	Task Name	Start	Finish	Duration	2014		2015			2016			2017					
					1st Quarter		4th Quarter		3rd Quarter		2nd Quarter		1st Quarter		4th Qua			
					Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep	
498	Granite Threshold	27-07-16	14-06-17	240 days														
499	Cooking Bench	13-08-16	15-06-17	231 days														
500	Metal Gate Set	11-07-16	09-06-17	250 days														
501	Sanitary Fittings	13-08-16	17-05-17	210 days														
502	Mirror	22-07-16	12-04-17	200 days														
503	Laundry Rack	22-07-16	22-06-17	250 days														
504	Sealant Pointing	22-07-16	11-05-17	220 days														
505	<b>Internal finishes for Common Area and Service Rooms</b>	<b>18-06-15</b>	<b>06-07-17</b>	<b>547 days</b>														
506	Door Subframe	18-06-15	13-06-16	260 days														
507	Blockwork	30-06-15	21-06-16	260 days														
508	Metalwork	13-10-15	12-12-16	318 days														
509	Door Kerb	10-09-15	14-04-16	164 days														
510	Wall Backing & Fair Face Formation	01-09-15	13-06-16	209 days														
511	Window Frame	27-08-15	31-05-16	207 days														
512	Waterproofing	02-10-15	17-06-16	190 days														
513	Floor Screeding	09-10-15	23-06-16	191 days														
514	Wall Tiling	12-02-16	11-10-16	172 days														
515	Floor Tiling	21-12-15	18-10-16	214 days														
516	Skim Coat and Painting (Ceiling)	24-09-15	15-05-17	440 days														
517	P & D Pipework	13-10-15	03-05-17	420 days														
518	Spray Painting	25-04-16	09-06-17	300 days														
519	Door Set & Ironmongeries	09-07-16	08-06-17	250 days														
520	FRP Metal Door	29-07-16	02-06-17	230 days														
521	Make Good and Spray Painting after Metal Door Installation	01-11-16	16-06-17	170 days														
522	Signage	28-07-16	08-06-17	235 days														
523	Sealant Pointing	10-09-16	06-07-17	225 days														
524	<b>Roof Finishes</b>	<b>25-06-16</b>	<b>26-06-17</b>	<b>269 days</b>														
525	Floor Screeding	25-06-16	30-08-16	43 days														
526	Waterproofing	31-08-16	30-09-16	26 days														
527	Water Tightness Test for Roof	30-09-16	11-10-16	8 days														
528	Insulation and Screeding	03-09-16	15-10-16	34 days														
529	Roof Tiling	03-09-16	28-03-17	160 days														
530	Sealant Pointing	29-03-17	18-04-17	15 days														
531	Metalwork	17-04-17	26-06-17	50 days														
532	<b>External Wall Finishes (Typical Floor)</b>	<b>26-10-15</b>	<b>28-06-17</b>	<b>450 days</b>														
533	<b>Block 1, 3 &amp; 4 - Low Zone (2/F - 20/F)</b>	<b>26-10-15</b>	<b>14-07-16</b>	<b>190 days</b>														
534	Fair Face Formation	26-10-15	02-06-16	165 days														
535	Water Tightness Test for Tie Bolt Holes	12-11-15	25-06-16	165 days														
536	Spray Paint	16-01-16	05-07-16	120 days														
537	P & D Pipework	20-02-16	14-07-16	100 days														
538	<b>Block 1 &amp; 2</b>	<b>18-03-16</b>	<b>28-06-17</b>	<b>337 days</b>														
539	Fair Face Formation	18-03-16	07-04-17	280 days														
540	Water Tightness Test for Tie Bolt Holes	08-04-16	11-04-17	270 days														
541	Spray Paint	16-04-16	26-04-17	275 days														
542	P & D Pipework	25-04-16	27-04-17	270 days														
543	Gas Pipework	18-05-16	21-04-17	250 days														
544	Glazing Installation	18-06-16	12-06-17	265 days														
545	Sealant Pointing	22-07-16	15-06-17	245 days														
546	Water Tightness Test for Façade Joint and Windows	29-07-16	28-06-17	248 days														
547	Finishing Works for External Wall after Material Hoist and Passenger Hoist Dismantling	19-10-16	18-05-17	160 days														
548	<b>Block 3 &amp; 4</b>	<b>14-04-16</b>	<b>28-06-17</b>	<b>321 days</b>														
549	Fair Face Formation	14-04-16	10-04-17	265 days														

**Construction of Public Rental Housing Development at Tung Chung Area 56**

ID	Task Name	Start	Finish	Duration	2014			2015			2016			2017						
					1st Quarter			4th Quarter			3rd Quarter			2nd Quarter			1st Quarter			4th Qua
					Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep
550	Water Tightness Test for Tie Bolt Holes	29-04-16	19-04-17	260 days																
551	Spray Paint	25-06-16	09-05-17	235 days																
552	P & D Pipework	08-07-16	10-05-17	230 days																
553	Gas Pipework	14-07-16	21-04-17	214 days																
554	Glazing Installation	14-07-16	20-06-17	255 days																
555	Sealant Pointing	08-08-16	26-06-17	240 days																
556	Water Tightness Test for Façade Joint and Windows	19-08-16	28-06-17	238 days																
557	Finishing Works for External Wall after Material Hoist and Passenger Hoist Dismantling	19-10-16	15-06-17	180 days																
558	<b>Internal Finishes (G/F - 1/F)</b>	<b>06-04-16</b>	<b>24-07-17</b>	<b>345 days</b>																
559	Door Subframe	06-04-16	31-05-16	40 days																
560	Blockwork	26-04-16	04-07-16	45 days																
561	Door Kerb & Additional U Chaneel	22-06-16	26-04-17	230 days																
562	Waterproofing	05-07-16	24-02-17	180 days																
563	Wall Backing & Fair Face Formation	25-07-16	05-11-16	79 days																
564	Floor Screeding	13-08-16	31-05-17	220 days																
565	Wall Tiling	31-08-16	09-03-17	150 days																
566	Floor Tiling	15-09-16	15-03-17	141 days																
567	Skim coat and Painting	23-09-16	15-05-17	177 days																
568	Door Set & Ironmongeries	24-04-17	19-06-17	40 days																
569	Mail Box and Guard counter	24-04-17	24-07-17	65 days																
570	Play Surfaces and Play Equipment	06-06-17	24-07-17	35 days																
571	<b>External Finishes (G/F - 1/F)</b>	<b>15-06-16</b>	<b>12-07-17</b>	<b>290 days</b>																
572	Fair Face Formation	15-06-16	21-03-17	210 days																
573	Steel and Metal Works	27-07-16	21-06-17	245 days																
574	Metal Door Louver and Windows	23-08-16	07-06-17	220 days																
575	Shutter (shopfront)	17-10-16	06-06-17	175 days																
576	Glass Door and Glass Shop Front	31-10-16	06-07-17	185 days																
577	Signbox (shopfront)	10-11-16	12-07-17	180 days																
578	Spray Paint	26-10-16	31-05-17	163 days																
579	<b>Plumbing and Drainage Works</b>	<b>29-11-14</b>	<b>18-07-17</b>	<b>706 days</b>																
580	Form WWO 46 Part I & II Submission	29-11-14	29-11-14	0 days																
581	Plumbing and Drainage Pipework Installation for Block 1-4	29-02-16	31-05-17	333 days																
582	Installation of Water Meter for Flat Unit	12-04-17	21-06-17	50 days																
583	Hydraulic Test of Plumbing System	28-04-17	14-06-17	33 days																
584	Leakage Test of Drainage System	15-06-17	18-07-17	24 days																
585	<b>Building Services Installation</b>	<b>26-05-14</b>	<b>20-07-17</b>	<b>849 days</b>																
586	<b>Electrical Works for Domestic Blocks</b>	<b>26-05-14</b>	<b>18-07-17</b>	<b>847 days</b>																
587	Concealed Conduit Installation & Other Conduit Works	26-05-14	30-06-16	565 days																
588	Wiring Works	11-09-15	17-10-16	293 days																
589	Handover of TX Room for NSCs	26-04-16	26-04-16	0 days																
590	TX Room Inspection & Handover to CLP	15-06-16	15-06-16	0 days																
591	Make Available Vehicular Access for TX Installation	24-05-16	24-05-16	0 days																
592	Make Available 1.5m Wide Area for UG Cable Route to CLP	15-06-16	15-06-16	0 days																
593	Handover of Main Switch Room for NSC	14-03-15	14-03-15	0 days																
594	Handover of Low Zone Meter Rooms for NSC	29-03-16	29-03-16	0 days																
595	Handover of High Zone Meter Rooms to NSC	27-05-16	27-05-16	0 days																
596	Handover of Genset Room for NSC	05-10-16	05-10-16	0 days																
597	Make Available Vehicular Access for Transportation of Equipment to Genset & Main Switch Rm	05-08-16	05-08-16	0 days																
598	Make Available the U/G Cable Ducts and Draw Pits to NSC and CLP	19-09-16	19-09-16	0 days																
599	CLP installation & power-on of TxRm	19-09-16	03-11-16	45 edays																
600	Electrical Meter Installation for Common Area and Flat Unit	01-11-16	16-11-16	14 days																
601	Power Energisation	17-11-16	21-11-16	4 days																





**Construction of Public Rental Housing Development at Tung Chung Area 56**

ID	Task Name	Start	Finish	Duration	2014				2015			2016			2017				
					1st Quarter			4th Quarter	3rd Quarter			2nd Quarter			1st Quarter		4th Qua		
					Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep		
706	Make Available water tanks & pump rooms to NSC	06-02-17	06-02-17	0 days															
707	FS installation & water pump installation	06-02-17	06-03-17	21 days															
708	Testing & commissioning (EL, FS, P&D)	07-03-17	15-06-17	72 days															
709	<b>Wet Market</b>	<b>09-11-15</b>	<b>16-08-17</b>	<b>473 days</b>															
710	<b>RC structure (Detailed Programmed to be Submitted Separately)</b>	<b>09-11-15</b>	<b>23-03-17</b>	<b>370 days</b>															
711	Excavation for the footing	09-11-15	01-12-15	20 days															
712	<b>Zone 1</b>	<b>19-11-15</b>	<b>11-11-16</b>	<b>261 days</b>															
713	ELSW & Footing construction	19-11-15	30-12-15	33 days															
714	Footing to G/F beam and slab construction and UG Drainage Works	31-12-15	09-05-16	94 days															
715	G/F - M/F construction	11-05-16	18-07-16	45 days															
716	M/F - roof construction	18-07-16	06-10-16	60 days															
717	Planter wall & other RC features on roof	07-10-16	11-11-16	30 days															
718	<b>Zone 2</b>	<b>05-12-15</b>	<b>21-11-16</b>	<b>255 days</b>															
719	ELSW & Footing construction	05-12-15	16-01-16	30 days															
720	Footing to G/F beam and slab construction and UG Drainage Works	18-01-16	19-05-16	90 days															
721	G/F - roof construction	20-05-16	27-09-16	90 days															
722	Planter wall & other RC features on roof	28-09-16	21-11-16	45 days															
723	<b>Zone 3</b>	<b>22-12-15</b>	<b>29-12-16</b>	<b>273 days</b>															
724	ELSW & Footing construction	22-12-15	29-01-16	28 days															
725	Footing to G/F beam and slab construction and UG Drainage Works	30-01-16	20-05-16	80 days															
726	G/F - roof construction	23-05-16	28-09-16	90 days															
727	Planter wall & other RC features on roof	05-11-16	29-12-16	45 days															
728	<b>Zone 4 (After Removal of Tower Crane for Block 2)</b>	<b>18-06-16</b>	<b>23-03-17</b>	<b>209 days</b>															
729	ELSW & Footing construction	18-06-16	09-07-16	14 days															
730	Footing to G/F beam and slab construction and UG Drainage Works	11-07-16	30-08-16	35 days															
731	G/F - M/F construction	31-08-16	31-10-16	50 days															
732	M/F - roof construction	31-10-16	17-12-16	42 days															
733	Planter wall & other RC features on roof	06-01-17	16-03-17	50 days															
734	F.S. Water Tank and Roof Slab	06-01-17	23-03-17	55 days															
735	<b>Finishing Works</b>	<b>25-10-16</b>	<b>16-08-17</b>	<b>219 days</b>															
736	Roof Finishing Works	15-02-17	16-08-17	130 days															
737	Internal Finishing Works	25-10-16	29-06-17	185 days															
738	External Wall Finishing Works	09-01-17	24-07-17	140 days															
739	<b>Building services installation</b>	<b>07-10-16</b>	<b>07-04-17</b>	<b>140 days</b>															
740	Builder's works & BS installation in G/F TX Rm + Switch Rm	25-10-16	01-11-16	7 days															
741	Clear 1.5m area on external U/G cable	01-11-16	01-11-16	0 days															
742	Make available vehicular access to Tx Rm	01-11-16	01-11-16	0 days															
743	Handover Main Switch Room to NSC	01-11-16	01-11-16	0 days															
744	Handover TX Rm to CLP	01-11-16	01-11-16	0 days															
745	CLP installation in TX Rm. & lead-in cables wiring	01-11-16	16-12-16	45 edays															
746	Power energisation to Wet Market by CLP	16-12-16	03-01-17	14 days															
747	Builder's works & BS installation in M/F Genset Rm	01-11-16	16-11-16	14 days															
748	Handover Genset Rm to NSC	16-11-16	16-11-16	0 days															
749	Genset installation by NSC	17-11-16	21-12-16	30 days															
750	Builder's works & BS installation in M/F FS Pump Rm + G/F FS Control Rm	06-02-17	07-03-17	22 days															
751	Handover M/F FS Pump Rm + G/F FS Control Rm to NSC	07-03-17	07-03-17	0 days															
752	FS Installation & Water Pump Installation	08-03-17	07-04-17	23 days															
753	Handover Chiller Plant Room to NSC	07-10-16	07-10-16	0 days															
754	Handover AHU Room and Fan Room to NSC	05-12-16	05-12-16	0 days															
755	AHU System Installation	07-12-16	07-04-17	90 days															
756	<b>Section 6 - Fit-out to Wet Market</b>	<b>17-12-14</b>	<b>24-08-17</b>	<b>719 days</b>															
757	Confirmation for the Scope for Fitting-out of Wet Market	17-12-14	17-12-14	0 days															

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Construction of Public Rental Housing Development at Tung Chung Area 56

ID	Task Name	Start	Finish	Duration	2014		2015			2016			2017							
					1st Quarter		4th Quarter		3rd Quarter		2nd Quarter		1st Quarter		4th Qua					
					Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep			
758	Issue Drawings for Fitting-out of Wet Market (SI - A053)	17-12-14	17-12-14	0 days																
759	Wet & Dry Stall Installation	29-10-16	14-06-17	170 days																
760	GMS Bulkhead & Signage Installation	21-12-16	26-07-17	155 days																
761	Associated Building Services Installation	25-11-16	07-04-17	100 days																
762	Inspection & Handover	27-07-17	24-08-17	21 days																
763	<b>Section 7 - Estate Road, EVA, Carriageway &amp; Basement Car park</b>	<b>25-08-14</b>	<b>25-08-17</b>	<b>813 days</b>																
764	<b>Basement car park</b>	<b>25-08-14</b>	<b>21-08-17</b>	<b>809 days</b>																
765	<b>RC structure</b>	<b>25-08-14</b>	<b>21-03-17</b>	<b>701 days</b>																
766	Pipe pile installation & grout curtain	25-08-14	21-01-15	120 days																
767	Pumping test and report submission	22-01-15	07-02-15	15 days																
768	Submit as-built record to CM for Approval	09-02-15	11-03-15	22 days																
769	Submit ICU14 & Obtain CM's Approval for Bulk Excavation Work	11-03-15	02-04-15	22 edays																
770	ELS for the footing/Plate Load Test	07-04-15	07-09-15	109 days																
771	Submit as-built ELS record to CM	22-08-15	07-09-15	12 days																
772	Obtain consent for footing construction	05-08-15	07-09-15	24 days																
773	Footing construction	08-09-15	27-11-15	65 days																
774	Footing - G/F construction	13-11-15	25-05-16	143 days																
775	Dismantling of ELSW	14-10-15	01-06-16	173 days																
776	Waterproofing / Underground Drainage / On Grade Slab	02-06-16	27-02-17	200 days																
777	Link Bridge	29-12-16	21-03-17	60 days																
778	Green Platform	29-12-16	14-03-17	55 days																
779	<b>Finishes &amp; building services</b>	<b>10-02-17</b>	<b>21-08-17</b>	<b>136 days</b>																
780	Car park wall & ceiling finishes	28-02-17	12-06-17	74 days																
781	Building services & plant rooms installation	10-02-17	05-05-17	60 days																
782	Car park floor finishes	16-05-17	12-07-17	42 days																
783	Elevated walkway, bicycle parking & planter finishes	16-05-17	21-08-17	70 days																
784	Painting works & signage	16-05-17	07-08-17	60 days																
785	<b>Building services installation</b>	<b>09-03-17</b>	<b>06-07-17</b>	<b>85 days</b>																
786	Builder's works & BS installation in Fan Rm,FS Pump rm,Sump Pit Rm & Switch Rm	09-03-17	26-04-17	35 days																
787	Make Available the Fan Room to NSC	26-04-17	26-04-17	0 days																
788	Air Exhaust System Installation	27-04-17	06-07-17	50 days																
789	Make Available the Pump & Sump Pit Room to NSC	05-05-17	05-05-17	0 days																
790	FS pipe & water pump installation	08-05-17	04-07-17	42 days																
791	Make Available the Switch Room to NSC	26-04-17	26-04-17	0 days																
792	E & M installation	27-04-17	06-07-17	50 days																
793	<b>Estate Road, EVA &amp; Carriageway</b>	<b>10-04-15</b>	<b>25-08-17</b>	<b>633 days</b>																
794	Issuance of U/G drainage & Utilities/run-in Connections location to Road L16	10-04-15	10-04-15	0 days																
795	Make Available to Electrical sub-contractor the underground cable ducts and draw pits	03-05-17	03-05-17	0 days																
796	Make available to the Town Gas Co. the area along the external underground route	02-06-17	02-06-17	0 days																
797	Make available to the FTNS the area along the external underground route	03-04-17	03-04-17	0 days																
798	Underground Drainage & Utilities Installation (Details to be submitted separately)	15-10-15	02-06-17	440 days																
799	EVA	06-02-17	30-06-17	104 days																
800	Paving works	05-06-17	25-08-17	60 days																
801	External furniture	05-06-17	25-08-17	60 days																
802	Signage & Road marking	05-05-17	24-08-17	80 days																
803	CCTV for U/G Drainage System	05-06-17	25-08-17	60 days																
804	<b>Section 8 - Temporary Sewage Pumping Station including Rising Mains</b>	<b>25-11-14</b>	<b>22-02-17</b>	<b>608 days</b>																
805	Submit the EO to CM and EPD Approval	25-11-14	25-11-14	0 days																
806	Rising Mains for Sewage Pumping	15-08-16	13-10-16	46 days																
807	Plant & M&E Installation of the TSPS (4 months)	16-06-16	13-10-16	86 days																
808	Testing & Commissioning of the TSPS (more than 2 months)	14-10-16	22-02-17	104 days																
809	<b>Section 9 - Remaining Works</b>	<b>20-08-15</b>	<b>22-08-17</b>	<b>539 days</b>																



Construction of Public Rental Housing Development at Tung Chung Area 56

ID	Task Name	Start	Finish	Duration	2014				2015			2016			2017				
					1st Quarter			4th Quarter	3rd Quarter			2nd Quarter		1st Quarter		4th Qua			
					Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep	Jan	May	Sep		
810	<b>Last Manhole Connections (Details to be Submitted Separately)</b>	<b>16-11-15</b>	<b>25-07-17</b>	<b>451 days</b>															
811	Construction of Last Manholes (Tally w/ the Progress of Civil Works Contractor)	16-11-15	12-12-16	290 days															
812	Technical Audit by DSD	03-04-17	05-05-17	24 days															
813	Issuance of Acceptance Letter	25-07-17	25-07-17	0 days															
814	<b>Under Ground Pumping and F.S. Pipe Works (Details to be Submitted Separately)</b>	<b>06-08-16</b>	<b>04-05-17</b>	<b>204 days</b>															
815	Water Submains and Irrigation Water Pipe	06-08-16	04-05-17	204 days															
816	F.S. water pipe and sheet Fire Hydrant	24-10-16	04-05-17	146 days															
817	Master Water Meter Room	20-08-15	31-03-16	170 days															
818	<b>Amphitheatre/Open Plaza Construction (Details to be Submitted Separately)</b>	<b>06-08-16</b>	<b>09-08-17</b>	<b>273 days</b>															
819	ELSW and Plate Load Test	06-08-16	27-08-16	13 days															
820	Obtain Consent for Footing Construction	27-08-16	10-09-16	14 edays															
821	Construction of Footing for Amphitheatre	29-09-16	04-11-16	30 days															
822	Construction of Amphitheatre and Open Plaza	14-11-16	03-02-17	65 days															
823	Finishing Works for Amphitheatre	22-02-17	09-08-17	120 days															
824	Planter Construction (including planter finish)	02-03-17	08-08-17	113 days															
825	Pergola Construction	17-05-17	08-08-17	60 days															
826	Perimeter Fence Wall & Covered Walkway Construction	17-05-17	22-08-17	70 days															
827	<b>Final Inspection Processes</b>	<b>30-05-16</b>	<b>31-08-17</b>	<b>335 days</b>															
828	<b>Inspection by WSD</b>	<b>01-03-17</b>	<b>14-08-17</b>	<b>118 days</b>															
829	Submit Form WWO 46 Part IV for Plumbing	01-03-17	31-05-17	65 days															
830	WSD inspection for Plumbing	02-03-17	13-06-17	73 days															
831	Cleansing & Disinfection of the Plumbing System	14-06-17	11-07-17	20 days															
832	Water Samplig Test	12-07-17	08-08-17	20 days															
833	Obtain water cert for Plumbing	14-08-17	14-08-17	0 days															
834	Submit Form WWO 46 Part IV for FS	15-03-17	15-03-17	0 days															
835	WSD inspection for FS	16-03-17	30-06-17	76 days															
836	Obtain water cert for FS	07-07-17	07-07-17	0 days															
837	<b>Inspection by FSD</b>	<b>27-06-17</b>	<b>31-07-17</b>	<b>25 days</b>															
838	FS integration test (EL+FS+P&D)	27-06-17	10-07-17	10 days															
839	Submission of Form 314 & 501	10-07-17	10-07-17	0 days															
840	FSD Inspection	18-07-17	24-07-17	5 days															
841	Re-inspection	25-07-17	31-07-17	5 days															
842	Issuance of FS Cert	31-07-17	31-07-17	0 days															
843	<b>ICU Submission of OP</b>	<b>17-07-17</b>	<b>28-08-17</b>	<b>30 days</b>															
844	Latest submission to CM to prepare Record Plan	17-07-17	17-07-17	0 days															
845	Latest submission of Material+EMSD+FS+Water Cert for ICU13 Submission	28-08-17	28-08-17	0 days															
846	Submit Form ICU13 to CM Processing OP Application	31-08-17	31-08-17	0 days															
847	<b>Project Inspection and Handover</b>	<b>30-05-16</b>	<b>31-08-17</b>	<b>335 days</b>															
848	Water Tightness Test for VPBs	30-05-16	04-05-17	250 days															
849	Water Tightness Test for Kitchen and Refuse Storage Room	09-09-16	14-06-17	210 days															
850	Flat - to - flat Inspection and Handover	12-12-16	23-06-17	140 days															
851	Defect Rectification Works and Re-inspection	22-02-17	26-07-17	110 days															
852	Common Areas and External Area Inspection	30-06-17	27-07-17	20 days															
853	Finial Inspection of External Works	03-08-17	31-08-17	21 days															

## **APPENDIX D**

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### Specification of Odour Removal System



**By Hand**

Hsin Chong Construction Company Limited  
9/F, Hsin Chong Center  
107 – 109 Wai Yip Street  
Kwun Tong, Kowloon, Hong Kong

Ref. : J53G219541/22951

Date: 29<sup>th</sup> Sep 2017

Attn. : Mr. K. K. Li

Dear Sirs,

**RE : CONSTRUCTION OF PUBLIC RENTAL HOUSING DEVELOPMENT AT  
TUNG CHUNG AREA 56 (CONTRACT NO. 20120731)  
TEMPORARY SEWAGE PUMPING STATION  
Letter of Odour removal system**

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According to Hsin Chong requested by mail on 27th Sep 2017, we refer to captioned project and would like to submit following information for your reference.

According to PS 6.33.7 A JEC shall select, provide, deliver to work locations, install, test, commission and be liable to defects during two-year Defects Liability Period of one (1) set of the deodorizer for the TSPS.

According to PS 6.33.7 F (2), during the DLP period, the filter media shall have a breakthrough hydrogen sulphide concentration of not greater than 0.025 ppm at a constant inlet hydrogen sulphide concentration of 5ppm at maximum air flow as specified, and shall provide an overall efficiency of not less than 99.5%. For the hydrogen sulphide concentration from 0 to 3ppm, the maximum hydrogen sulphide concentration of the deodorized air shall not be more than 0.015ppm.

The odour commissioning test will be conducted on Early of December.

Following information will show as Appendix.

- 1.1 Catalogue of Activate carbon filter
- 1.2 Photo record of the deodorizer

Yours faithfully,  
The Jardine Engineering Corporation, Limited

C K Mok  
Project Manager  
E&M Contracting  
CK Mok/HM/hm  
Encl.

File: J53G219541-22951

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5/F Tower A Manulife Financial Centre  
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# **Appendix 1.1**

## **Catalogue of Activate carbon filter**



Hsin Chong Construction Company Limited  
9/F, Hsin Chong Center  
107 – 109 Wai Yip Street  
Kwun Tong, Kowloon, Hong Kong

Ref. : J53G219541/20968

Date: 14 January 2016

Attn. : Mr. Ivan HO (Site Agent)

Dear Sirs,

**RE : CONSTRUCTION OF PUBLIC RENTAL HOUSING DEVELOPMENT AT  
TUNG CHUNG AREA 56 (CONTRACT NO. 20120731)  
TEMPORARY SEWAGE PUMPING STATION  
MATERIAL SUBMISSION – ES11A, B, D & H – CARBON FILTER TANK,  
ACTIVATED CARBON FILTER, DEHUMIDIFIER AND EXTRACTION FAN**

We refer to the comments under HA ref. HD(BS1) SPS/926/1 dated 19 June 2015 and would like to submit our response in attached Comments and Responses for your onward submission to HA for approval.


Thank you for your attention.

Yours faithfully,  
The Jardine Engineering Corporation, Limited

  
CK Mok  
Project Manager  
E&M Contracting

CKM/HM/PM/hc  
Encl. 

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## Comments and Responses List

**Project** : Construction of Public Housing Development At Tung Chung Area 56  
**Contract no.** : 20120731  
**Submission Ref.** : J53G219541/ 20968  
**Comment Ref.** : Housing Authority : HD(BS1) SPS/926/1 Hsin Chong : HCC/283/L2477/HD/1931  
**Title** : Equipment Submission ES11A – Carbon Filter Tank  
 – Equipment Submission ES11B – Activated Carbon Filter  
 – Equipment Submission ES11D –Dehumidifier  
 – Equipment Submission ES11H –Extraction Fan

Material Description	Response by JEC
Carbon Filter Tank	Approved subject to incorporation of comments / remarks 1 and 4.
Activated Carbon Filter	Approved subject to incorporation of comments / remarks 1 and 5.
Dehumidifier	
Extraction Fan	

Item Number	Comment	Response JEC
1	Please explain with substantiation for each “NA” reply to Specification Clauses or confirm compliance.	Please refer to the revised Compliance List.
2	Please confirm that your reply marked with “Noted” to each Specification clause means compliance of the clause	Please refer to the revised Compliance List.
3	Please confirm the compliance of the Specification Clause 6.33.7(H) regarding the H2S detection system in DO unit	Please refer to the revised Compliance List. The H2S sensor will be submitted separately.
4	Please confirm the compliance of the Specification Clause 6.33.7 (I) regarding air ducts of DO System	Please refer to the revised Compliance List.
5	Please specify the place of manufacturer for reference.	Provided in the revised schedule of particular.

**TEMPORARY SEWAGE PUMPING STATION  
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~~(13) All functions, such as 'start/On', 'stop/OFF', 'stay-put-key-release-type "emergency stop" pushbuttons, all indication lamps, individual fault indication lamps for each type of fault condition, fault reset, motor starters, overload protection units, etc. which are required for the operation at normal and fault condition shall be repeated at these local control panels.~~

**6.33.7 DEODORIZATION SYSTEM**

(A) **The Contractor shall select, provide, deliver to work locations, install, test, commission and be liable to defects during two-year Defects Liability Period of one (1) set of the deodorizer for the TSPS.** The deodorizer shall consist of one (1) activated carbon filter, one (1) set of pre-filter unit, mist-filter and after-filter unit, one (1) set of differential pressure gauge, one (1) set of desiccant type dehumidifier, two (2) numbers of centrifugal fans with variable motor drives and flexible coupling connector, volume control dampers, silencer, acoustic enclosure, air ducts, discharge hood and two (2) sets of hydrogen sulphide detection sensors.

Comply

(B) The deodorizer shall be designed to extract foul air from wet wells, screen chambers, inlet chamber, pump hall, screen house, screenings enclosures and toilet etc. of the TSPS. It shall deodorize the foul air by passing through activated carbon filter beds and discharge the deodorized air to atmosphere at a direction away from the sensitive receivers of the pumping station through two weatherproof louvers of a dog house at roof. The Contractor shall coordinate with the Main Contractor before installing the weatherproof stainless steel louvers and arrange the discharge air duct at least 150mm above the roof finished floor level and fabricate the discharge air duct in a shape effectively discharging the deodorized air to outside. The Contractor shall apply proper sealants along the edges of louvers to mitigate the risk of water leakage or seepage into the dog house.

Comply

(C) The deodorizer shall be able to continuously handle air flows of not less than the following air change per hour with hydrogen sulphide concentration of 5 ppm.

Comply

Scenario	Minimum Required Flow Rate (m <sup>3</sup> /s)	Minimum No. of Air Change Per Hour	Handling Area(s)
Normal Mode (that is, without maintenance work in process)	0.44	4	Inlet Chamber, Screen Chamber, Screenings Enclosures, Wet Well and Toilet
Maintenance Mode at Screen House	1.42	12	Inlet Chamber, Screen Chamber, Screenings Enclosures, Wet Well, Toilet and Screen House
Maintenance Mode at Pump Hall	1.95	12	Inlet Chamber, Screen Chamber, Screenings Enclosures, Wet Well, Toilet and Pump Hall

Comply

(D) The Contractor shall be responsible for the design of the deodorization system based on

**TEMPORARY SEWAGE PUMPING STATION  
(ELECTRICAL & MECHANICAL WORKS)**

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actual site condition and submit the design calculations of the deodorizer, all air ducts, identification of ductwork to BS4800 to the Engineer/Engineer's Representative for approval.

(E) If installation of deodorizer is unlikely to be installed due to presence of floor opening, the Contractor shall be responsible for relocation of such floor opening to a location agreed by the Engineer/Engineer's Representative at no extra cost to the Employer.

Comply

(F) Deodorizers (Non-impregnated Activated Carbon Filter)

(1) The deodorizer shall use non-impregnated activated carbon ("activated carbon" hereinafter) as filter media to treat the extracted foul air before discharging to atmosphere. The Contractor shall provide the initial filling of the filter media at installation stage and arrange a complete replacement of the used filter media each year over the two-year Defects Liability Period. The Contractor shall provide test certificate to verify the capacity of the activated carbon for initial filling. The replacement filter media shall only be delivered to Site towards the end of two-year Defects Liability Period.

Comply

(2) The filter media shall have a breakthrough hydrogen sulphide concentration of not greater than 0.025 ppm at a constant inlet hydrogen sulphide concentration of 5ppm at maximum air flow as specified, and shall provide an overall efficiency of not less than 99.5%. For the hydrogen sulphide concentration from 0 to 3ppm, the maximum hydrogen sulphide concentration of the deodorized air shall not be more than 0.015ppm. Removal efficiency test report shall be submitted for the Engineer's approval.

Comply

(3) The housing of the activated carbon filter shall be fabricated from flame retardant glass fibre reinforced plastic resins (GRP) or approved equivalent. The supporting framework and all metallic fittings for the activated carbon filter shall be made of stainless steel.

Comply

(4) The activated carbon filter shall be provided with access hatches at level not higher than 1 m above the finished floor for replacement of filter media. All hinges, hold-down lever and accessories shall be made of stainless steel. In addition to the access hatches, media test ports shall be provided.

Comply

(5) Maintenance platform complete with hand-railings, toe board, step ladder and etc. shall be provided for the activated carbon filter by the Contractor. The maintenance platform shall be made of GRP or approved equivalent. The detailed designs of GRP maintenance platforms, together with structural calculations endorsed by Registered Structural Engineer (RSE) and Independent Checking Engineer (ICE), shall be submitted to the Engineer for approval prior to fabrication.

Comply

(6) The vessel of the deodorizer shall be fabricated from flame retardant glass fibre reinforced plastic resins (GRP) or approved equivalent. The supporting frameworks and all metallic fittings for the deodorizer shall be made of stainless steel grade 316. The vessel shall be furnished with a bottom drain valve with associated drain pipe to nearby drain. The bottom of the vessel shall be fabricated to have an inclination with fall to the bottom of the drain point.

Comply

Comply

(7) All pipework and drain valve shall be constructed of a material suitable for handling with acidic water containing sulfuric acid at temperature between 50°C and 70°C.



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- (8) All vessels shall be provided with access hatches at level not higher than 1,000 mm above the finished floor for replacement of filter media. The access hatches shall be sealed up with gaskets to prevent the foul air from being leaked. All hinges, hold-down lever and accessories shall be made of stainless steel grade 316. In addition to the access hatches, media test ports shall be provided.

Comply

(G) Dehumidifier

- (1) The cabinet of the dehumidifier shall be constructed from stainless steel with all orifices covered with stainless steel wire mesh and measuring device with covered base.
- (2) Stainless steel weatherproof enclosure shall be provided for the dehumidifier. The configuration of the whole unit shall be submitted to the Engineer or his Representative for review and approval before ordering.
- (3) The dehumidifier shall be designed to have the dry air capacity to meet the optimal operation point of the deodorizer in a condition that the temperature and humidity of the mixed air (heated ambient air plus the extracted foul air from TSPS) are best for the activated carbon filters to adsorb the foul particles.

Comply

Comply

Comply

(H) Hydrogen Sulphide Detection Systems

- (1) The hydrogen sulphide concentration of the foul air and the deodorized air shall be continuous monitored by the hydrogen sulphide detection system. The system shall be able to determine the hydrogen sulphide concentration in the range from 0 ppm to 50 ppm and from 0 to 1,000 ppb respectively, shall give a local visual indication of the concentration. Apart from the local visual indication, the H<sub>2</sub>S concentration levels before and after the filter media shall be repeated to the MACS of TCSPS and SHWSTW for on-line monitoring. The enclosures for the sensors and transmitters shall have IP 65 protection or better. The monitors shall be of electronic type with IP 66 protection.
- (2) When the inlet hydrogen sulphide concentration is found over 10 ppm, a local audible and visual alarm shall be activated. When the audible alarm is activated for an adjustable time of 0 to 60 seconds, the ongoing audible alarm shall be automatically muted but the light shall remain steady ON until the inlet hydrogen sulphide concentration is lower than 10 ppm or the alarm is reset. The operator should also be able to mute the audible alarm locally by pressing "Silence" button.
- (3) The Contractor shall provide one (1) set of portable calibrator complete with test point adaptors, seal kit and carrying case for on-site calibration and testing of the hydrogen sulphide detection system.

Complied

(I) Extraction Fans and Air Ducts

- (1) The motors of extraction fans shall have class F insulation and an enclosure with a lifting eye bolt for easy mobilization and protection to IP 55. The motor shall be suitable for variable speed drive running and generates low noise and no high sound pitch at specified operation speeds. The extraction fans shall be equipped with

Comply

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ADDENDUM NO. 1

Comply

variable speed drives (VSDs) which shall be installed in the local control panel. The Contractor shall submit the current, power, pitch frequency, speed, efficiency, temperature and sound pressure level in dBA measured at 1 m from each fan motor at all operation speeds to the Engineer or his Representative for review. The sound power level of the fan at any speed shall not exceed 73 dB(A). The Contractor shall provide noise abatement at no cost to the Employer if the sound power level measured at work location is beyond the acceptable level.

(2) The extraction fans shall deliver the specified extraction flow rate as required in the relevant Clause of Particular Specification. The motor control panels shall be fitted with bypass starters for maintaining the extraction fans in operation when the main starter malfunctions. The fan cowl of each motor shall be provided with separately-driven fan for motor cooling. The fan motors shall have a service factor of 1.15 times the rated shaft power and sized to operate throughout the entire fan performance curve.

Comply

(3) The minimum rated efficiencies of fans shall comply with Clause 3.3(g) of General Specification.

Comply

(4) Two fans in one duty and one standby arrangement shall be provided. The centrifugal fans shall be capable of providing the maximum airflow as specified against the respective system loss. Design calculation for the ventilation shall be submitted to the Engineer for approval before manufacturing. The fan impellers and casings in contact with the air extracted shall be made of GRP.

Comply

(5) Manual speed adjustment shall be available on the local control panel and through MACS at TCSPS and SHWSTW.

Comply

(6) The motors of extraction fans shall be of variable speed type and shall meet the limit of wattage consumption (W) per air flow (L/s) as stated in the BEC. The Contractor shall determine the running speeds of the extraction fan as per the specified air flow requirements in sub-clause (C) above before manufacturing. Operation mode selection with respect to different speed shall be provided at the local control panel. The Contractor shall carefully read the Drawings and understand the control philosophy in relation to the ventilation system before manufacturing the control panel.

Comply

Pumping Station	Operation Modes	Handling Area(s)
Tung Chung Area 56 Temporary SPS with Maintenance Mode 1 (at Screen House)	Low Speed	Inlet Chamber, Screen Chamber, Screenings Enclosures, Distribution Chamber, Wet Well and Toilet
	High Speed 1	Inlet Chamber, Screen Chamber, Screenings Enclosures, Distribution Chamber, Wet Well, Toilet and Screen House
Tung Chung Area 56 Temporary SPS with Maintenance Mode 2 (at Pump Hall)	Low Speed	Inlet Chamber, Screen Chamber, Screenings Enclosures, Distribution Chamber, Wet Well and Toilet

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Mode 2 (at Pump Hall)	High Speed 2	Inlet Chamber, Screen Chamber, Screenings Enclosures, Distribution Chamber, Wet Well, Toilet and Pump Hall
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(7) Interlocking schemes between the deodorizers and ventilation fans at Pump Hall shall be provided. When the Pump Hall or Screen House is served by the deodorizer in the event of the pump(s) being removed from the wet well or inlet screen/screenings container(s) being taken out from the enclosure, the respective zone ventilation system shall be isolated to prevent foul air escaping into atmosphere. Manual bypass switch for interlocking system shall be provided.

Comply

(8) Manually operated volume control dampers and motorized shut-off dampers with manual winches shall be provided on all main ducts and branches for regulation and balancing the system. All dampers shall include a means for indicating externally the position of the blades and shall include a device for positioning and locking the damper blades. The positions of all dampers 'as-set' after final regulation shall be indelibly marked at the adjusting device. Each damper shall be provided with a pair of micro-switches to indicate its respective position.

Comply

Comply to PS6.33.7(1)(1), for the noise criteria, material and construction of enclosure comply to the clause.

(9) The noise level of the fan shall not exceed 5 dBA above the background noise level measured at 1m from the discharge hood. Should this not be met by the deodorizers during testing and commissioning stage, the Contractor shall provide and install noise abatement equipment to attain the required noise level without any extra cost incurred. All metalwork of the noise abatement equipment shall be made of stainless steel. An acoustic enclosure for the fans shall be provided if necessary, without any extra cost to the Employer.

(10) Air ducts shall be made of stainless steel grade 316 with minimum thickness of 1.0 mm. All other metal parts of the ductwork shall also be made of stainless steel grade 316. The air leakage limit shall comply with the BEC. The ducts and fittings shall be designed and constructed with all necessary accessories to minimize waste of energy and pressure losses due to eddies, vortices, etc. Adequate supports and other necessary absorbers and fittings for reducing noise/ vibration shall be provided.

Comply

(11) Cleaning points and services openings shall be provided in air ductwork systems. The cleaning points and services openings shall in general be installed in fully accessible locations. The Contractor shall also provide sufficient drain points to air ductwork and extraction fans complete with automatic drain valves, bypass manual drain valves and all necessary pipework to nearby drain.

Comply

(12) The Contractor shall provide on each main air duct with a duct mounted temperature and humidity sensor complete with a transmitter, a local LCD/LED display with font size 20mm and one decimal point, 4 - 20 mA output signals/ 0 - 10V output signals and all necessary accessories. The measurement ranges of relative humidity and temperature shall be 0 - 100% RH and 0 - 60°C respectively.

Comply. But the size is only 18mm

(13) The Contractor shall provide on each main air duct with an air velocity sensor complete with a transmitter, a local LCD/LED display with 20mm font size and one decimal point, 4 - 20 mA output signals and all necessary accessories. 18mm

Comply. But the size is only 18mm

(14) A damper shall be installed at the upstream of the mist eliminator and prefilter,

Comply

**TEMPORARY SEWAGE PUMPING STATION  
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which enables the isolation of the deodorizer for maintenance purpose.

(15) Noise and vibration shall not be transmitted to the structure or any other element through hangers and brackets. Flexible connection for joining the ductwork with the extraction fan shall be provided. CPC (Earth) cables shall be provided across the flexible connection.

(16) The Contractor shall provide a silencer in the discharge ductwork of deodorizers and acoustic enclosure over the motor-fan to attenuate the sound levels to the specified allowable noise level, if required. The Contractor shall submit the acoustic calculation to prove the provision fulfilling the noise criteria for the Engineer's approval under the Contract.

(17) All intake openings shall be fitted with stainless steel grade 316 wire guards.

(18) GRP discharge hood complete with stainless steel insect guard shall be provided.

(19) Ductwork as shown in the Drawings is for indication purposes. The Contractor shall be responsible for the sizing and detailing of the complete ductwork arrangement, inclusive of fittings, dampers, grilles, cleaning points, services openings etc., and shall submit detailed calculations on the extraction system for the Engineer's approval.

(20) The Contractor shall provide all the accessories and equipment necessary to comply with FSD's requirements at no extra cost to the Employer. The Contractor shall coordinate with and provide necessary document to the FSWP NSC on submission to FSD for approval.

(21) All ductwork shall be constructed to the recommendation of the U.K. Heating and Ventilation Contractors Association (HVAC); ductwork group as summarized in their publication DW/142: "Sheet Metal Ductwork Specification for Low, Medium and High pressure/Velocity Air Systems". The recommendations for low velocity systems shall be applicable for this Contract. The Contractor shall also submit the identification of ductwork to BS 4800 for the Engineer or his Representative's approval.

(22) The Contractor shall test and demonstrate the air tightness of the ductwork by measuring and comparing the total air flows at the inlet and discharge points. The air leakage limit shall comply with the BEC. Discrepancy between the total inlet and discharge volume shall not be greater than 5%.

(J) Control and Alarm

(1) General

(a) Each deodorizer has three modes of operation, "Local Manual" control, "Remote Manual" control and "Automatic" control. Key-lockable selector switches shall be provided at the local control panel for manual selection of operating mode.

(2) Automatic Control

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(a) When the "Automatic" control mode is selected, the deodorizers shall be controlled by means of 24-hour timers adjustable from 0 - 60 minutes. Besides, the operators shall be allowed to manually adjust or reset any control parameter values of deodorizer at any time through the workstation of MACS at the TCSPS and SHWSTW. Extraction fan duty selection shall be available at the workstation of MACS.

Comply

(b) Under the "Automatic" control mode, the duty extraction fan shall automatically run at a preset schedule or a running speed according to the number of manually operated volume control dampers to be fully opened.

Comply with condition

(c) When the duty extraction fan failed, the standby fan shall take up the duty automatically and the signal for automatically changeover of fan shall be initiated locally and also repeated to the MACS at the TCSPS and SHWSTW.

Comply

(3) Manual Control

(a) When the "Remote Manual" control mode is selected, the deodorizers shall be remote-controlled at the workstation of MACS at the TCSPS and SHWSTW through manual input.

Comply

(b) When "Local Manual" control mode is selected, each deodorizer shall be controlled by the "Start/ Stop/ Emergency Stop" push buttons at the local control panel, on a suitable rigid stainless steel grade 316 or better material framework solidly anchored to the concrete foundation, or at locations as approved by the Engineer. Manually speed adjustment for the duty fan shall be available in this manual control mode. The local manual control shall override the remote manual control, but monitoring function of the deodorizer's status shall be available.

Comply

(4) Requirements of Local Control Panel

(a) The Contractor shall provide a local control panel for each deodorizer. The details of local control panels shall be submitted to the Engineer for approval. The exact location of the local control panel shall be determined at work location.

Comply

(b) Each local control panel shall be provided with the following items:

(i) Energy monitoring meter for reading the real-time phase currents, phase and line voltages, frequency, power factor, power active and reactive power, apparent power, kWh of the deodorizer's extraction fan. The energy monitoring meter shall be able to transmit the measured data to the MACS of the TCSPS and SHWSTW for logging-on and on-line monitoring. They shall be capable of handling and sending min. 5 seconds interval of measuring data (can be adjusted from 5 seconds to 1 hour);

Comply

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Comply but without neutral position (ii) Automatic/ off/ manual key-lockable selector switch with neutral position;

Comply (iii) Remote/ local manual key-lockable selector switch;

Comply (iv) Hour-run meters;

Comply (v) Key-lockable selector for selection of operation modes (normal/pump hall maintenance/screen house maintenance); This status shall repeat to MACS at TCSPS and SHWSTW;

Comply (vi) Push-buttons for manual "Start" and "Stop" control, "Emergency Stop", "Reset" and "Lamp Test";

Comply (vii) "Stopped", "Emergency Stop Pressed", "Local Control", and "Remote Control" indication lamps;

Comply (viii) Indications for selected operating modes with which handling areas are being served;

Comply (ix) Operating frequency of VSD for the duty fan;

Comply of the speed for the mode mentioned at Clause 6.33.7(C)

Comply (x) Operating mode of the duty fan (high/high/low speed);

Comply (xi) LED indication lamps for fault signals, but not limited to the following:-

High1/High2/Low Speed (High 1 & High 2 for Maintenance Mode of Pump Hall and Screen House)

- Fan fault;
- H<sub>2</sub>S breakthrough alarm;
- Prefilter clog;
- Carbon media clog;
- Afterfilter clog;
- Inlet H<sub>2</sub>S sensor Fault; and
- Outlet H<sub>2</sub>S sensor Fault

Comply (xii) "Duty" and "Standby" LED indication lamps for extraction fans;

Comply (xiii) Inlet H<sub>2</sub>S concentration; and

Comply (xiv) Outlet H<sub>2</sub>S concentration.

Comply (e) Running/ stopped status of the deodorizers shall be repeated to the MACS of TCSPS AND SHWSTW. A common alarm of the deodorizer shall also be transmitted to the MACS of the TCSPS AND SHWSTW whenever the following conditions arise:

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Comply

- (i) Phase or supply mains failure;
- (ii) Fan fault;
- (iii) H<sub>2</sub>S breakthrough alarm;
- (iv) Prefilter clog;
- (v) Carbon media clog;
- (vi) Afterfilter clog;
- (vii) Inlet H<sub>2</sub>S sensor fault;
- (viii) Outlet H<sub>2</sub>S sensor fault; and
- (ix) High outlet H<sub>2</sub>S concentration.

**(K) Testing and Commissioning**

Comply

- (1) The Contractor shall carry out a performance test for the deodorizer before completion of Works to verify the hydrogen sulphide removal efficiency taking into account temperature, humidity, air velocity and carbon contact time. The test shall be carried out for three (3) consecutive days without any major faults or alarms requiring attendance at work location. Removal efficiency is defined as:

$$\% \text{ removal} = \frac{(\text{inlet concentration} - \text{outlet concentration})}{\text{inlet concentration}} \times 100\% \text{ H}_2\text{S}$$

Comply

- (2) If there is no/ insufficient foul air for the test, the test shall be carried out by a recognized laboratory, which shall set up a scale down model in the laboratory and simulate the operating parameters likely to occur in reality for the test. The testing parameters adopted in the test shall be submitted to the Engineer for approval. The Contractor shall take into account temperature, humidity, air velocity and carbon contact time during the test to determine the overall hydrogen sulphide removal efficiency. The performance test shall be considered successful if, the following removal efficiency performance criteria can be achieved:

Inlet H <sub>2</sub> S Concentration	Removal Efficiency
3 ppm to 5 ppm	At least 99.5%
< 3 ppm	The outlet H <sub>2</sub> S concentration shall not be higher 0.02 ppm.

Comply

- (3) Samples of foul air and deodorized air shall be taken and tested for the verification of the accuracy of the H<sub>2</sub>S detection system. If there is no foul air when the unit is commissioned, the Contractor shall use the artificial hydrogen sulphide gas for verification of the accuracy of the H<sub>2</sub>S detection system. Sampling and testing of

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H<sub>2</sub>S detection system shall also be conducted by the recognized laboratory.

Comply

- (4) If the test fails to verify the required removal efficiency as specified in this Specification, the Contractor shall modify the system to comply with the Specification and carry out the test again until it complies with the Specification at his own costs.

Comply

- (5) All costs incurred for the tests and re-tests, including labour, testing equipment, materials and all necessary accessories shall be provided by the Contractor.

~~(L) Odour Monitoring System~~

- (1) The Contractor shall provide a total of four (4) sets of on-line odour monitoring systems and all other associated power and signal cables as shown in the Drawings.
- (2) The requirements for the system being installed at different part of the TSPS are as follows: -

Location	H <sub>2</sub> S Range (ppm)	Lowest Measureable Level (ppm)
Deodorization Area at Pump Hall	0 - 10.00	< = 0.01
Coarse Inlet Screen at Screen House	0 - 10.00	< = 0.01

- (3) The system shall be designed to draw air sample with a built-in sampling pump from a monitoring location and furnished with a digital readout and alarms relays.
- (4) The system shall provide an analog transmission of 4 – 20 mA and dry contact relay outputs.
- (5) The system shall provide self-diagnostic functions including but not limited to trouble, low flow, system failure, communication error and zero correction.
- (6) The system shall be operated on voltage 220V, +/- 6%, 50Hz, single phase with or without an AC adaptor.
- (7) An IP 54 enclosure shall be provided for housing of the system. The reading shall be displayed on the local control panel with 200mm in height and connected to the SCADA system and repeated to the Remote Control Centre at TCSPS and SHWSTW.
- (8) The Contractor shall provide all necessary hardware and software in order to display the on-line reading and logging the readings of each of the detectors.
- (9) The Contractor shall provide one (1) set of portable calibrator complete with test point adaptors, seal kit and carrying case for on-site calibration and testing of the odour monitoring system.



## General Specification for E&M Sewerage Facility Installations

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- ~~(e) The Contractor shall be required to calibrate each orifice at Site. The method of calibration shall be submitted to the Engineer for approval before the tests.~~
- ~~(f) A separate temperature sensor shall be provided for each air main to monitor and report air temperature.~~

### 2.17 Deodorization System

#### 2.17.1 General

- (a) Materials used in the construction of the deodorization system shall be resistant to corrosive attacks and suitable for its working environment. The components of the deodorization system, including ductwork, dampers, louvers, air grilles, supports, fixings, guards, fan casing etc., shall be of grade 316 stainless steel or glass reinforced plastic (GRP) or equivalent.  
Comply
- (b) Contaminated air shall be taken from the source through ductwork, delivered to the deodorization system and discharged to atmosphere with sufficient height. The location of the discharge outlet should not be less than 5m away from any windows, doors and intake of ventilation system of buildings.  
Comply
- (c) The deodorization system shall be designed for continuous operation in 24 hours a day, 7 days a week in an outdoor environment.  
Comply
- (d) The deodorization system shall be automatically controlled and connected to the SCADA/PLC system for control and monitoring purposes.  
Comply
- (e) All openings of the deodorizer shall be sealed up with gasket to prevent odour leaked to the surrounding area.  
Comply
- (f) The deodorization system shall be rated to handle 100% of the specified air flow and odour loading as specified in the Particular Specification.  
Comply
- (g) Access manholes shall be provided to allow access to the deodorizer for inspection, removal and maintenance purposes. The deodorizer shall include with all piping, valves and fittings. Lifting and hold down lugs shall be provided.  
Comply
- (h) Supporting framework and maintenance platform including handrailings, toe boards, non-skid tread surface, etc. for the deodorizer shall be provided for the operation and inspection. The entire system shall be factory assembled and made of grade 316 stainless steel or GRP or equivalent. All bolts and fasteners including anchor bolts and flange bolts shall be grade 316 stainless steel.  
Comply
- (i) Hydrogen Sulphide (H<sub>2</sub>S) removal efficiency shall meet the requirement as specified in the Particular Specification.  
Comply

General Specification for E&M Sewerage Facility Installations

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- ~~(b) Chemical metering pumps shall be positive displacement, mechanical diaphragm type. All chemical metering pumps shall be suitable for 24 hours per day operation.~~
- (c) The pumps shall be operated on 220V/single phase/50Hz. Housing of the pumps shall be corrosion proof as well as dust and water proof to Class IP65. The housing shall be constructed from UPVC and impeller shall be viton diaphragm.
- (d) Chemical metering pumps shall dose to maintain the desired concentration of the scrubbing liquid. NaOH shall be controlled with pH analyzer to maintain an optimal pH value while NaOCl shall be controlled with ORP analyzer to maintain an ORP value.
- (e) Each pump shall be automatically shut off if a low level is sensed in the appropriate chemical tanks.
- (f) Pipes, valves, fittings and all other items necessary for the proper functioning of the system shall be provided. Pipework shall be made of polyethylene or other materials suitable for the chemical solutions.
- (g) The chemical feed line shall be protected with UPVC sleeve (pipe-in-pipe design) to prevent leaking of chemical to atmospheric. Transparent sight tube with drain valve shall be provided at appropriate locations along the pipeline for monitoring leakage of chemical.
- (h) The installation of chemical storage system shall comply with the latest requirements of the Fire Services Department (FSD), and the General Specification of Fire Services Installation in Government Buildings, Hong Kong, 1997 Edition. All associated equipment shall be of types approved by FSD.

2.17.7 Activated Carbon System

- (a) The activated carbon system shall be completed with desiccant type dehumidifier.  
Comply
- (b) The activated carbon system shall be designed to extract foul air from the areas at an air flow rate as specified in the Particular Specification, deodorize the foul air by passing through an activated carbon filter bed and discharge the deodourised air to atmosphere.  
Comply
- (c) The activated carbon system shall be properly fixed to suit the site environment condition.  
Comply

2.17.8 Activated Carbon Filter

- (a) The activated carbon filter housing shall be of prefabricated type and suitable for the application. The activated carbon bed shall be fitted on stainless steel

General Specification for E&M Sewerage Facility Installations

Comply perforated sheet / GRP grid with permanent rigid support. Filter housing shall be equipped with media loading port on the top and media gravity unloading port at the side.

(b) Comply The filter media shall also be totally inorganic, non-toxic, self-incombustible and not support any bacterial or microbial growth.

Comply with NaOH impregnated activated carbon is used as per PS.

(c) The filter media shall be potassium hydroxide (KOH) impregnated activated carbon and suitable for adsorption of odourous compounds such as hydrogen sulphide, ammonia and mercaptans. The impregnated activated carbon shall be made of coal substrate. (NaOH)

(d) Comply The air velocity through the carbon filter media shall not be greater than 0.3 m/s with an overall carbon contact time of not less than 3.0 seconds at maximum flow condition and shall provide a maximum removal efficiency of 99.5% at 5ppm concentration. The breakthrough time of the carbon filter beds shall not be less than twelve (12) months under continuous operation as specified.

Range will comply to PS

(e) A system for monitoring the H<sub>2</sub>S concentration before and after the filter media shall be provided. The monitor shall have visual indication of the H<sub>2</sub>S concentration ranging from 0ppm to 10ppm. The monitor shall be electronic type with IP 66 rating.

(f) Comply Access hatches and media test port of the activated carbon filter shall be at a level not higher than 1 m above the finished floor for replacement of filter media.

Comply

(g) Prefilter and after-filter unit shall be installed at the inlet and outlet of the activated carbon unit for the removal of particulate. It shall be in a readily accessible and removable frame and have an average efficiency of not less than 40% when tested in accordance with ASHRAE 52-76. The prefilter and the framework shall be made of stainless steel grade 316. The prefilter shall be designed so as to facilitate side removal of the filter elements. After filter shall have at least 90% particulate removal efficiency and be of disposable type.

Comply

(h) Differential pressure gauges shall be installed to measure the pressure drop across all filters, including activated carbon filter, prefilter and after filter. Alarm indication at the control panel shall be provided in the case of a preset level of high pressure drop is detected.

Desiccant type dehumidifiers will be provided and moisture will less than 85%. So, no mist will form. No mist eliminator is required.

(i) Mist eliminator shall be provided and made of grade 316 stainless steel housed in stainless steel grade 316 frame. The mist removal efficiency shall not be less than 98% on 20 micron moisture droplets.

General Specification for E&M Sewerage Facility Installations

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2.17.9 Dehumidifier

- (a) Comply Fresh air shall be first drawn into the dehumidifier, dried and then discharged into the foul air steam. The mixed air is then to the activated carbon filter; No foul air shall be in contact with the dehumidifier.
- (b) Comply Dehumidifier shall be provided to reduce the relatively humidity of the foul air into 85%RH(max) under any conditions.
- (c) Comply The dehumidifier shall be sorption type. The dehumidifier shall complete with high efficiency, incombustible, non-toxic Silica Gel impregnated rotor; process air fan, reactivation air fan, electrical heater, air filters, control panel and duct type remote humidistat. The rotor shall be washable.

2.17.10 Site Testing and Commissioning

- (a)  On completion of erection of each item of equipment, test and commissioning of the deodorization system shall be carried out to prove that the system be proper functions/performance under good and safe working condition.
- (b)  Testing procedures shall be submitted. Any specific requirements of individual equipment suppliers shall be taken into account in these procedures.
- (c)  Site testing of all mechanical and electrical installations unless otherwise specified shall comply with Parts 2 and 3 of the General Specification.
- (d)  Performance test with an independent laboratory to verify the odour removal efficiency of the deodorization system shall be conducted.
- (e)  At least two sampling tests for the system, one for inlet gases and the other for outlet gases, to verify the odour removal efficiency of the odour control system shall be carried out. The complete testing procedure shall be as recommended by the manufacturer and details of the testing shall be submitted for approval one month before the tests.
- (f)  All instrument including air floymeter, air differential gauge and H<sub>2</sub>S sensor shall be routine tested and functional tested. Calibration certificate for each instrument shall be submitted before the instrument leaving the manufacturers' place.
- (g)  The deodorization system shall be fully assembled at the place of manufacture and functional tested.
- (h)  If the removal efficiency falls below the specified performance, the system shall be modified to comply with the specified requirement.

General Specification for E&M Sewerage Facility Installations

Comply

- (i) Commissioning test shall be carried out and 3<sup>rd</sup> party testing certificate shall be obtained to verify the removal efficiency and proof test shall be carried out upon handover of plant to DSD.



Hsin Chong Construction Company Limited  
9/F, Hsin Chong Center  
107 - 109 Wai Yip Street  
Kwun Tong, Kowloon, Hong Kong

Ref. : J53G219541/20969

Date: 25 January 2016

Attn. : Mr. Ivan HO (Site Agent)

Dear Sirs,

**RE : CONSTRUCTION OF PUBLIC RENTAL HOUSING DEVELOPMENT AT  
TUNG CHUNG AREA 56 (CONTRACT NO. 20120731)  
TEMPORARY SEWAGE PUMPING STATION  
MATERIAL SUBMISSION - ES11C, E, F, G,I,J - PRE-FILTER & AFTER-  
FILTER, VSD, SENSOR AND DIFFERENTIAL PRESSURE GAUGE**

We refer to the captioned project and would like to submit hereafter 3 sets of our material submissions as list as supplementary sheet for your onward submission to HA for comment and approval.

Thank you for your attention.

Yours faithfully,  
The Jardine Engineering Corporation, Limited

CK Mok  
Project Manager  
E&M Contracting

CKM/HM/PM/hc  
Encl.

The Jardine Engineering Corporation, Limited  
5/F Tower A Manulife Financial Centre  
223-231 Wai Yip Street Kwun Tong Kowloon Hong Kong  
Tel (852) 2807 1717 Fax (852) 2887 9090  
www.jec.com



HONG KONG HOUSING AUTHORITY

BUILDING SERVICES MATERIAL SUBMISSION AND APPROVAL FORM

Contract Title	: Construction of Public Rental Housing Development at Tung Chung Area 56	Main Contractor's Letter Ref. No.	: _____
Contract No.	: 20120731	Date	: 28 January 2016
Ref. No. (HOMES)	: _____	Ref. No. of Previous Submission(s)	: _____
		(1)	: _____
		(2)	: _____

DETAILS OF SUBMISSION

To : Contract Manager's Representative (Attn : BSE / C 34)  
From : (Name of Main Contractor) Hsin Chong Construction Limited

The enclosed  Catalogue\*  Product Certificate\*  Specification Compliance Checklist\*  Certificate of Origin\*  Place of Manufacture\*  Technical Data\*  Calculation\*  Test Report\*  Job Reference\* as described below have been checked and found complied with the Specifications and Drawings, and are submitted for approval.

1. General Information

- a. Material Description<sup>1</sup> : Deodorization System
- b. Installation Location / Application : TSPS at +5.86mPD Ground Floor
- c. Specification Clause(s) : PS 6.33.7(A) – (K), DSD GS2.17.1 to 2.17.10
- d. Anticipated date of approval : 14/03/2016 (dd/mm/yyyy)

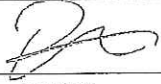
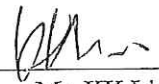
2. Technical Information

Items	Description
a. Brand	Refer to Annex. 1
b. Model	Refer to Annex. 1
c. Rating	Refer to Annex. 1
d. Size	Refer to Annex. 1
e. Country of Origin	Refer to Annex. 1
f. Place of Manufacture / Manufacture's Name & Address	Refer to Annex. 1
g. Supplier	Aromatrix Technologies (Hong Kong) Limited
h. Tender Offer (Yes/No/NA)	NA
i. Manufacturer's Catalogue	-
j. Specification Clause(s)	PS 6.33.7(A) – (K), DSD GS2.17.1 to 2.17.10
k. Test Certificate(s) and Test Report (s) (Reference no. and validity of the test certificate and report shall be stated)	-

Note 1: Details of Key Components of the submitted material shall be provided in "Annex I".

Items	Description
I. Job Reference	-
m. This submission is referred to the Base Document of BS Materials Database assessed by HA's Specialist Vetting Team (SVT).	<input type="checkbox"/> Yes* <input checked="" type="checkbox"/> No* If Yes, (i) We, _____ (Name of Sub-Contractor) have studied the full set of Base Documents of the product we proposed to use, and; (ii) Our offer fully conforms to the Base Documents and is listed in full in our submissions.
n. Supplementary Information	-
o. WSD Approval Letter, if any <sup>2</sup> (Only applicable to FS&WP and ACMV Installation)	-

Note 2: Documentary evidence shall be provided (such as general approval letter issued by Water Authority) to support that the proposed material is acceptable to Water Authority, if available. In case Water Authority's general approval is not available, PBSE may approve the material stating that the granting of such approval is "subject to Water Authority's approval". Water Authority's guidelines for material approval can be found in the following link-  
[http://www.wsd.gov.hk/en/plumbing\\_and\\_engineering/fitings\\_to\\_be\\_installed\\_or\\_use/guideline/index.html](http://www.wsd.gov.hk/en/plumbing_and_engineering/fitings_to_be_installed_or_use/guideline/index.html)

Signature:		
Name:	TM Man	Mr. KK Li
Date (dd/mm/yyyy):	05/02/2016	
For and on behalf of the:	JEC NSC	Hsin Chong Main Contractor
	(Sub-Contractor's Supervising Engineer)	(Main Contractor's Building Services Engineer)

**CONTRACT MANAGER'S COMMENTS**

To : (Name of Main Contractor) \_\_\_\_\_

From : Contract Manager's Representative

On the basis of the material and information given, the above material(s) submitted is/are :

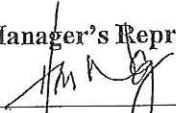
(1)  Approved. ~~except~~ except ES11C and ES11F

(2)  Not approved because \_\_\_\_\_

Remarks : Please refer to comments on the approval letter.

Approval does not alter the requirements of the Contract.

Contract Manager's Representative

Signature: 

Name: Amok Wong

Date: 24/3/2016 (dd/mm/yyyy)

c.c. Contract File : HD(BS\_\_ ) / \_\_\_\_\_ via SBSE / C \_\_\_\_ } w/e full set of submission document, signed Form DBSP-F31, and endorsed Form DBSP-F04 (if applicable)

PBSI

Sub-Contractor - JEC (# Name of Sub-Contractor)

(\* Tick as appropriate)





香港房屋委員會  
Hong Kong Housing Authority



Our Ref.: HD(BS1) SPS/926/1

Tel No.: 2129 3669

24 March 2016

Fax No.: 3152 2030

Hsin Chong Construction Company Limited

Hsin Chong Center, 107-109 Wai Yip Street,

Kwun Tong, Kowloon,

Hong Kong

Attn.: Mr. Man HO (Senior Project Manager)

Dear Sirs,

*Construction of Public Rental Housing Development at Tung Chung Area 56*

*(Contract No. 20120731)*

*TSPS E&M Installation – Material Re-submission for Pre-filter, After-filter, VSD, Sensor & Differential Pressure Gauge (ES11C, E, F, G, I, J) (Rev. 0)*

With reference to your letter ref: HCC/283/L4285/HD/3341 on the captioned, please be advised our comments on the submission are stipulated as below for your follow up actions:

Submission Reference	Material Description	Brand name & model no	Place of manufacturer	Comment/Remark
ES11C	Pre-filter and After-filter	Pre-filter : AAF/AmWash Series After-filter: AAF /AmAir 1300 Series	PRC	1. Approval pending. 2. Please refer to comments/remarks 1, 2 and 8.
ES11E	Variable Speed Drive	Schneider/ ATV61HD5N4	Indonesia	1. Approval pending. 2. Please refer to comments/remarks 3 to 5.
ES11F	Air velocity Device	REGIN/ AVDT25	Sweden	Approved subject to incorporation of comments
ES11G	Humidity and Temperature Transmitter	REGIN/ HTDT2200-420	Sweden	/remark 7.
ES11F&G	LCD Display for Sensor	SIMEX/SWP-99	Poland	
ES11I	Inlet H2S Sensor	MSA/Ultima X Series	USA	Approved subject to
ES11I	Outlet H2S Sensor	RKI/GD-K70D	Japan	incorporation of comments /remarks 6 and 7.
ES11J	Differential Pressure Gauge	Dwyer/Magnehelic/ 3000SGT Series	USA	Approved subject to full compliance with the Specification.

香港九龍何文田佛光街33號房屋委員會總部

Housing Authority Headquarters, 33 Fat Kwong Street, Ho Man Tin, Kowloon, Hong Kong.

互聯網網址 :

Comments/Remarks:

1. Please submit the mist eliminator for review;
2. Please be reminded to take pressure drops across pre-/after- filters and mist eliminator into account when selecting the extraction fan;
3. Please show the extraction fan motor able to work with variable speeds;
4. Please show the rating of the selected VSD in line with the proposed extraction fan;
5. Please state how to suppress harmonics generated from the VSD without installing an EMC filter;
6. Please show the outlet H2S sensor with measuring sensitivity range 0-1ppm;
7. Please provide local job references of sensors for measuring air velocity, humidity, temperature and H2S for information;and
8. Please clarify the filter media of the activated carbon filter, impregnated KOH or NaOH. Normally, impregnated KOH shall be used.

A copy of the approval form DBSP-F30 is also returned for your attention.

Yours faithfully,



(Amos H.L. WONG)

BSE/C34

Contract Manager Representative

c.c. File copy via SBSE/C10,  
A/36, COW/A1/TC56,BSI/C14



HONG KONG HOUSING AUTHORITY

BUILDING SERVICES MATERIAL SUBMISSION AND APPROVAL FORM

Contract Title : <u>Construction of Public Rental</u>	Main Contractor's Letter Ref. No. : _____
<u>Housing Development at</u>	Date : <u>28 January 2016</u>
<u>Tung Chung Area 56</u>	Ref. No. of Previous Submission(s) : _____
Contract No. : <u>20120731</u>	(1) _____
Ref. No. (HOMES) : _____	(2) _____

DETAILS OF SUBMISSION

To : Contract Manager's Representative (Attn : BSE / C 34)  
 From : (Name of Main Contractor) Hsin Chong Construction Limited

The enclosed  Catalogue\*  Product Certificate\*  Specification Compliance Checklist\*  Certificate of Origin\*  Place of Manufacture\*  Technical Data\*  Calculation\*  Test Report\*  Job Reference\* as described below have been checked and found complied with the Specifications and Drawings, and are submitted for approval.

1. General Information

- a. Material Description<sup>1</sup> : Deodorization System
- b. Installation Location / Application : TSPS at +5.86mPD Ground Floor
- c. Specification Clause(s) : PS 6.33.7(A) – (K), DSD GS2.17.1 to 2.17.10
- d. Anticipated date of approval : 14/03/2016 (dd/mm/yyyy)

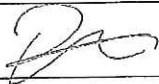
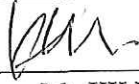
2. Technical Information

Items	Description
a. Brand	Refer to Annex. 1
b. Model	Refer to Annex. 1
c. Rating	Refer to Annex. 1
d. Size	Refer to Annex. 1
e. Country of Origin	Refer to Annex. 1
f. Place of Manufacture / Manufacture's Name & Address	Refer to Annex. 1
g. Supplier	Aromatrix Technologies (Hong Kong) Limited
h. Tender Offer (Yes/No/NA)	NA
i. Manufacturer's Catalogue	-
j. Specification Clause(s)	PS 6.33.7(A) – (K), DSD GS2.17.1 to 2.17.10
k. Test Certificate(s) and Test Report (s) (Reference no. and validity of the test certificate and report shall be stated)	-

Note 1: Details of Key Components of the submitted material shall be provided in "Annex I".

Items	Description
l. Job Reference	-
m. This submission is referred to the Base Document of BS Materials Database assessed by HA's Specialist Vetting Team (SVT).	<input type="checkbox"/> Yes* <input checked="" type="checkbox"/> No* If Yes, (i) We, _____ (Name of Sub-Contractor) have studied the full set of Base Documents of the product we proposed to use, and; (ii) Our offer fully conforms to the Base Documents and is listed in full in our submissions.
n. Supplementary Information	-
o. WSD Approval Letter, if any <sup>2</sup> (Only applicable to FS&WP and ACMV Installation)	-

Note 2: Documentary evidence shall be provided (such as general approval letter issued by Water Authority) to support that the proposed material is acceptable to Water Authority, if available. In case Water Authority's general approval is not available, PBSE may approve the material stating that the granting of such approval is "subject to Water Authority's approval". Water Authority's guidelines for material approval can be found in the following link-  
[http://www.wsd.gov.hk/en/plumbing\\_and\\_engineering/fitings\\_to\\_be\\_installed\\_or\\_use/guideline/index.html](http://www.wsd.gov.hk/en/plumbing_and_engineering/fitings_to_be_installed_or_use/guideline/index.html)

Signature:		
Name:	TM Man	Mr. KK Li
Date (dd/mm/yyyy):	05/02/2016	
For and on behalf of the:	<u>JEC</u> NSC	<u>Hsin Chong</u> Main Contractor
	(Sub-Contractor's Supervising Engineer)	(Main Contractor's Building Services Engineer)

#### CONTRACT MANAGER'S COMMENTS

To : (Name of Main Contractor) \_\_\_\_\_

From : Contract Manager's Representative

On the basis of the material and information given, the above material(s) submitted is/are :

(1) \*  **Approved.**

(2) \*  **Not approved** because

Remarks : \_\_\_\_\_

**Approval does not alter the requirements of the Contract.**

**Contract Manager's Representative**

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Date : \_\_\_\_\_ BSE / C \_\_\_\_\_ (dd/mm/yyyy)

c.c. Contract File : HD(BS\_\_ ) / \_\_\_\_\_ via SBSE / C \_\_\_\_\_ } w/e full set of submission document, signed Form DBSP-F31, and endorsed Form DBSP-F04 (if applicable)

PBSI

Sub-Contractor - JEC (# Name of Sub-Contractor)

(\* Tick as appropriate)

Contract Title : Construction of Public Rental Housing Development at Tung Chung Area 56	Main Contractor's Letter Ref. No.
Contract No. : 20120731	Date :
Ref. No. (HOMES) :	Ref. No. of Previous Submission(s) :
	(1)
	(2)

Material Description	Components	Brand / Model	Rating	Material Composition	Country of Origin	Place of Manufacture / Manufacture's Name & Address
Deodorization System	Pre-filter and After-filter	Pre-filter: AAF/AmWash Series After-filter: AAF/AmAir 1300 Series	-	-	USA	PRC
	Variable Speed Device	Schneider / ATV61HD5N4	-	-	France	Indonesia
	Air Velocity Sensor	REGIN / AVDT25	-	-	Sweden	Sweden
	Humidity and Temperature Transmitter	REGIN / HTDT200-420	-	-	Sweden	Sweden
	LCD Display for Sensor	SIMEX / SWP-99			Poland	Poland
	Inlet H2S Sensor	MSA / Ultima X Series			USA	USA
	Outlet H2S Sensor	RKI / GD-K70D			Japan	Japan
	Differential Pressure Gauge	Dwyer / Magnehelic 3000SGT Series			USA	USA

TSPS Installation for Construction of Public Rental Housing Development at

Tung Chung Area 56

(Contract No. 20120731)

SUPPLEMENTARY SHEET

<u>Item</u>	<u>Submission No.</u>	<u>Description</u>	<u>Brand / Model</u>	<u>Country of manufacturer</u>	<u>Rev.</u>
1	ES11C	Pre-Filter and After-Filter	Pre-Filter: AAF / AmWash Series After-Filter: AAF / AmAir 1300 Series	PRC	0
2	ES11E	Variable Speed Device	Schneider / ATV61HD15N4	Indonesia	0
3	ES11F	Air Velocity Sensor with LCD Display	Air Velocity Sensor: REGIN / AVDT25 LCD Display: SIMEX / SWP-99	Air Velocity Sensor: Sweden LCD Display: Poland	0
4	ES11G	Humidity and Temperature Transmitter with LCD Display	Air Velocity Sensor: REGIN / AVDT25 LCD Display: SIMEX / SWP-99	Humidity and Temp. Transmitter: Sweden LCD Display: Poland	0
5	ES11I	Inlet and Outlet H2S Sensor	Inlet H2S Sensor: MSA / Uffima X Series Outlet H2S Sensor RKI / GD-K70D	Inlet H2S Sensor: USA Outlet H2S Sensor: Japan	0
6	ES11J	Differential Pressure Gauge	Dwyer / 3000SGT Series	USA	0

**Schedule No. SP7- Deodourization System**

**1. Deodourizing Unit and Dehumidifiers - ES11A, 11B, 11D, 11H**

a. Manufacturer and place of manufacture	Aromatrix Technology Ltd. (Hong Kong) / PRC
b. Material of construction	
i. Housing	GRP
ii. Structure	GRP
c. Type of DO unit - ES11A	Vertical AroCARB
d. Type of non-impregnated activated carbon	Donau K-43
e. Residence time (s)	3.0 second
f. Design air flow rate (m <sup>3</sup> /hr)	8020 m <sup>3</sup> /hr
g. Dimensions	2200 x 3100 x 2100 (H) mm
h. Total weight (kg)	5000 kg
i. Estimated breakthrough time of the activated carbon	2.16 years
j. Type of dehumidifier - ES11D	Desiccant wheel
k. Power rating (W) of dehumidifier - ES11D	7515W
l. Dry air flow rate (m <sup>3</sup> /hr) - ES11D	500 m <sup>3</sup> /hr x 2 = 1000 m <sup>3</sup> /hr
m. Fan Motor rating (kW) at 380V and Noise level (dBA) @ 1m - ES11H	11 kW

**\* 2. Pre-Filter and After-Filter - ES11C**

a. Pre-filter - ES11C	
i. Manufacturer	American Air Filter (AAF)
ii. Model	AmWash Series
iii. Place of Manufacturer	PRC
iv. Material	Frame: Stainless Steel 316, Media: Synthetic fiber
b. After-filter - ES11C	
i. Manufacturer	American Air Filter (AAF)
ii. Model	AmAir 1300 Series
iii. Place of Manufacturer	PRC
iv. Material	Paper

\* 3. Variable Speed Device - ES11E

a. i. Manufacturer	Schneider
ii. Model	ATV61HD5N4
iii. Place of Manufacturer	Indonesia
iv. Supply Voltage (V)	380V
v. Standard	IEC 61000-4-5, EN/IEC 61800-3
vi. Motor Power (kW)	15kW
vii. IP Protection (IP)	20

\* 4. Air Velocity Sensor - ES11F

a. i. Manufacturer	REGIN
ii. Model	AVDT25
iii. Place of Manufacturer	Sweden
iv. Supply Voltage (V)	24 VDC
v. Output Signal	4 - 20mA
vi. Protection Class (IP)	65

\* 5. Humidity and Temperature Transmitter - ES11G

a. i. Manufacturer	REGIN
ii. Model	HTDT2200-420
iii. Place of Manufacturer	Sweden
iv. Supply Voltage (V)	24 VDC
v. Output Signal	4 - 20mA
vi. Protection Class (IP)	65

\* 6. LCD Display for Air Velocity Sensor and Humidity & Temperature Transmitter - ES11F&G

a. i. Manufacturer	SIMEX
ii. Model	SWP-99
iii. Country of Manufacture	Poland



\* 7. H2S Sensor - ES11I

- a. Inlet H2S Sensor - ES11I
  - i. Manufacturer
  - ii. Model
  - iii. Country of Manufacture
  - iv. Sensitivity Range of H2S

MSA
Ultima X Series
USA
0 - 50 ppm

- a. Outlet H2S Sensor - ES11I
  - i. Manufacturer
  - ii. Model
  - iii. Country of Manufacture
  - iv. Sensitivity Range of H2S

RKI
GD-K70D
Japan
0 - 1ppm (0-1000ppb)

\* 8. Differential Pressure Gauge - ES11J

- a. i. Manufacturer
- ii. Model
- iii. Country of Manufacture
- iv. Output Range

Dwyer
Magnehelic 3000SGT Series
USA
4 - 20mA

**Remark:**

- \* New material submission for approval



**CONSTRUCTION OF PUBLIC RENTAL HOUSING DEVELOPMENT AT TUNG CHUNG  
AREA 56 OF TEMPORARY SEWAGE  
CONTRACT NO. J53G219541**

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## **COMPLIANCE LIST**

**TEMPORARY SEWAGE PUMPING STATION  
(ELECTRICAL & MECHANICAL WORKS)**

~~(13) All functions, such as 'start/On', 'stop/OFF', stay-put key-release-type "emergency-stop" pushbuttons, all indication lamps, individual fault indication lamps for each type of fault condition, fault reset, motor starters, overload protection units, etc. which are required for the operation at normal and fault condition shall be repeated at these local control panels.~~

**6.33.7 DEODORIZATION SYSTEM**

(A) The Contractor shall select, provide, deliver to work locations, install, test, commission and be liable to defects during two-year Defects Liability Period of one (1) set of the deodorizer for the TSPS. The deodorizer shall consist of one (1) activated carbon filter, one (1) set of pre-filter unit, mist-filter and after-filter unit, one (1) set of differential pressure gauge, one (1) set of desiccant type dehumidifier, two (2) numbers of centrifugal fans with variable motor drives and flexible coupling connector, volume control dampers, silencer, acoustic enclosure, air ducts, discharge hood and two (2) sets of hydrogen sulphide detection sensors.

Comply

(B) The deodorizer shall be designed to extract foul air from wet wells, screen chambers, inlet chamber, pump hall, screen house, screenings enclosures and toilet etc. of the TSPS. It shall deodorize the foul air by passing through activated carbon filter beds and discharge the deodorized air to atmosphere at a direction away from the sensitive receivers of the pumping station through two weatherproof louvers of a dog house at roof. The Contractor shall coordinate with the Main Contractor before installing the weatherproof stainless steel louvers and arrange the discharge air duct at least 150mm above the roof finished floor level and fabricate the discharge air duct in a shape effectively discharging the deodorized air to outside. The Contractor shall apply proper sealants along the edges of louvers to mitigate the risk of water leakage or seepage into the dog house.

Comply

(C) The deodorizer shall be able to continuously handle air flows of not less than the following air change per hour with hydrogen sulphide concentration of 5 ppm.

Comply

Scenario	Minimum Required Flow Rate (m <sup>3</sup> /s)	Minimum No. of Air Change Per Hour	Handling Area(s)
Normal Mode (that is, without maintenance work in process)	0.44	4	Inlet Chamber, Screen Chamber, Screenings Enclosures, Wet Well and Toilet
Maintenance Mode at Screen House	1.42	12	Inlet Chamber, Screen Chamber, Screenings Enclosures, Wet Well, Toilet and Screen House
Maintenance Mode at Pump Hall	1.95	12	Inlet Chamber, Screen Chamber, Screenings Enclosures, Wet Well, Toilet and Pump Hall

(D) The Contractor shall be responsible for the design of the deodorization system based on

Comply

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actual site condition and submit the design calculations of the deodorizer, all air ducts, identification of ductwork to BS4800 to the Engineer/Engineer's Representative for approval.

- (E)  Comply If installation of deodorizer is unlikely to be installed due to presence of floor opening, the Contractor shall be responsible for relocation of such floor opening to a location agreed by the Engineer/Engineer's Representative at no extra cost to the Employer.
- (F) Deodorizers (Non-impregnated Activated Carbon Filter)
- (1)  Comply The deodorizer shall use non-impregnated activated carbon ("activated carbon" hereinafter) as filter media to treat the extracted foul air before discharging to atmosphere. The Contractor shall provide the initial filling of the filter media at installation stage and arrange a complete replacement of the used filter media each year over the two-year Defects Liability Period. The Contractor shall provide test certificate to verify the capacity of the activated carbon for initial filling. The replacement filter media shall only be delivered to Site towards the end of two-year Defects Liability Period.
- (2)  Comply The filter media shall have a breakthrough hydrogen sulphide concentration of not greater than 0.025 ppm at a constant inlet hydrogen sulphide concentration of 5ppm at maximum air flow as specified, and shall provide an overall efficiency of not less than 99.5%. For the hydrogen sulphide concentration from 0 to 3ppm, the maximum hydrogen sulphide concentration of the deodorized air shall not be more than 0.015ppm. Removal efficiency test report shall be submitted for the Engineer's approval.
- (3)  Comply The housing of the activated carbon filter shall be fabricated from flame retardant glass fibre reinforced plastic resins (GRP) or approved equivalent. The supporting framework and all metallic fittings for the activated carbon filter shall be made of stainless steel.
- (4)  Comply The activated carbon filter shall be provided with access hatches at level not higher than 1 m above the finished floor for replacement of filter media. All hinges, hold-down lever and accessories shall be made of stainless steel. In addition to the access hatches, media test ports shall be provided.
- (5)  Comply Maintenance platform complete with hand-railings, toe board, step ladder and etc. shall be provided for the activated carbon filter by the Contractor. The maintenance platform shall be made of GRP or approved equivalent. The detailed designs of GRP maintenance platforms, together with structural calculations endorsed by Registered Structural Engineer (RSE) and Independent Checking Engineer (ICE), shall be submitted to the Engineer for approval prior to fabrication.
- (6)  Comply The vessel of the deodorizer shall be fabricated from flame retardant glass fibre reinforced plastic resins (GRP) or approved equivalent. The supporting frameworks and all metallic fittings for the deodorizer shall be made of stainless steel grade 316. The vessel shall be furnished with a bottom drain valve with associated drain pipe to nearby drain. The bottom of the vessel shall be fabricated to have an inclination with fall to the bottom of the drain point.
- (7)  Comply All pipework and drain valve shall be constructed of a material suitable for handling with acidic water containing sulfuric acid at temperature between 50°C and 70°C.

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- (8) All vessels shall be provided with access hatches at level not higher than 1,000 mm above the finished floor for replacement of filter media. The access hatches shall be sealed up with gaskets to prevent the foul air from being leaked. All hinges, hold-down lever and accessories shall be made of stainless steel grade 316. In addition to the access hatches, media test ports shall be provided.

Comply

(G) Dehumidifier

- (1) The cabinet of the dehumidifier shall be constructed from stainless steel with all orifices covered with stainless steel wire mesh and measuring device with covered base.
- (2) Stainless steel weatherproof enclosure shall be provided for the dehumidifier. The configuration of the whole unit shall be submitted to the Engineer or his Representative for review and approval before ordering.
- (3) The dehumidifier shall be designed to have the dry air capacity to meet the optimal operation point of the deodorizer in a condition that the temperature and humidity of the mixed air (heated ambient air plus the extracted foul air from TSPS) are best for the activated carbon filters to adsorb the foul particles.

Comply

Comply

Comply

(H) Hydrogen Sulphide Detection Systems

- (1) The hydrogen sulphide concentration of the foul air and the deodorized air shall be continuous monitored by the hydrogen sulphide detection system. The system shall be able to determine the hydrogen sulphide concentration in the range from 0 ppm to 50 ppm and from 0 to 1,000 ppb respectively, shall give a local visual indication of the concentration. Apart from the local visual indication, the H<sub>2</sub>S concentration levels before and after the filter media shall be repeated to the MACS of TCSPS and SHWSTW for on-line monitoring. The enclosures for the sensors and transmitters shall have IP 65 protection or better. The monitors shall be of electronic type with IP 66 protection.
- (2) When the inlet hydrogen sulphide concentration is found over 10 ppm, a local audible and visual alarm shall be activated. When the audible alarm is activated for an adjustable time of 0 to 60 seconds, the ongoing audible alarm shall be automatically muted but the light shall remain steady ON until the inlet hydrogen sulphide concentration is lower than 10 ppm or the alarm is reset. The operator should also be able to mute the audible alarm locally by pressing "Silence" button.
- (3) The Contractor shall provide one (1) set of portable calibrator complete with test point adaptors, seal kit and carrying case for on-site calibration and testing of the hydrogen sulphide detection system.

Complied

(I) Extraction Fans and Air-Ducts

- (1) The motors of extraction fans shall have class F insulation and an enclosure with a lifting eye bolt for easy mobilization and protection to IP 55. The motor shall be suitable for variable speed drive running and generates low noise and no high sound pitch at specified operation speeds. The extraction fans shall be equipped with

Comply

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Comply

variable speed drives (VSDs) which shall be installed in the local control panel. The Contractor shall submit the current, power, pitch frequency, speed, efficiency, temperature and sound pressure level in dBA measured at 1 m from each fan motor at all operation speeds to the Engineer or his Representative for review. The sound power level of the fan at any speed shall not exceed 73 dB(A). The Contractor shall provide noise abatement at no cost to the Employer if the sound power level measured at work location is beyond the acceptable level.

(2)

Comply

The extraction fans shall deliver the specified extraction flow rate as required in the relevant Clause of Particular Specification. The motor control panels shall be fitted with bypass starters for maintaining the extraction fans in operation when the main starter malfunctions. The fan cowl of each motor shall be provided with separately-driven fan for motor cooling. The fan motors shall have a service factor of 1.15 times the rated shaft power and sized to operate throughout the entire fan performance curve.

(3)

Comply

The minimum rated efficiencies of fans shall comply with Clause 3.3(g) of General Specification.

(4)

Comply

Two fans in one duty and one standby arrangement shall be provided. The centrifugal fans shall be capable of providing the maximum airflow as specified against the respective system loss. Design calculation for the ventilation shall be submitted to the Engineer for approval before manufacturing. The fan impellers and casings in contact with the air extracted shall be made of GRP.

(5)

Comply

Manual speed adjustment shall be available on the local control panel and through MACS at TCSPS and SHWSTW.

(6)

Comply

The motors of extraction fans shall be of variable speed type and shall meet the limit of wattage consumption (W) per air flow (L/s) as stated in the BEC. The Contractor shall determine the running speeds of the extraction fan as per the specified air flow requirements in sub-clause (C) above before manufacturing. Operation mode selection with respect to different speed shall be provided at the local control panel. The Contractor shall carefully read the Drawings and understand the control philosophy in relation to the ventilation system before manufacturing the control panel.

Pumping Station	Operation Modes	Handling Area(s)
Tung Chung Area 56 Temporary SPS with Maintenance Mode 1 (at Screen House)	Low Speed	Inlet Chamber, Screen Chamber, Screenings Enclosures, Distribution Chamber, Wet Well and Toilet
	High Speed I	Inlet Chamber, Screen Chamber, Screenings Enclosures, Distribution Chamber, Wet Well, Toilet and Screen House
Tung Chung Area 56 Temporary SPS with Maintenance Mode 2 (at Pump Hall)	Low Speed	Inlet Chamber, Screen Chamber, Screenings Enclosures, Distribution Chamber, Wet Well and Toilet

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Mode 2 (at Pump Hall)	High Speed 2	Inlet Chamber, Screen Chamber, Screenings Enclosures, Distribution Chamber, Wet Well, Toilet and Pump Hall
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(7) Interlocking schemes between the deodorizers and ventilation fans at Pump Hall shall be provided. ~~When the Pump Hall or Screen House is served by the deodorizer in the event of the pump(s) being removed from the wet well or inlet screen/screenings container(s) being taken out from the enclosure, the respective zone ventilation system shall be isolated to prevent foul air escaping into atmosphere.~~ Manual bypass switch for interlocking system shall be provided.

Comply

(8) Manually operated volume control dampers and motorized shut-off dampers with manual winches shall be provided on all main ducts and branches for regulation and balancing the system. All dampers shall include a means for indicating externally the position of the blades and shall include a device for positioning and locking the damper blades. The positions of all dampers 'as-set' after final regulation shall be indelibly marked at the adjusting device. Each damper shall be provided with a pair of micro-switches to indicate its respective position.

Comply

Comply to PS6.33.7(l)(1), for the noise criteria, material and construction of enclosure comply to the clause.

(9) The noise level of the fan shall not exceed 5 dBA above the background noise level measured at 1m from the discharge hood. Should this not be met by the deodorizers during testing and commissioning stage, the Contractor shall provide and install noise abatement equipment to attain the required noise level without any extra cost incurred. All metalwork of the noise abatement equipment shall be made of stainless steel. An acoustic enclosure for the fans shall be provided if necessary, without any extra cost to the Employer.

(10) Air ducts shall be made of stainless steel grade 316 with minimum thickness of 1.0 mm. All other metal parts of the ductwork shall also be made of stainless steel grade 316. The air leakage limit shall comply with the BEC. The ducts and fittings shall be designed and constructed with all necessary accessories to minimize waste of energy and pressure losses due to eddies, vortices, etc. Adequate supports and other necessary absorbers and fittings for reducing noise/ vibration shall be provided.

Comply

(11) Cleaning points and services openings shall be provided in air ductwork systems. The cleaning points and services openings shall in general be installed in fully accessible locations. The Contractor shall also provide sufficient drain points to air ductwork and extraction fans complete with automatic drain valves, bypass manual drain valves and all necessary pipework to nearby drain.

Comply

(12) The Contractor shall provide on each main air duct with a duct mounted temperature and humidity sensor complete with a transmitter, a local LCD/LED display with font 18mm size ~~20mm~~ and one decimal point, 4 - 20 mA output signals/ 0 - 10V output signals and all necessary accessories. The measurement ranges of relative humidity and temperature shall be 0 - 100% RH and 0 - 60°C respectively.

Comply. But the size is only 18mm

(13) The Contractor shall provide on each main air duct with an air velocity sensor complete with a transmitter, a local LCD/LBD display with ~~20mm~~ font size and one decimal point, 4 - 20 mA output signals and all necessary accessories. 18mm

Comply. But the size is only 18mm

(14) A damper shall be installed at the upstream of the mist eliminator and prefilter,

Comply

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which enables the isolation of the deodorizer for maintenance purpose.

- (15)  Comply Noise and vibration shall not be transmitted to the structure or any other element through hangers and brackets. Flexible connection for joining the ductwork with the extraction fan shall be provided. CPC (Earth) cables shall be provided across the flexible connection.
- (16)  Comply The Contractor shall provide a silencer in the discharge ductwork of deodorizers and acoustic enclosure over the motor-fan to attenuate the sound levels to the specified allowable noise level, if required. The Contractor shall submit the acoustic calculation to prove the provision fulfilling the noise criteria for the Engineer's approval under the Contract.
- (17)  Comply All intake openings shall be fitted with stainless steel grade 316 wire guards.
- (18)  Comply GRP discharge hood complete with stainless steel insect guard shall be provided.
- (19)  Comply Ductwork as shown in the Drawings is for indication purposes. The Contractor shall be responsible for the sizing and detailing of the complete ductwork arrangement, inclusive of fittings, dampers, grilles, cleaning points, services openings etc., and shall submit detailed calculations on the extraction system for the Engineer's approval.
- (20)  Comply The Contractor shall provide all the accessories and equipment necessary to comply with FSD's requirements at no extra cost to the Employer. The Contractor shall coordinate with and provide necessary document to the FSWP NSC on submission to FSD for approval.
- (21)  Comply All ductwork shall be constructed to the recommendation of the U.K. Heating and Ventilation Contractors Association (HVAC); ductwork group as summarized in their publication DW/142: "Sheet Metal Ductwork Specification for Low, Medium and High pressure/Velocity Air Systems". The recommendations for low velocity systems shall be applicable for this Contract. The Contractor shall also submit the identification of ductwork to BS 4800 for the Engineer or his Representative's approval.
- (22)  Comply The Contractor shall test and demonstrate the air tightness of the ductwork by measuring and comparing the total air flows at the inlet and discharge points. The air leakage limit shall comply with the BEC. Discrepancy between the total inlet and discharge volume shall not be greater than 5%.
- (J) Control and Alarm
- (1) General
- Comply (a) Each deodorizer has three modes of operation, "Local Manual" control, "Remote Manual" control and "Automatic" control. Key-lockable selector switches shall be provided at the local control panel for manual selection of operating mode.
- (2) Automatic Control



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(a) Comply When the "Automatic" control mode is selected, the deodorizers shall be controlled by means of 24-hour timers adjustable from 0 - 60 minutes. Besides, the operators shall be allowed to manually adjust or reset any control parameter values of deodorizer at any time through the workstation of MACS at the TCSPS and SHWSTW. Extraction fan duty selection shall be available at the workstation of MACS.

(b) Comply with condition Under the "Automatic" control mode, the duty extraction fan shall automatically run at a preset schedule ~~or a running speed according to the number of manually operated volume control dampers to be fully opened.~~

(c) Comply When the duty extraction fan failed, the standby fan shall take up the duty automatically and the signal for automatically changeover of fan shall be initiated locally and also repeated to the MACS at the TCSPS and SHWSTW.

(3) Manual Control

(a) Comply When the "Remote Manual" control mode is selected, the deodorizers shall be remote-controlled at the workstation of MACS at the TCSPS and SHWSTW through manual input.

(b) Comply When "Local Manual" control mode is selected, each deodorizer shall be controlled by the "Start/ Stop/ Emergency Stop" push buttons at the local control panel, on a suitable rigid stainless steel grade 316 or better material framework solidly anchored to the concrete foundation, or at locations as approved by the Engineer. Manually speed adjustment for the duty fan shall be available in this manual control mode. The local manual control shall override the remote manual control, but monitoring function of the deodorizer's status shall be available.

(4) Requirements of Local Control Panel

(a) Comply The Contractor shall provide a local control panel for each deodorizer. The details of local control panels shall be submitted to the Engineer for approval. The exact location of the local control panel shall be determined at work location.

(b) Each local control panel shall be provided with the following items:

(i) Comply Energy monitoring meter for reading the real-time phase currents, phase and line voltages, frequency, power factor, power active and reactive power, apparent power, kWh of the deodorizer's extraction fan. The energy monitoring meter shall be able to transmit the measured data to the MACS of the TCSPS and SHWSTW for logging-on and on-line monitoring. They shall be capable of handling and sending min. 5 seconds interval of measuring data (can be adjusted from 5 seconds to 1 hour);

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Comply but without neutral position	(ii)	Automatic/ off/ manual key-lockable selector switch with neutral position;	
Comply	(iii)	Remote/ local manual key-lockable selector switch;	
Comply	(iv)	Hour-run meters;	
Comply	(v)	Key-lockable selector for selection of operation modes (normal/pump hall maintenance/screen house maintenance); This status shall repeat to MACS at TCSPS and SHWSTW;	
Comply	(vi)	Push-buttons for manual "Start" and "Stop" control, "Emergency Stop", "Reset" and "Lamp Test";	
Comply	(vii)	"Stopped", "Emergency Stop Pressed", "Local Control", and "Remote Control" indication lamps;	
Comply	(viii)	Indications for selected operating modes with which handling areas are being served;	
Comply	(ix)	Operating frequency of VSD for the duty fan;	
Comply of the speed for the mode mentioned at Clause 6.33.7(C)	(x)	Operating mode of the duty fan ( <del>high/high/low speed</del> );	
	Comply	(xi)	LED indication lamps for fault signals, but not limited to the following:-
		<ul style="list-style-type: none"> <li>- Fan fault;</li> <li>- H<sub>2</sub>S breakthrough alarm;</li> <li>- Prefilter clog;</li> <li>- Carbon media clog;</li> <li>- Afterfilter clog;</li> <li>- Inlet H<sub>2</sub>S sensor Fault; and</li> <li>- Outlet H<sub>2</sub>S sensor Fault</li> </ul>	High1/High2/Low Speed (High 1 & High 2 for Maintenance Mode of Pump Hall and Screen House)
Comply	(xii)	"Duty" and "Standby" LED indication lamps for extraction fans;	
Comply	(xiii)	Inlet H <sub>2</sub> S concentration; and	
Comply	(xiv)	Outlet H <sub>2</sub> S concentration.	
Comply	(e)	Running/ stopped status of the deodorizers shall be repeated to the MACS of TCSPS AND SHWSTW. A common alarm of the deodorizer shall also be transmitted to the MACS of the TCSPS AND SHWSTW whenever the following conditions arise:	

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Comply

- (i) Phase or supply mains failure;
- (ii) Fan fault;
- (iii) H<sub>2</sub>S breakthrough alarm;
- (iv) Prefilter clog;
- (v) Carbon media clog;
- (vi) Afterfilter clog;
- (vii) Inlet H<sub>2</sub>S sensor fault;
- (viii) Outlet H<sub>2</sub>S sensor fault; and
- (ix) High outlet H<sub>2</sub>S concentration.

(K) Testing and Commissioning

Comply

- (1) The Contractor shall carry out a performance test for the deodorizer before completion of Works to verify the hydrogen sulphide removal efficiency taking into account temperature, humidity, air velocity and carbon contact time. The test shall be carried out for three (3) consecutive days without any major faults or alarms requiring attendance at work location. Removal efficiency is defined as:

$$\% \text{ removal} = \frac{(\text{inlet concentration} - \text{outlet concentration})}{\text{inlet concentration}} \times 100\% \text{ H}_2\text{S}$$

Comply

- (2) If there is no/ insufficient foul air for the test, the test shall be carried out by a recognized laboratory, which shall set up a scale down model in the laboratory and simulate the operating parameters likely to occur in reality for the test. The testing parameters adopted in the test shall be submitted to the Engineer for approval. The Contractor shall take into account temperature, humidity, air velocity and carbon contact time during the test to determine the overall hydrogen sulphide removal efficiency. The performance test shall be considered successful if, the following removal efficiency performance criteria can be achieved:

Inlet H <sub>2</sub> S Concentration	Removal Efficiency
3 ppm to 5 ppm	At least 99.5%
< 3 ppm	The outlet H <sub>2</sub> S concentration shall not be higher 0.02 ppm.

Comply

- (3) Samples of foul air and deodorized air shall be taken and tested for the verification of the accuracy of the H<sub>2</sub>S detection system. If there is no foul air when the unit is commissioned, the Contractor shall use the artificial hydrogen sulphide gas for verification of the accuracy of the H<sub>2</sub>S detection system. Sampling and testing of

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H<sub>2</sub>S detection system shall also be conducted by the recognized laboratory.

(4) Comply If the test fails to verify the required removal efficiency as specified in this Specification, the Contractor shall modify the system to comply with the Specification and carry out the test again until it complies with the Specification at his own costs.

(5) Comply All costs incurred for the tests and re-tests, including labour, testing equipment, materials and all necessary accessories shall be provided by the Contractor.

~~-(L) — Odour Monitoring System~~

(1) The Contractor shall provide a total of four (4) sets of on-line odour monitoring systems and all other associated power and signal cables as shown in the Drawings.

(2) The requirements for the system being installed at different part of the TSPS are as follows: -

Location	H <sub>2</sub> S Range (ppm)	Lowest Measureable Level (ppm)
Deodorization Area at Pump Hall	0 - 10.00	<= 0.01
Coarse Inlet Screen at Screen House	0 - 10.00	<= 0.01

(3) The system shall be designed to draw air sample with a built-in sampling pump from a monitoring location and furnished with a digital readout and alarms relays.

(4) The system shall provide an analog transmission of 4 – 20 mA and dry contact relay outputs.

(5) The system shall provide self-diagnostic functions including but not limited to trouble, low flow, system failure, communication error and zero correction.

(6) The system shall be operated on voltage 220V, +/- 6%, 50Hz, single phase with or without an AC adaptor.

(7) An IP 54 enclosure shall be provided for housing of the system. The reading shall be displayed on the local control panel with 200mm in height and connected to the SCADA system and repeated to the Remote Control Centre at TCSPS and SHWSTW.

(8) The Contractor shall provide all necessary hardware and software in order to display the on-line reading and logging the readings of each of the detectors.

(9) The Contractor shall provide one (1) set of portable calibrator complete with test point adaptors, seal kit and carrying case for on-site calibration and testing of the odour monitoring system.

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- ~~(e) The Contractor shall be required to calibrate each orifice at Site. The method of calibration shall be submitted to the Engineer for approval before the tests.~~
- ~~(f) A separate temperature sensor shall be provided for each air main to monitor and report air temperature.~~

**2.17 Deodorization System**

**2.17.1 General**

- (a) Materials used in the construction of the deodorization system shall be resistant to corrosive attacks and suitable for its working environment. The components of the deodorization system, including ductwork, dampers, louvers, air grilles, supports, fixings, guards, fan casing etc., shall be of grade 316 stainless steel or glass reinforced plastic (GRP) or equivalent.  
Comply
- (b) Contaminated air shall be taken from the source through ductwork, delivered to the deodorization system and discharged to atmosphere with sufficient height. The location of the discharge outlet should not be less than 5m away from any windows, doors and intake of ventilation system of buildings.  
Comply
- (c) The deodorization system shall be designed for continuous operation in 24 hours a day, 7 days a week in an outdoor environment.  
Comply
- (d) The deodorization system shall be automatically controlled and connected to the SCADA/PLC system for control and monitoring purposes.  
Comply
- (e) All openings of the deodorizer shall be sealed up with gasket to prevent odour leaked to the surrounding area.  
Comply
- (f) The deodorization system shall be rated to handle 100% of the specified air flow and odour loading as specified in the Particular Specification.  
Comply
- (g) Access manholes shall be provided to allow access to the deodorizer for inspection, removal and maintenance purposes. The deodorizer shall include with all piping, valves and fittings. Lifting and hold down lugs shall be provided.  
Comply
- (h) Supporting framework and maintenance platform including handrailings, toe boards, non-skid tread surface, etc. for the deodorizer shall be provided for the operation and inspection. The entire system shall be factory assembled and made of grade 316 stainless steel or GRP or equivalent. All bolts and fasteners including anchor bolts and flange bolts shall be grade 316 stainless steel.  
Comply
- (i) Hydrogen Sulphide (H<sub>2</sub>S) removal efficiency shall meet the requirement as specified in the Particular Specification.  
Comply

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- ~~(b) Chemical metering pumps shall be positive displacement, mechanical diaphragm type. All chemical metering pumps shall be suitable for 24 hours per day operation.~~
- (c) The pumps shall be operated on 220V/single phase/50Hz. Housing of the pumps shall be corrosion proof as well as dust and water proof to Class IP65. The housing shall be constructed from UPVC and impeller shall be viton diaphragm.
- (d) Chemical metering pumps shall dose to maintain the desired concentration of the scrubbing liquid. NaOH shall be controlled with pH analyzer to maintain an optimal pH value while NaOCl shall be controlled with ORP analyzer to maintain an ORP value.
- (e) Each pump shall be automatically shut off if a low level is sensed in the appropriate chemical tanks.
- (f) Pipes, valves, fittings and all other items necessary for the proper functioning of the system shall be provided. Pipework shall be made of polyethylene or other materials suitable for the chemical solutions.
- (g) The chemical feed line shall be protected with UPVC sleeve (pipe-in-pipe design) to prevent leaking of chemical to atmosphere. Transparent sight tube with drain valve shall be provided at appropriate locations along the pipeline for monitoring leakage of chemical.
- (h) The installation of chemical storage system shall comply with the latest requirements of the Fire Services Department (FSD), and the General Specification of Fire Services Installation in Government Buildings, Hong Kong, 1997 Edition. All associated equipment shall be of types approved by FSD.

### 2.17.7 Activated Carbon System

- (a) The activated carbon system shall be completed with desiccant type dehumidifier.  
Comply
- (b) The activated carbon system shall be designed to extract foul air from the areas at an air flow rate as specified in the Particular Specification, deodorize the foul air by passing through an activated carbon filter bed and discharge the deodorised air to atmosphere.  
Comply
- (c) The activated carbon system shall be properly fixed to suit the site environment condition.  
Comply

### 2.17.8 Activated Carbon Filter

- (a) The activated carbon filter housing shall be of prefabricated type and suitable for the application. The activated carbon bed shall be fitted on stainless steel

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Comply	perforated sheet / GRP grid with permanent rigid support. Filter housing shall be equipped with media loading port on the top and media gravity unloading port at the side.
Comply	(b) The filter media shall also be totally inorganic, non-toxic, self-incombustible and not support any bacterial or microbial growth.
Comply with NaOH impregnated activated carbon is used as per PS.	(c) The filter media shall be potassium hydroxide (KOH)- impregnated activated carbon and suitable for adsorption of odorous compounds such as hydrogen sulphide, ammonia and mercaptans. The impregnated activated carbon shall be made of coal substrate.
Comply	(d) The air velocity through the carbon filter media shall not be greater than 0.3 m/s with an overall carbon contact time of not less than 3.0 seconds at maximum flow condition and shall provide a maximum removal efficiency of 99.5% at 5ppm concentration. The breakthrough time of the carbon filter beds shall not be less than twelve (12) months under continuous operation as specified.
Range will comply to PS	(e) A system for monitoring the H <sub>2</sub> S concentration before and after the filter media shall be provided. The monitor shall have visual indication of the H <sub>2</sub> S concentration ranging from 0ppm to 10ppm. The monitor shall be electronic type with IP 66 rating.
Comply	(f) Access hatches and media test port of the activated carbon filter shall be at a level not higher than 1 m above the finished floor for replacement of filter media.
Comply	(g) Prefilter and after-filter unit shall be installed at the inlet and outlet of the activated carbon unit for the removal of particulate. It shall be in a readily accessible and removable frame and have an average efficiency of not less than 40% when tested in accordance with ASHRAE 52-76. The prefilter and the framework shall be made of stainless steel grade 316. The prefilter shall be designed so as to facilitate side removal of the filter elements. After filter shall have at least 90% particulate removal efficiency and be of disposable type.
Comply	(h) Differential pressure gauges shall be installed to measure the pressure drop across all filters, including activated carbon filter, prefilter and after filter. Alarm indication at the control panel shall be provided in the case of a preset level of high pressure drop is detected.
Desiccant type dehumidifiers will be provided and moisture will less than 85%. So, no mist will form. No mist eliminator is required.	(i) Mist eliminator shall be provided and made of grade 316 stainless steel housed in stainless steel grade 316 frame. The mist removal efficiency shall not be less than 98% on 20 micron moisture droplets.

General Specification for E&M Sewerage Facility Installations

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2.17.9 Dehumidifier

- (a) Fresh air shall be first drawn into the dehumidifier, dried and then discharged into the foul air steam. The mixed air is then to the activated carbon filter. No foul air shall be in contact with the dehumidifier.  
Comply
- (b) Dehumidifier shall be provided to reduce the relative humidity of the foul air into 85%RH(max) under any conditions.  
Comply
- (c) The dehumidifier shall be sorption type. The dehumidifier shall complete with high efficiency, incombustible, non-toxic Silica Gel impregnated rotor, process air fan, reactivation air fan, electrical heater, air filters, control panel and duct type remote humidistat. The rotor shall be washable.  
Comply

2.17.10 Site Testing and Commissioning

- (a) On completion of erection of each item of equipment, test and commissioning of the deodorization system shall be carried out to prove that the system be proper functions/performance under good and safe working condition.
- (b) Testing procedures shall be submitted. Any specific requirements of individual equipment suppliers shall be taken into account in these procedures.
- (c) Site testing of all mechanical and electrical installations unless otherwise specified shall comply with Parts 2 and 3 of the General Specification.
- (d) Performance test with an independent laboratory to verify the odour removal efficiency of the deodorization system shall be conducted.
- (e) At least two sampling tests for the system, one for inlet gases and the other for outlet gases, to verify the odour removal efficiency of the odour control system shall be carried out. The complete testing procedure shall be as recommended by the manufacturer and details of the testing shall be submitted for approval one month before the tests.
- (f) All instrument including air flowmeter, air differential gauge and H<sub>2</sub>S sensor shall be routine tested and functional tested. Calibration certificate for each instrument shall be submitted before the instrument leaving the manufacturers' place.
- (g) The deodorization system shall be fully assembled at the place of manufacture and functional tested.
- (h) If the removal efficiency falls below the specified performance, the system shall be modified to comply with the specified requirement.



General Specification for E&M Sewerage Facility Installations

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Comply

- (i) Commissioning test shall be carried out and 3<sup>rd</sup> party testing certificate shall be obtained to verify the removal efficiency and proof test shall be carried out upon handover of plant to DSD.



CONSTRUCTION OF PUBLIC RENTAL HOUSING DEVELOPMENT AT TUNG CHUNG  
AREA 56 OF TEMPORARY SEWAGE  
CONTRACT NO. J53G219541

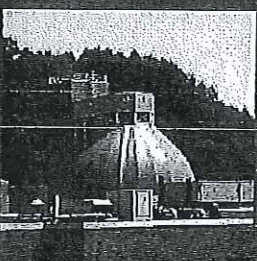
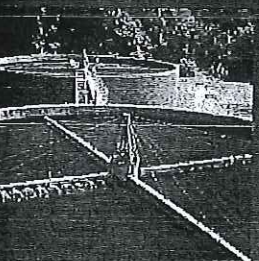
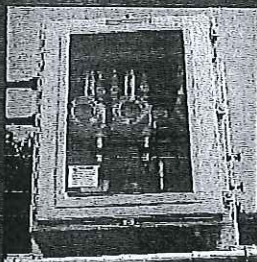
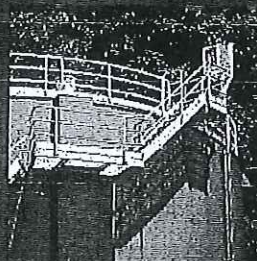
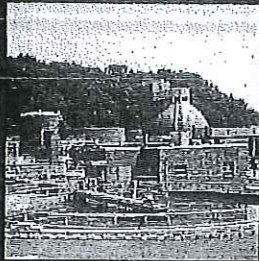
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**CATALOGUE**  
**(ES11I – Inlet and Outlet H<sub>2</sub>S Sensor)**

Inlet H<sub>2</sub>S Sensor

# MSA Gas Detection

[ for the Water and Wastewater Industries ]



[www.msagasdetection.com](http://www.msagasdetection.com)

**MSA**

## A Passion for Safety

MSA's passion for safety comes from almost a full century of manufacturing high quality gas monitoring instruments.

MSA designs and manufactures a complete line of world-class gas detection products for the water and wastewater industries.

Our passion shows through in our rugged, globally-approved permanent instruments and our reliable, easy-to-use and durable single- and multi-gas portable instruments, providing you with a complete solution for your needs.

We are dedicated to designing and manufacturing the highest-quality gas monitoring instruments for our customers to ensure that men and women may work in safety and that they, their families and their communities may live in health throughout the world.

Providing the best products, service and support in the industry. That's the MSA passion.

**MSA**

*MSA offers a full line of gas detection instruments to meet your needs and those of everyone in your organization.*

### Ultima® X Gas Monitors

The Ultima X Gas Monitors offer the latest in mechanical and electrical technologies for the continuous gas monitoring of combustible and toxic gases, as well as oxygen deficiency.

Advanced features of the Ultima X Monitor include:



**Sensor Disconnect Under Power** - MSA's proprietary feature allows for sensor change-out without declassifying a hazardous area.

**Interchangeable Smart Sensors** - Pre-calibrated sensor modules are ready for installation out of the box. Sensors can be replaced in the field without the use of tools.

**State-of-the-Art Display** - Liquid crystal display conveniently alternates between sensor reading and gas type and features scrolling messaging, indicating ongoing diagnostic checks such as sensor "end-of-life" condition.

**World-Class Design** - Engineering efforts feature a single-board design for ultimate reliability and serviceability. Ultima XE and XIR Gas Monitors feature a 316 stainless-steel multiple-entry mounting enclosure. The Ultima XA Monitor features a water- and corrosion-resistant, all-purpose, NEMA4X poly-carbonate enclosure. Both enclosures are designed to be separate from the electronics and sensor, allowing for problem-free installation and servicing.

**Infrared Technology** - The Ultima XIR Gas Monitor provides microprocessor-based, infrared point gas detection for continuous monitoring of combustible gases and vapors. Operation using dual wavelength-heated optics technology, provides definitive compensation for temperature, humidity and aging effects. Ultima XIR Gas Monitors are IP67 rated (dust proof, protected from temporary immersion in water) to withstand the rugged demands of the water and waste water industry.



**Onboard LEDs and Relays** - Optional "quick-check" LEDs and four relay outputs allow for increased indication of alarm and fault conditions. "Quick-check" LEDs, viewable from afar, indicate NORMAL (green) and ALERT (red) status conditions.

## Gas Detection Selection Chart

Hazard Location	Methane	Oxygen	Hydrocarbon	Chlorine	Hydrogen Sulfide	Carbon Monoxide	Carbon Dioxide	Sulfur Dioxide	Ammonia
Anaerobic Digesters Both Fixed & Floating Cover*	•	•			•		•		
Digester Control Building	•	•			•				
Digester Gas Processing Rooms	•	•			•				
Underground (piping) Tunnels Containing Natural or Sludge Gas Piping	•	•			•				
In-vessel Compositing*	•								
Alcohol Storage	•	•							
Incinerators	•	•	•			•			
Chlorination Room				•					
Chlorine Storage Tanks & Room				•					
Ammonia Storage Tanks & Pipes									•
De-chlorination Processes		•						•	
Sulfur Dioxide Storage Tanks								•	
Wet Wells	•	•			•				
Pumping Stations	•	•			•				
Course & Fine* Screen Facilities	•	•			•				
Flow Equalization Tanks*	•				•				
Grit Removal Tanks*	•	•			•				
Pre-Aeration Tanks*	•				•				
Primary Sedimentation Tanks*	•	•			•				
Oxygen Aeration Tanks	•								
Scum Handling Building*	•	•			•				
Scum Pits*	•	•			•				
Scum Pumping Areas* Wet & Dry Side	•	•			•				
Sludge Thickener*	•	•			•				
Sludge Storage Areas*	•	•			•				
Sludge Blending Tanks* and Holding Wells	•	•			•				



# [ Technical Specifications ]

<b>Gas Types:</b>	Combustibles, toxics and oxygen	<b>Signal Output:</b>	
<b>Temperature Range:</b>	-40 °C to +60 °C [-40 °F to +140 °F] [typical, range for some gases may differ]	<b>ULTIMA XE</b>	4-20 mA 2-wire current sink 4-20 mA 3-wire current source
<b>Drift:</b>		<b>Relay Contacts:</b>	
<b>Zero Drift</b>	< 5% per year, typical	<b>Rating</b>	5 A @ 220 VAC; 5 A @ 30 VDC
<b>Span Drift</b>	<10% per year, typical	<b>Alarm</b>	normally energised/de-energised, SPDT, upscale/downscale, latching/nonlatching
<b>Accuracy:</b>		<b>Fault</b>	normally energised, SPDT, non-latching
<b>Repeatability</b>	± 1% Full Scale or 2 ppm, typical	<b>Cable Entries:</b>	Four, 3/4 inch NPT or 25 mm
<b>Linearity</b>	± 2% Full Scale or 2 ppm [O <sub>2</sub> , CO], typical ± 3% Full Scale [<50% LEL combustibles] ± 5% Full Scale [>50% LEL combustibles] ±10% Full Scale or 2 ppm [non-CO toxics], typical	<b>Physical:</b>	
<b>Response Times:</b>		<b>Weight</b>	4.7 kg
<b>τ<sub>20</sub> oxygen and toxics</b>	<12 seconds [typically 6 seconds]	<b>Dimensions</b>	261 x 160 x 99 mm [H x W x D]
<b>τ<sub>50</sub> oxygen and toxics</b>	<30 seconds [typically 12 seconds]	<b>Material</b>	316 Stainless Steel
<b>τ<sub>50</sub> combustibles</b>	< 8 seconds	<b>Approvals:</b>	
<b>τ<sub>90</sub> combustibles</b>	<20 seconds	<b>ULTIMA XE/XIR/X<sup>3</sup></b>	CE Low Voltage Directive: 73/23/EEC
<b>τ<sub>90</sub> XIR</b>	< 5 seconds [without sensor guard]	<b>ULTIMA XE/XIR/X<sup>3</sup></b>	CE ATEX Directive: 94/9/EC
<b>Humidity:</b>	15% - 95% RH, non-condensing	<b>and Remote Sensor</b>	CE EMC Directive: 89/336/EEC
<b>Sensor Life:</b>		<b>ULTIMA XE/XIR/X<sup>3</sup></b>	Ⓢ II 2G EEx d IIC T5 [main enclosure]
<b>Oxygen and toxics</b>	2 years typical		Ⓢ II 2G EEx d IIC T4 [sensor excluding IR]
<b>Combustibles</b>	3 years typical		Ⓢ II 2G EEx d IIC T5 [IR sensor]
<b>Power Input:</b>	24 VDC [oxygen] 24 VDC @ 450 mA maximum [combustibles] 24 VDC @ 750 mA maximum [XIR]	<b>EC-Type Examination Certificate</b>	Ⓢ II 2G EEx ia IIC T4 [sensor with safety barrier] -40 °C to +60 °C
<b>Wiring Requirements:</b>		<b>DMT 02 ATEX E 202 X</b>	
<b>Combustibles [Incl. XIR]</b>	3-wire	<b>ULTIMA XE/XIR</b>	Performance approval EN 61779-1: 2001 EN 61779-4: 2001 EN 50104: 2002 [PFG-No. 41301103P] EN 50271: 2002
<b>Oxygen and toxics</b>	2-wire; no LEDs or relays	<b>ULTIMA Calibrator</b>	Ⓢ II 2G EEx ib IIC T3/T4/T5
<b>Oxygen and toxics</b>	3-wire; LEDs and/or relays	<b>ULTIMA Controller</b>	Ⓢ II 2G EEx ib IIC T4
		<b>Warranty:</b>	24 months on all components including IR sensor [does not include catalytic or electrochemical sensor modules]



# [ Ordering Information ]

Cable Gland Thread Type  
3/4" NPT      25 mm metric

Please choose from  
the options to create  
your ULTIMA X

Enclosure Type		
Enclosure without terminal strips	10044380	10044382
Enclosure with terminal strips	10044381	10044383

Gas Type		
<b>Infrared Sensors</b>		
IR Sensor for Combustible Gases, Group 3*: 0-100% LEL	10044425	10044449
IR Sensor for Combustible Gases, Group 4*: 0-100% LEL	10044426	10044450
<b>Catalytic Sensors</b>		
Catalytic Sensor for Combustible Gases, Group 1*: 0-100% LEL	10044423	10044447
Catalytic Sensor for Combustible Gases, Group 2*: 0-100% LEL	10044424	10044448

Electrochemical Sensors		
Ammonia	0-50 ppm	10044520
Ammonia	0-100 ppm	10062612
Arsine	0-2 ppm	10044428
Bromine	0-5 ppm	10044518
Carbon Monoxide	0-100 ppm	10044364
Carbon Monoxide	0-500 ppm	10044365
Chlorine	0-5 ppm	10044514
Chlorine Dioxide	0-3 ppm	10044517
Diborane	0-50 ppm	10044431
Ethylene Oxide	0-10 ppm	10044521
Fluorine	0-10 ppm	10044519
Germane	0-3 ppm	10044430
Hydrogen	0-1000 ppm	10044432
Hydrogen Chloride	0-50 ppm	10044516
Hydrogen Cyanide	0-50 ppm	10044422
Hydrogen Sulphide	0-10 ppm	10044368
Hydrogen Sulphide	0-50 ppm	10044369
Hydrogen Sulphide	0-100 ppm	10044420
Nitric Oxide	0-100 ppm	10044421
Nitrogen Dioxide	0-10 ppm	10044515
Oxygen	0-10%	10044366
Oxygen	0-25%	10044367
Phosphine	0-2 ppm	10044427
Silane	0-25 ppm	10044429

LED/Relay/Output Options		
ULTIMA XE/XIR	no LEDs and no relays, 2-wire output [only for toxics, not for combustibles]	10044388
ULTIMA XE/XIR	no LEDs and no relays, 3-wire output	10044386
ULTIMA XE/XIR	LEDs and no relays, 3-wire output	10044385
ULTIMA XE/XIR	Relays and no LEDs, 3-wire output	10044387
ULTIMA XE/XIR	LEDs and relays, 3-wire output	10044384
ULTIMA X <sup>2</sup> ModBUS-PCB	no LEDs and no relays	10062613
ULTIMA X <sup>2</sup> ModBUS-PCB	LEDs and no relays	10062614
ULTIMA X <sup>2</sup> ModBUS-PCB	Relays and no LEDs	10062615
ULTIMA X <sup>2</sup> ModBUS-PCB	LEDs and relays	10062616

Installation Options	
Instrument mounting bracket	10047561
Housing for remote sensor installation, 3/4" NPT	10044457
Housing for remote sensor installation, 25 mm metric	10044458
Reducer M25/M20 EEx de	10045881
Cable Gland M20 EEx d	10045880

Distributed by:



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Scotland, UK

www.amsequipment.com / sales@amsequipment.com / 0141 587 8296



INSTRUMENTS

# INTELLIGENT GAS DETECTOR

**Gas Detection For Life**
**GD-70D Series**


## Features

- Monitor combustibles, O<sub>2</sub>, and a wide range of toxics
- Plug and play intelligent sensors retain calibration and sensor data
- Common platform (main unit / sensor / pump) for all detection methods
- Universal main unit (all sensor types)
- Multifunctional sensor unit (new Intelligent sensor)
- No internal tubing (main unit) / No coil (pump)
- Front access, no tools required, easy sensor and pump replacement
- Large size LCD screen
- Various communication methods available (4-20mA, LonWorks, and PoE)
- Minimal maintenance cost through enhanced troubleshooting firmware functions
- Small mounting space
- Environmentally friendly
- Wide variety of sensors available

The new Model GD-70D smart gas detection transmitter series sets a new standard for performance, flexibility, and versatility. The GD-70D sample-draw transmitter offers an array of sensor technologies unmatched in the industry, including unique offerings, such as our hydrogen-specific or LEL versions.

The long life high capacity pump and wide variety of sensing elements are replaceable in a few seconds, with no tools required! The smart sensors retain all calibration and sensor-specific data in non-volatile memory, so sensors can be hot-swapped in the field with no programming required. The sensors also retain calibration information, which means they can be conveniently calibrated separate from the transmitter, avoiding transport of calibration gases to field locations. The GD-70D firmware automatically corrects for long-term zero and span "drift" minimizing maintenance and maximizing reliability.

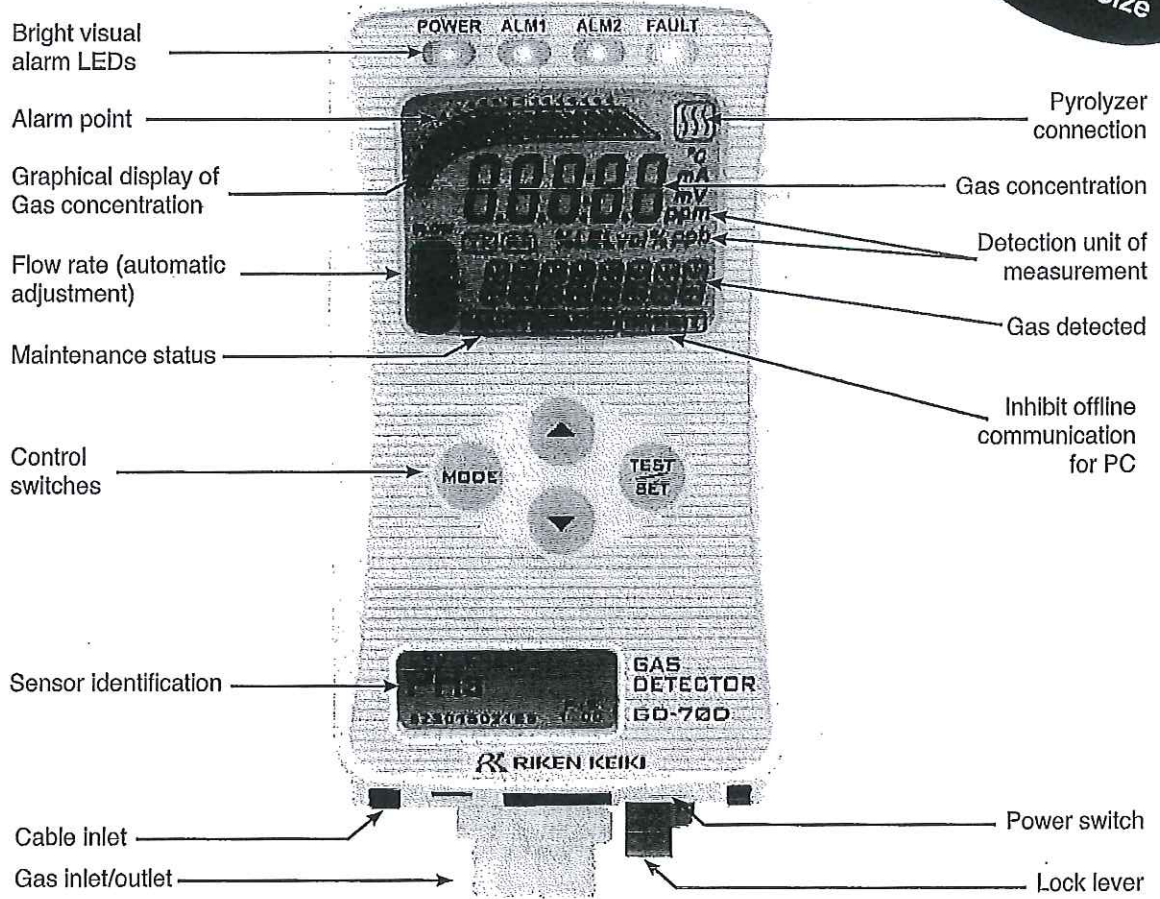
The GD-70D can be used as a stand-alone device, offering a number of communication protocols to existing PLC systems, or can be integrated with RKI's Beacon series of single and multi-channel controllers.

All GD-70D transmitters include a large, easy to read integral LCD display, tri-color bar graph for visual notification of alarm status, programmable low and high alarm relays, and fault relay. Pump flow is self-tuning for maintenance-free operation. Because all GD-70D base units are identical, sensors can be interchanged with no programming or tools required, resulting in maximum flexibility to the user. NEMA 4X 115 VAC versions available.

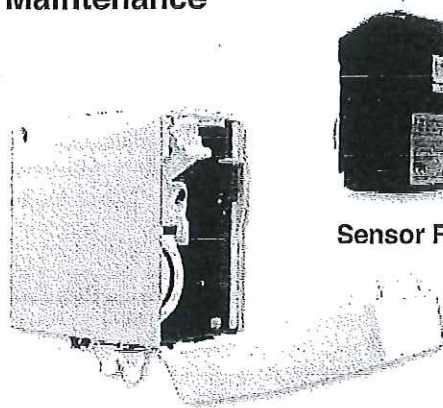


# Gas Detection For Life

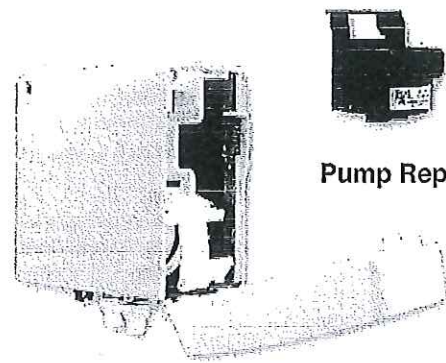
Actual Size



## Tool Free Maintenance



Sensor Replacement



Pump Replacement

Specifications subject to change without notice.

# GD-70D Series

MAIN UNIT			
Model	GD-70D	GD-70D-NT	GD-70D-ET
Communication	4-20mA DC	DC power line communication	PoE method
Detection principle	Different type depending upon sensor unit and detectable gas (see table)		
Sampling method	Sample draw (auto-adjustment of flow rate) 0.5 L / min +/-10%		
Display	<ul style="list-style-type: none"> <li>Large LCD display (white backlight)</li> <li>Flow rate, communication status, pyrolyzer status, gas detected</li> </ul>		<ul style="list-style-type: none"> <li>Gas concentration</li> <li>Error code, content of error</li> </ul>
Gas alarms	Two alarm levels: 1st alarm - Red	2nd alarm - Red	Fault alarm - Yellow
External output	1st, 2nd, and trouble alarms: Relay contact output for each alarm		
Self diagnostic function	System failure, sensor failure, flow failure, communication error NT / ET / Analog		
Datalogging	Event history, alarm history, calibration history. Alarm trend (180 sec before / after 1st alarm)		
Operation temp. & humidity	0 ~ 40°C, 30 ~ 70% RH (non-condensing)		
Operating settings	All operational settings are user adjustable through front panel		
Power requirements	DC 24V +/- 10%, approx 1.5W (Max 4W including sensor unit) Note: Approx. 2.5W (Max 5W) with SGU sensor unit		PoE standard arrangement
Dimensions	2.8"W x 4.7"H x 5.9"D (70W x 120H x 150Dmm)		
Weight	Approx. 0.9kg (2.0lbs), including sensor unit		
Mounting	Wall-mounting base plate by 2 or 3 screws		
Sampling tubing	4 x 6mm PTFE tubing recommended. Tube fittings provided as standard accessories		
Bushing	Cable type varies depending on communication method (Cable bushing optional)		

SENSOR UNIT					
Model	ESU	SGU	SSU	OSU	NCU
Detection principle	Electrochemical cell	Semiconductor	Pyrolysis-particle	Galvanic cell	Catalytic combustion
Gas detected and detection range	Refer to list of detectable gases	0-2000ppm H <sub>2</sub> , CH <sub>4</sub> , or CH <sub>2</sub> F <sub>2</sub> (R-32) in air and others	0-15ppm TEOS in air	0-25% O <sub>2</sub> in air	0-100% LEL H <sub>2</sub> , CH <sub>4</sub> , and others
Self diagnosis function	Sensor trouble, system failure				
Date logging function	Event history, alarm history, calibration history, Alarm trend (60 sec. before/after 1st alarm)				

PYROLYZER UNIT		Not applicable to H <sub>2</sub> S gas detector
Model	PLU-70	
Application	NF <sub>3</sub> / TEOS gases detected in air	
Usage	Used by connecting to "GD-70D" (Main unit)	
Power Lamp	LED (Green color) Normal: Light-on Warming-up: Flashing at every 1 sec interval Trouble: Flashing at every 0.2 sec interval	
Self-diagnostic function	Pyrolyzer unit trouble Fan trouble System trouble	
Operating temp. & humidity	0-40° C, 30-70% RH (non-condensing)	
Operational settings	All operational settings are user adjustable through front panel	
Power requirements	DC 24V +/- 10%, approx. 25W (max)	
Dimensions	2.8"W x 4.7"H x 5.9"D (70W x 120H x 150Dmm)	
Weight	Approx. 1.2kg (2.6lbs)	
Mounting	Wall-mounting base plate by 2 or 3 screws	
Sampling	4x6mm PTFE tubing recommended. Tube fittings provided as standard accessories	
Bushing	1.25sq 2 core cable for power supply DC24V (Cable bushing optional)	

# GD-70D Series

ESU Gas Detected		Detection Range	ACGIH TLV-TWA	Part #
Ammonia	NH3	75 ppm	25 ppm	GD-70D-NH3
Arsine	AsH3	0.2 ppm	5 ppb	GD-70D-ASH3
Boron Trichloride	BCl3	15 ppm		GD-70D-BCl3
Boron Trifluoride	BF3	9 ppm	0.1 ppm	GD-70D-BF3
Bromine	BR2	1 ppm	0.1 ppm	GD-70D-BR2
Carbon Monoxide	CO	75 ppm * 150 ppm 300 ppm *	25 ppm	GD-70D-CO-01/02/03/11/12/13
Chlorine	Cl2	3 ppm 1.5 ppm *	0.5 ppm	GD-70D-Cl2
Chlorine Trifluoride	ClF3	0.6 ppm	(C) 0.1 ppm	GD-70D-ClF3-A
Diborane	B2H6	0.3 ppm	0.1 ppm	GD-70D-B2H6
Dichlorosilane	DCS	15 ppm		GD-70D-DCS
Dissilane	Si2H6	15 ppm	(C) 2 ppm	GD-70D-Si2H6
Dimethylamine	(CH3)2NH	15 ppm	5 ppm	GD-70D-DMA
Diethylamine	(CH3CH2)2NH	15 ppm	5 ppm	GD-70D-DEA
Fluorine	F2	3 ppm	1 ppm	GD-70D-F2
Germane	GeH4	0.8 ppm	(C) 2 ppm	GD-70D-GeH4
Hydrogen Bromide	HBr	6 ppm, 9 ppm *	(C) 2 ppm	GD-70D-HBR-06/-09
Hydrogen Chloride	HCl	6 ppm, 15 ppm *	(C) 2 ppm	GD-70D-HCL-06E/15E
Hydrogen Cyanide	HCN	15 ppm		GD-70D-HCN
Hydrogen Fluoride	HF	9 ppm, 3 ppm *	0.5 ppm	GD-70D-HF-03/-09
Hydrogen Selenide	H2Se	0.2 ppm	0.05 ppm	GD-70D-H2Se
Hydrogen Sulfide	H2S	1 ppm 30 ppm	1 ppm	GD-70D-H2S-01/-30
Methylamine	CH3NH2	15 ppm	5 ppm	
Nitric Oxide	NO	100 ppm	25 ppm	GD-70D-NO
Nitrogen Dioxide	NO2	9 ppm 15 ppm	3 ppm	GD-70D-NO2-09
Nitrogen Tetraoxide	N2O4	15 ppm		GD-70D-N2O4
Nitrogen Trifluoride	NF3	30 ppm	10 ppm	
Ozone	O3	0.6 ppm	0.1 ppm	GD-70D-O3
Phosphine	PH3	1 ppm	0.3 ppm	GD-70D-PH3-AH
Silane	SiH4	15 ppm	5 ppm	GD-70D-SiH4-AH/DH
Silicon Tetrachloride	SiCl4	15 ppm		GD-70D-SiCl4
Silicon Tetrafluoride	SiF4	9 ppm		GD-70D-SiF4
Sulfur Dioxide	SO2	6 ppm		GD-70D-SO2
Sulfur Tetrafluoride	SF4	9 ppm		GD-70D-SF4
Tetraethyl Orthosilicate	TEOS	15 ppm		GD-70D-TEOS
Trichlorosilane	TCS	15 ppm		GD-70D-TCS
Trimethylamine	(CH3)3N	15 ppm	5 ppm	GD-70D-TMA
Tungsten Hexafluoride	WF6	9 ppm		GD-70D-WF6

SGU Gas Detected		Detection Range	ACGIH TLV-TWA	Part #
Carbonyl Sulfide	COS	2,000 ppm	—	
Dichloroethene	C2H2CL2	600 ppm	200 ppm	
Dichlorethylene	DCE	600 ppm		GD-70D-MDCE
Dichloromethane	CH2CL2	2,000 ppm	50 ppm	GD-70D-MDCM
Difluoromethane	R-32	2,000 ppm	1,000 ppm	
Fluoro Methane	R-41	2,000 ppm	1,000 ppm	
Hydrogen	H2	500 ppm * 1,000 ppm * 2,000 ppm 2% Vol.	—	GD-70D-MH2-S500 GD-70D-MH2-S1K GD-70D-MH2-S2K GD-70D-MH2-20K
Isopropyl Alcohol	CH3CHOHCH3	2,000 ppm	200 ppm	GD-70D-MIPA-2K
Methane	CH4	2,000 ppm 5,000 ppm *	—	GD-70D-MCH4-2K GD-70D-MCH4-5K GD-70D-MCH4-20K GD-70D-MCH3OH-1 GD-70D-MCH3OH-2
Methyl Alcohol	CH3OH	1,000 ppm 2,000 ppm *	200 ppm	
Propane	CH3H8	2,000 ppm 5,000 ppm *	1,000 ppm	GD-70D-MC3H8-2K GD-70D-MC3H8-2K
NCU Gas Detected		Detection Range	LEL % Vol. Levels	
Hydrogen	H2	100% LEL	—	GD-70D-LEL-H2
Hydrogen	H2	2% Vol.	—	GD-70D-H2-20K
Isobutane	I-C4H10	100% LEL	—	GD-70D-ISOB
Methane	CH4	100% LEL	—	GD-70D-LEL-CH4
Methane	CH4	2% Vol.	—	GD-70D-CH4-20K
SSU Gas Detected		Detection Range	ACGIH TLV-TWA	
Trimethyl Silane	TMS	15 ppm	—	GD-70D-TMS
Trimethoxysilane	TRIMOS	15 ppm	—	GD-70D-TRIMOS
Tetraethyl Orthosilicate	TEOS	15 ppm	10 ppm	
OSU Gas Detected		Detection Range	ACGIH TLV-TWA	
Oxygen	O2	25% Vol.	—	GD-70D-OXY

\* Special order for non-standard range



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**CONSTRUCTION OF PUBLIC RENTAL HOUSING DEVELOPMENT AT TUNG CHUNG  
AREA 56 OF TEMPORARY SEWAGE  
CONTRACT NO. J53G219541**

---

**CATALOGUE**  
**(ES11J – Differential Pressure Gauge)**

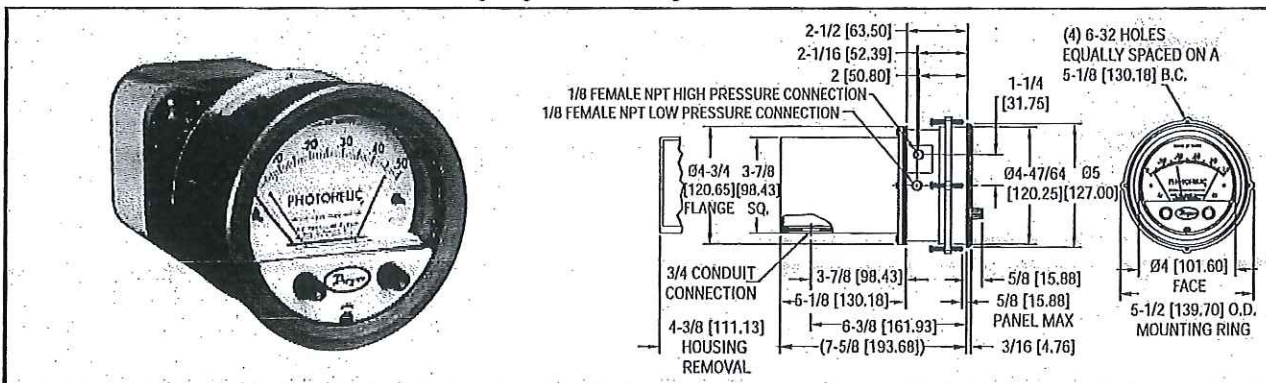


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The Series 3000SGT Photohelic® Switch/Gage/Transmitter combines several critical control functions into a single, easy-to-install package. This versatile instrument starts with the universally accepted standard for reliable low air pressure measurement, the Dwyer® Magnohelic® Gage. It measures positive, negative or differential pressures within ±2% of full scale accuracy. This time-proven component provides highly reliable analog indication of air or compatible gas pressure on a 4", 80° scale. Gage operation is completely independent—functions normally even if power is interrupted to electrical elements of the control.

Next, two DPDT relays are added which serve as Low/High limit controls (or pressure switches) capable of handling up to 10 amps @ 28 VDC or 120/240 VAC directly. Individual setpoint deadband is one pointer width—less than 1% of full scale; just enough to assure positive, chatter-free operation. Integral holding coils enable user to connect the two so they work like a single control with variable deadband—ideal for applications such as clean room and building pressurization, HVAC systems, automatic air filter or level control and much more. Actuation points are fully adjustable over the entire pressure range with convenient front mounted knobs linked to bright red setpoint indicators.

Finally, the Photohelic® SGT includes a separate 4-20 mA, 2-wire transmitter operating from an external 10.0 - 35 VDC power supply. Separate adjustments are included for zero and span inside the rear electronics enclosure. Optional A-700 Power Supply is a perfect companion rated for AC inputs from 100-240V; DC outputs from 24 - 28V. The transmitter component is an ideal driver for variable speed blowers and fans, damper positioners and for continuous data logging on computerized VAV systems or strip chart recorders. Besides the obvious cost and space saving advantages of combining all these control functions in a single unit, think of the additional savings in time and material with just one set of pneumatic lines to connect instead of three or four.

#### OPTIONS & ACCESSORIES

**Tamper-Proof Knobs** — Require special spanner-type key (included) to adjust set points. Add suffix -TAMP

**Low Temperature Option** — 0°F (-18°C). Add suffix -LT

**A-700 Power Supply** — AC input: 100/120/220/230-240 VAC ±10%, 47-63 Hz. DC output: 24-28 VDC regulated

**A-298 Flat Aluminum Bracket**, for flush mounting 3000SGT

#### SPECIFICATIONS

##### GAGE SPECIFICATIONS

**Service:** Air and non-combustible, compatible gases.

**Wetted Materials:** Consult factory.

**Accuracy:** See model chart below.

**Pressure Limits:** See model chart below.

**Temperature Limits:** 20 to 120°F (-6.67 to 48.9°C).

**Process Connections:** 1/8" female NPT.

**Size:** 4" (101.6 mm) dial face, 5" (127 mm) O.D. x 8-1/4" (209.55 mm).

**Weight:** 3 lb, 14.5 oz (1.77 kg).

##### SWITCH SPECIFICATIONS

**Switch Type:** Each set point has 2 Form C relays (DPDT).

**Repeatability:** ±1% of full scale.

**Electrical Rating:** 10A @ 24 VDC or 120 VAC, 6A @ 240 VAC.

**Electrical Connections:** Screw terminals.

**Power Requirements:** 120 VAC, ±10%.

**Mounting Orientation:** Diaphragm in vertical position. Consult factory for other position orientations.

**Set Point Adjustment:** Adjustable knobs on face.

##### TRANSMITTER SPECIFICATIONS

**Accuracy:** See model chart below.

**Temperature Limits:** 20 to 120°F (-6.67 to 48.9°C).

**Pressure Limits:** See model chart below.

**Thermal Effects:** ±0.025% F.S./°F (0.045% F.S./°C).

**Power Requirements:** 10.0 to 35 VDC (2-wire).

**Output Signal:** 4-20 mA DC.

**Zero & Span Adjustments:** Multi-turn potentiometers, internally accessible.

**Response Time:** 250 mSec.

**Loop Resistance:** 0 - 1250 ohms.

**Current Consumption:** 38 mA DC, maximum.

**Electrical Connections:** Terminal block.

**Warm-up Time:** 10 minutes.

Model	Range, In. w.c.	Maximum Pressure	Electrical Accuracy +/-%	Mechanical Accuracy +/-%	Model	Range, Pascals	Maximum Pressure	Electrical Accuracy +/-%	Mechanical Accuracy +/-%
3000SGT-0	0-0.5	25 psi (1.7 bar)	2	3	3000SGT-250PA 3000SGT-500PA	0-250 0-500	25 psi (1.7 bar) 5 psi (34.5 kPa)	2 0.5	2 2
3001SGT	0-1.0	25 psi (1.7 bar)	2	2					
3002SGT	0-2.0	5 psi (34.5 kPa)	0.5	2	Model	Range, Kilopascal			
3003SGT	0-3.0	5 psi (34.5 kPa)	0.5	2					
3006SGT	0-6.0	5 psi (34.5 kPa)	0.5	2	3000SGT-1.5KPA	0-1.5	5 psi (34.5 kPa)	0.5	2
3010SGT	0-10	5 psi (34.5 kPa)	0.5	2					
3020SGT	0-20	10 psi (69 kPa)	0.5	2					
3030SGT	0-30	10 psi (69 kPa)	0.5	2					

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## **Appendix 1.2**

# **Photo record of the Odour control System**

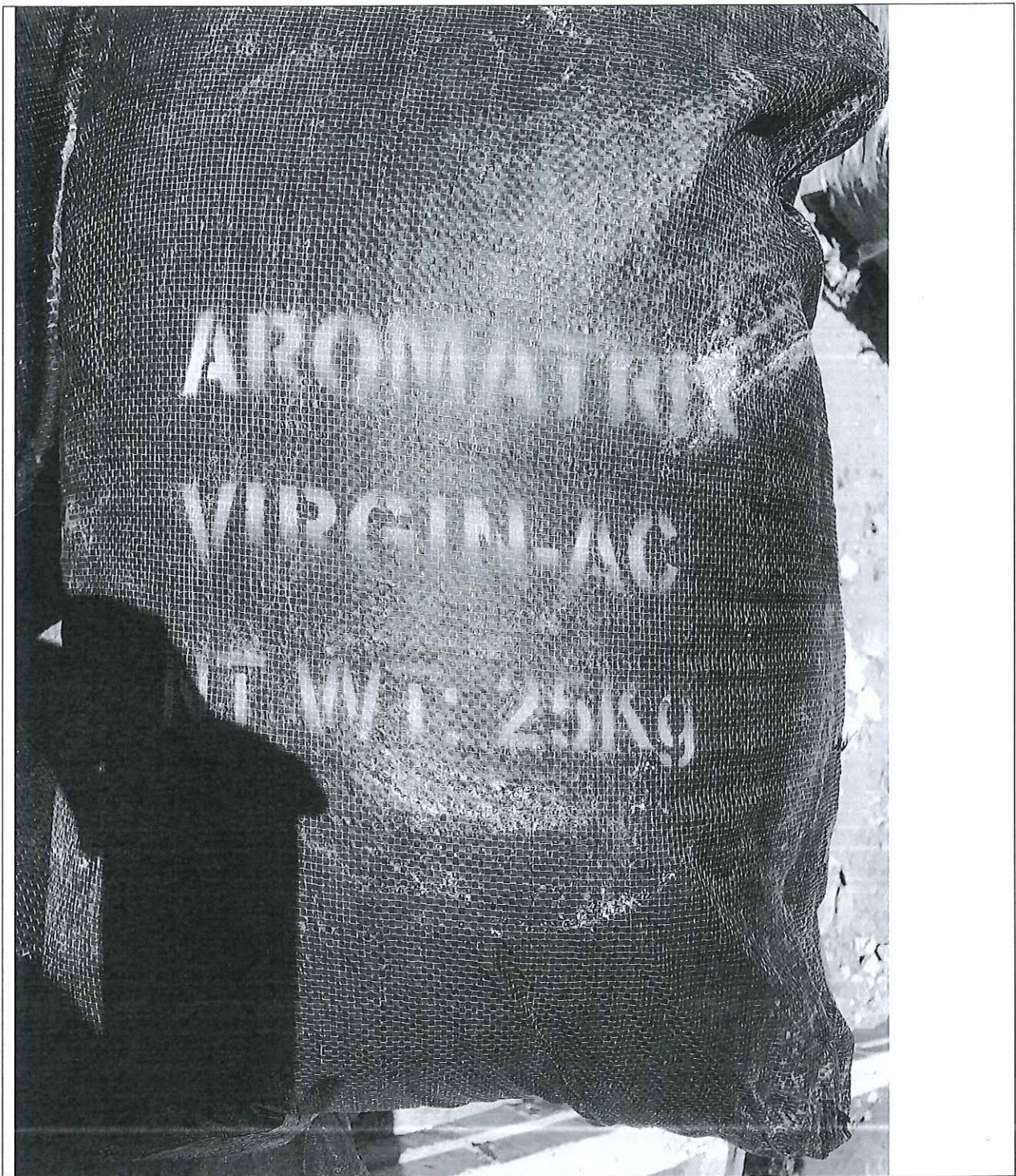


Photo 1.1 Carbon; Brand - Aromatix

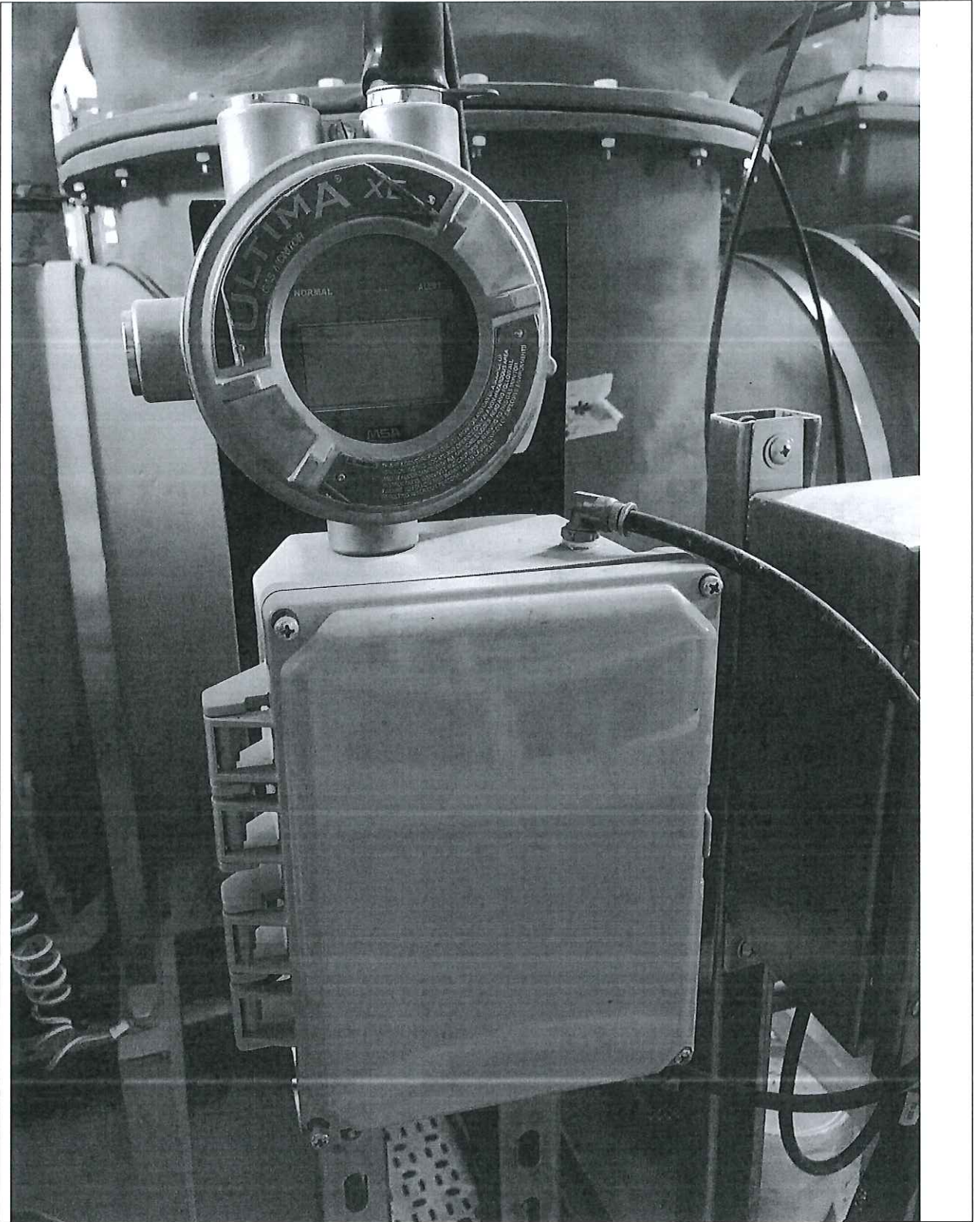


Photo 1.2 inlet H2S sensor; Brand -MSA



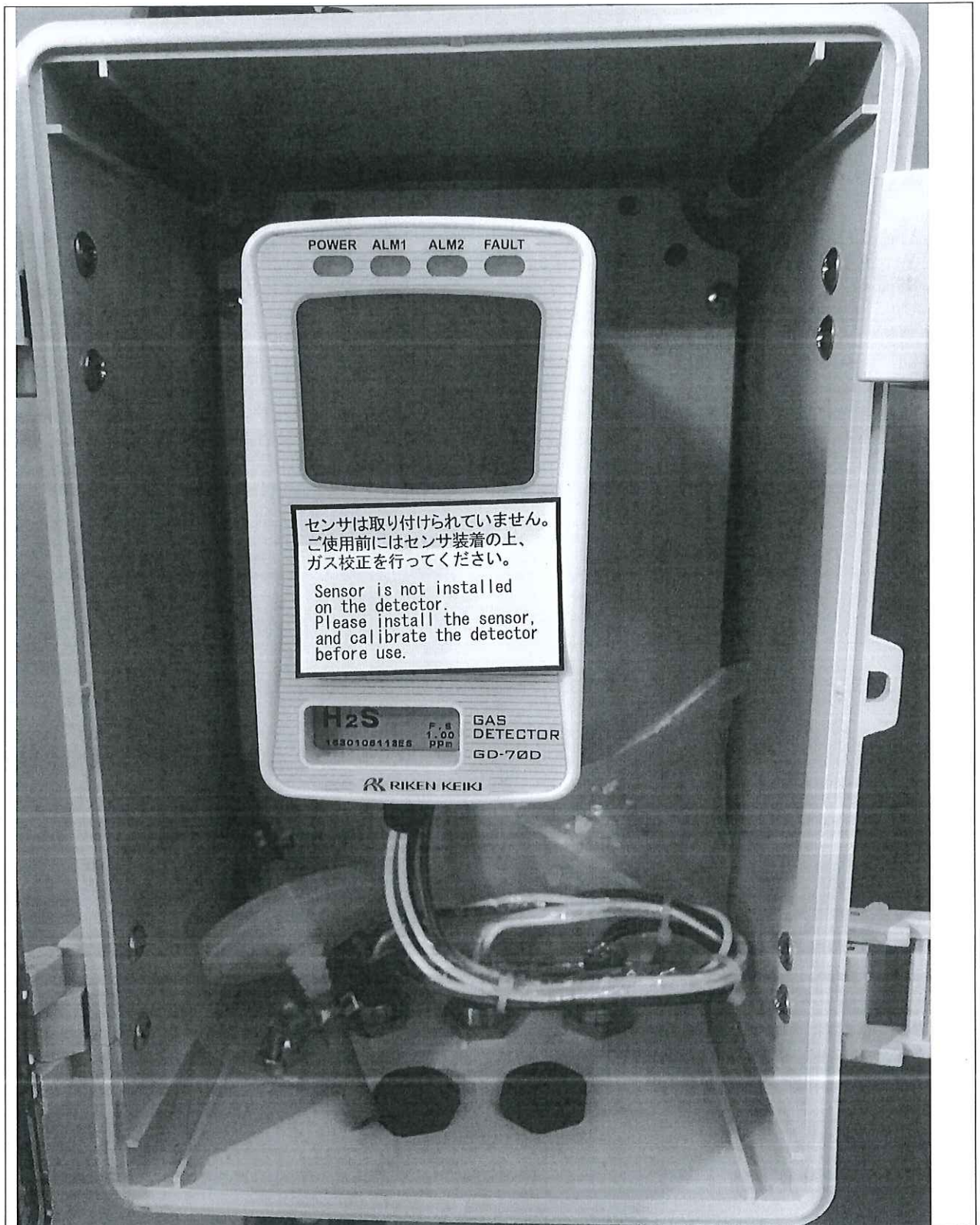


Photo 1.3 Outlet H2S sensor; Brand - RKI

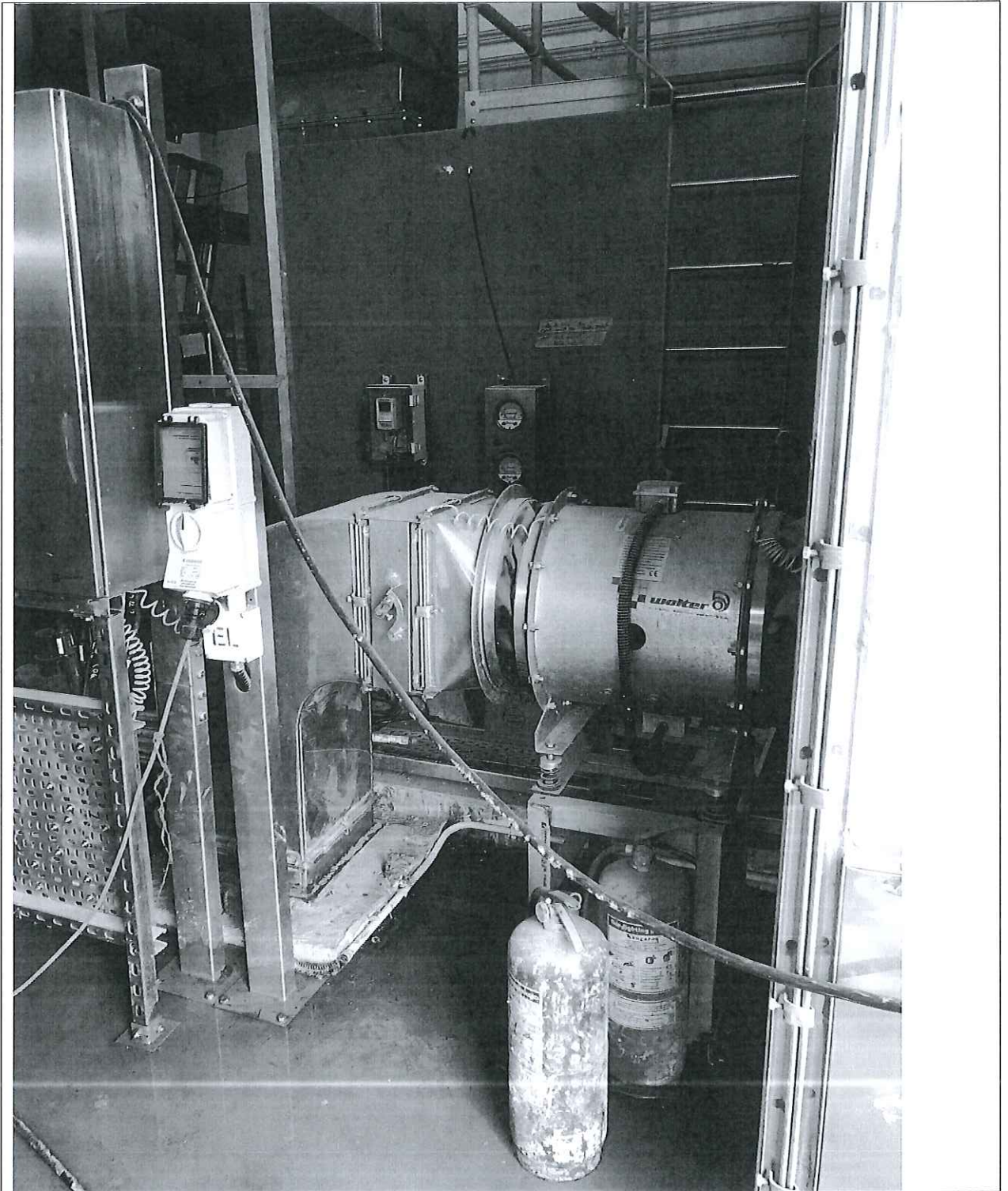


Photo 1.4 overview of Odour control system

## **APPENDIX E**

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### Noise Measurement Report

# Temporary Sewage Pumping Station Ancillary to Tung Chung Area 56 Public Housing Development

## Noise Measurement Report

Reference: R9452/01 Issue 1

Date: September 2017

Confidential



# Temporary Sewage Pumping Station Ancillary to Tung Chung Area 56 Public Housing Development

## Noise Measurement Report

Prepared under the Management of:

Name: *Lee Chi Pang*

Position: *Senior Consultant, MHKIOA Membership (No. M248)*

Signature:



Reviewed and Approved by:

Name: *Derek Ho*

Position: *Director*

Signature:



Reference: R9452/01 Issue 1

Date: 25 September 2017

Filename: [J:\9452 - Noise Measurement for TSPS at TC Area 56\Report1\\_NMR\R9452-01-I1-NMR\(Draft3\).docx](#)

5/F, FWD Financial Centre, 308 Des Voeux Road Central, Hong Kong

Tel: (852) 2815 2221

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# 1 Introduction

## 1.1 Background

1.1.1.1 BMT has been commissioned by Hsin Chong Construction Co., Ltd. to conduct an onsite noise measurement at the public rental housing estate in Tung Chung Area 56. The aim is to determine the compliance of noise criteria for the operation of Temporary Sewage Pumping Station (TSPS) in accordance with the requirement set under the Project Profile (PP-481/2013) and Environmental Permit (EP-452/2013).

## 1.2 Objectives

1.2.1.1 To determine the noise compliance of the operation of TSPS, onsite noise measurement shall be conducted at the representative occupied room with potential noise impact. The measured noise level shall be compared against the requirement stated in the Project Profile (PP-481/2013) to determine the noise compliance of the TSPS. The results of noise measurement is documented in this report.

## 1.3 Report Structure

1.3.1.1 The remaining chapters of this report are shown below:

Chapter 2 – Measurement Details

Chapter 3 – Noise Measurement Results

Chapter 4 – Conclusion



## 2 Measurement Details

### 2.1 Assessment Criteria

- 2.1.1.1 According to the PP-481/2013(PP-481/2013), the noise criteria [in  $LA_{eq(30min)}$ ] from fixed noise sources of the TSPS should be 60 dB(A) during daytime and evening time period (0700 - 2300 hours) and 50 dB(A) during night-time period (2300 - 0700 hours) at the façade of the representative Noise Sensitive Receiver (NSR). The noise criteria are tabulated in [Table 2.1](#).

Table 2.1 Noise Criteria for Fixed Noise Sources from TSPS

Time Period	Noise Criteria, $LA_{eq(30min)}$ , dB(A)
Day and Evening (0700 – 2300 hours)	60
Night (2300 – 0700 hours)	50

Note: Noise Criteria = ANL-5 dB(A) as stated in PP-481/2013 (PP-481/2013)

### 2.2 Noise Sources

- 2.2.1.1 The major noise sources of the TSPS are included three submersible pumps, one deodorizer fan, two mechanical raked bar screens and two exhaust fans. The location of the TSPS is shown in [Figure 1](#).

### 2.3 Noise Measurement Location

- 2.3.1.1 NSR has been identified in accordance with Annex 13 of the Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO). The residential premises which rely on opened windows for ventilation should be considered as NSRs. The representative NSR was chosen by the nearest distance between the TSPS and residential flat unit. The representative NSR and its corresponding measurement point was summarised in . The measurement point shall be positioned 1 meter exterior of the window for sensitive uses (i.e. living room/bedroom).

Table 2.2 Representative Noise Sensitive Receiver (NSR)

NSR ID	Description	Uses	Horizontal Distance to TSPS	Measurement Height
NSR 1	Flat 21 at 3/F of Block 2	Residential	~ 16 m	2m above floor

- 2.3.1.2 An intervening building canopy is found between the identified NSR and TSPS, which is partial screened the TSPS. Therefore, the measurement point was adjusted to the position which have no obstructed line of sight from the measurement point to the whole TSPS, i.e. 2m above 3/F. The locations of measurement point and noise sources are indicated in [Figure 1](#). Photo record of NSR is shown in [Photo 1](#) of [Appendix B](#).

## 2.4 Methodology

- 2.4.1.1 The noise measurement methodology as detailed in EPD's Technical Memorandum for the Assessment of Noise from Places Other Than Domestic Premises, Public Places or Construction Sites (IND-TM) will be followed.
- 2.4.1.2 Background noise and source noise measurement shall be conducted at the representative noise measurement location as mentioned in for day and evening time (i.e 0700 – 2300 hours), and night-time period (i.e. 2300 – 0700 hours). If the existing site condition is not suitable for measurement, another suitable location will be chosen wherever practicable.
- 2.4.1.3 The noise measurements will be taken at approximately 1 meter away from the façade of the NSR. [Photo 2](#) of [Appendix B](#) shows the setup of noise measurement equipment.
- 2.4.1.4 The major noise sources in TSPS include three submersible pumps, one deodorizer fan, two mechanical raked bar screens and two exhaust fans. All equipment in TSPS will be turned on during the source noise measurement. Also, all fans and bar screens will be operated in high speed mode to represent the worst-case scenario. The noise levels shall be measured in terms of the A-weighted equivalent continuous sound pressure level (LAeq) over the one-third octave frequency 20 Hz to 20,000 Hz. The sampling time for each measurement is 30 minutes.
- 2.4.1.5 The influence of background noise shall be recorded and removed from the source noise level measurements by logarithmic subtraction, where appropriate, for the purposes of comparison with noise criteria.
- 2.4.1.6 The source noise level at NSR is calculated with the following equation:

$$CNL = MNL + C_{tone} + C_{imp} + C_{int} + C_{facade}$$

where

- CNL* – Corrected Noise Level (CNL) due to noise emitted from noise source, [ $LA_{eq(30-min)}$ , dB(A)]
- MNL* – Measured Noise Level (MNL) due to noise emitted from noise source, [dB(A)]; Background noise adjustment shall be made where appropriate.
- C<sub>tone</sub>* – Correction of tonality, dB(A).
- C<sub>imp</sub>* – Correction of impulsiveness, dB(A)

- $C_{int}$  – Correction of intermittency, dB(A)  
 $C_{façade}$  – Correction of façade effect, dB(A); Addition of +3 dB(A) if the measurement is in free-field condition.

Note

All the correction factors shall be determined in accordance with the procedures stated in IND-TM.

## 2.5 Measurement Procedures

### 2.5.1.1

The detailed measurement procedure is summarised as below:

1. Check settings of sound level meter (SLM):
  - i) 'Fast' time weighting;
  - ii) 'A' frequency weighting;
2. Record and note the general weather conditions and wind speed; No noise measurement shall be conducted if there is raining or wind speed greater than 5 m/s;
3. Calibrate the SLM using the sound calibrator for 94.0 dB at 1000 Hz;
4. Setup the SLM to the measurement position which is located 1m exterior of noise sensitive façade and lowered sufficiently so that the external building façade acts as a reflective surface;
5. Measure the background noise level in terms of LAeq for 30 minutes of time. Ensure measurement taken in the absence of source noise from TSPS;
6. Record the extraneous noise events during background noise measurement, if any;
7. Switch on and ensure all identified noise sources from TSPS in normal operation;
8. Measure the source noise level in terms of LAeq for 30 minutes of time. Ensure measurement taken in the presence of source noise from the TSPS;
9. Record the extraneous noise events during source noise measurement, if any;
10. Re-calibrate the SLM. In the event that the deviation of calibration level before and after the measurement is greater than 1 dB(A) then the measurement results obtained will not be valid and the measurement will have to be repeated;
11. Repeat Step 1 to 10 for other measurement periods or measurement locations.

## 2.6 Instrumentation

2.6.1.1 The instrument used for the noise measurement are shown in [Table 2.3](#). The calibration certificates are provided in [Appendix A](#).

**Table 2.3 Equipment List**

Item	Manufacturer and Model	Serial No.	Precision Grade	Quantity
Precision Sound Level Meter	Brüel & Kjær Type 2250	300968	IEC 61672:2013 Class 1	1
Sound Calibrator	Brüel & Kjær Type 4231	2061519	IEC 60942:2003 Class 1	1

## 2.7 Date, Time and Personal for Noise Measurement

2.7.1.1 The onsite noise measurement was conducted between 0500 and 0800 hours on 31 August 2017 by qualified acoustic specialist, Mr. Dicky Siu (MHKIOA). The photo documentations during noise measurement are provided in [Appendix B](#).

## 3 Noise Measurement Results

### 3.1 Site Observation

3.1.1.1 Background and source noise measurement were conducted at the representative noise sensitive location as presented in [Figure 1](#).

3.1.1.2 Noise influencing events are observed during the period of noise measurement and summarized in [Table 3.1](#).

**Table 3.1 Noise Influencing Events**

Period	Date	Measurement Time	Observed Noise Influencing Events
Night-time	2017.08.31	05:00 - 05:30	- Road Traffic Noise - Dog Barking - Insect Noise - Aircraft Noise
Night-time	2017.08.31	05:45 - 06:15	- Road Traffic Noise - Aircraft Noise
Daytime	2017.08.31	07:00 - 07:30	- Road Traffic Noise - Bird calling - Construction Noise
Daytime	2017.08.31	07:30 - 08:00	- Road Traffic Noise - Ship Traffic - Bird calling - Aircraft Noise - Construction Noise

3.1.1.3 During the measurement period, a continuous tonal sound was observed at the measurement location. As confirmed by the site operator, the tonal sound is a warning signal generated from the protection buzzer of water pump room located at Block 1 in the project site.

### 3.2 Noise Characteristics

3.2.1.1 According to Section 3.1.1.3, a tonal sound from the protection buzzer of water pump room at Block 1 was identified which is not related to the operation of TSPS. The protection buzzer will not be activated under normal operation condition. Hence, the measured noise data was adjusted to eliminate this independent tonal signal.

3.2.1.2 Based on the measurement results, no tonal, impulsive or intermittent noise was observed from the operations of TSPS. The detailed assessment for the tonal characteristic of noise was presented in [Appendix C](#).

### 3.3 Background Noise Level

#### 3.3.1.1

The background noise measurement was conducted during daytime and night-time period as tabulated in Table 3.2. The detailed background noise measurement data is presented in [Appendix D](#).

**Table 3.2 Measured Background Noise Levels**

NSR ID	Measurement Period	Background Noise Levels <sup>1,2</sup>	
		LA <sub>eq(5min)</sub> , dB(A)	LA <sub>eq(30min)</sub> , dB(A)
<b>Day and Evening Time (2017.08.31)</b>			
NSR 1	07:30 - 07:35	56.9	57.8
	07:35 - 07:40	58.0	
	07:40 - 07:45	56.5	
	07:45 - 07:50	56.9	
	07:50 - 07:55	58.9	
	07:55 - 08:00	59.9	
<b>Night-time (2017.08.31)</b>			
NSR 1	05:00 - 05:05	50.7	50.9
	05:05 - 05:10	50.0	
	05:10 - 05:15	49.7	
	05:15 - 05:20	50.3	
	05:20 - 05:25	51.6	
	05:25 - 05:30	52.3	

Note:

1. It is façade measurement. No façade correction is applied.
2. Noise influencing events, including aircraft noise, dog barking and construction events, are excluded from the measurement data.

### 3.4 Source Noise Level

3.4.1.1 Source noise measurement was conducted to determine the noise impact from the operation of TSPS. The measurement results were tabulated in Table 3.3.

**Table 3.3 Measured Source Noise Levels at NSR**

NSR ID	Measurement Period	Measured Noise Levels <sup>1,2</sup>		Background Noise Level, LA <sub>eq(30min)</sub> , dB(A)	Corrected Noise Levels, LA <sub>eq(30min)</sub> , dB(A)	Noise Criteria, dB(A)
		LA <sub>eq(5min)</sub> , dB(A)	LA <sub>eq(30min)</sub> , dB(A)			
<b>Day and Evening Time (2017.08.31)</b>						
NSR 1	07:00 - 07:05	53.4	56.1	57.8	56.1 <sup>3</sup>	60
	07:05 - 07:10	55.4				
	07:10 - 07:15	56.2				
	07:15 - 07:20	56.0				
	07:20 - 07:25	57.2				
	07:25 - 07:30	57.8				
<b>Night-time (2017.08.31)</b>						
NSR 1	05:45 - 05:50	52.4	52.6	50.9	49.1	50
	05:50 - 05:55	52.7				
	05:55 - 06:00	52.5				
	06:00 - 06:05	52.2				
	06:05 - 06:10	53.6				
	06:10 - 06:15	51.8				

Note:

1. It is façade measurement. No façade correction is applied.
2. Noise influencing events, including aircraft noise, dog barking and construction events, are excluded from the measurement data.
3. As the background noise level is higher than the measured source noise level during daytime period, no background noise correction is adopted.

3.4.1.2 According to the result of the source noise measurement, both daytime and night-time corrected noise levels at the representative NSR are complied with the noise criteria as stated in Section 2.1. The detailed noise measurement data is presented in [Appendix C](#).

## 4

### Conclusion

#### 4.1.1.1

Based on the assessment results, both daytime and night-time noise levels at the representative NSR are complied with the noise criteria stated in Section 2.1.



## Figures



# Appendix A

## Calibration Certificate of Sound Level Meter



輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

# Certificate of Calibration 校正證書

Certificate No. : C170519

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-0161)

Date of Receipt / 收件日期 : 23 January 2017

Description / 儀器名稱 : Sound Level Meter

Manufacturer / 製造商 : Brüel & Kjær

Model No. / 型號 : 2250

Serial No. / 編號 : 3000968

Supplied By / 委託者 : BMT Asia Pacific Limited

5/F., FWD Financial Centre, 308 Des Voeux Road Central,  
Hong Kong

## TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C

Relative Humidity / 相對濕度 : (55 ± 20)%

Line Voltage / 電壓 : ---

## TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 1 February 2017

## TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.

The results do not exceed manufacturer's specification.


The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By

測試

  
H T Wong  
Technical Officer

Certified By

核證

  
K C Lee  
Project Engineer

Date of Issue

簽發日期

2 February 2017

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。

Sun Creation Engineering Limited - Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 - 校正及檢測實驗室

c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel/電話: 2927 2606

Fax/傳真: 2744 8986

E-mail/電郵: callab@suncreation.com

Website/網址: www.suncreation.com

# Certificate of Calibration

## 校正證書

Certificate No. : C170519

證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
2. Self-calibration using the B & K Acoustic Calibrator 4231, S/N : 2061519 was performed before the test.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL280	40 MHz Arbitrary Waveform Generator	C170048
CL281	Multifunction Acoustic Calibrator	PA160023

5. Test procedure : MA101N.

6. Results :

### 6.1 Sound Pressure Level

#### 6.1.1 Reference Sound Pressure Level

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	93.9	± 1.1

#### 6.1.2 Linearity

UUT Setting		Applied Value		UUT Reading (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)	
20 - 140	LAF (SPL)	94.00	1	93.9 (Ref.)
		104.00		103.9
		114.00		113.9

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

### 6.2 Time Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq. (kHz)		
20 - 140	LAF (SPL)	94.00	1	93.9	Ref.
	LAS (SPL)			93.9	± 0.3

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C170519

證書編號

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LAF (SPL)	94.00	63 Hz	67.7	-26.2 ± 1.5
			125 Hz	77.7	-16.1 ± 1.5
			250 Hz	85.2	-8.6 ± 1.4
			500 Hz	90.6	-3.2 ± 1.4
			1 kHz	93.9	Ref.
			2 kHz	95.1	+1.2 ± 1.6
			4 kHz	94.9	+1.0 ± 1.6
			8 kHz	92.8	-1.1(+2.1 ; -3.1)
			12.5 kHz	89.2	-4.3(+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting		Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Main	Level (dB)	Freq.		
20 - 140	LCF (SPL)	94.00	63 Hz	93.1	-0.8 ± 1.5
			125 Hz	93.7	-0.2 ± 1.5
			250 Hz	93.9	0.0 ± 1.4
			500 Hz	93.9	0.0 ± 1.4
			1 kHz	93.9	Ref.
			2 kHz	93.7	-0.2 ± 1.6
			4 kHz	93.1	-0.8 ± 1.6
			8 kHz	90.9	-3.0 (+2.1 ; -3.1)
			12.5 kHz	87.3	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : 4189 & S/N : 2795326

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

#### Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration 校正證書

Certificate No. : C170518  
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC17-0161)      Date of Receipt / 收件日期 : 23 January 2017

Description / 儀器名稱 : Acoustical Calibrator  
Manufacturer / 製造商 : Brüel & Kjær  
Model No. / 型號 : 4231  
Serial No. / 編號 : 2061519  
Supplied By / 委託者 : BMT Asia Pacific Limited  
5/F., FWD Financial Centre, 308 Des Voeux Road Central,  
Hong Kong

## TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C      Relative Humidity / 相對濕度 : (55 ± 20)%  
Line Voltage / 電壓 : ---

## TEST SPECIFICATIONS / 測試規範

Calibration check


DATE OF TEST / 測試日期 : 1 February 2017

## TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.  
The results do not exceed manufacturer's specification.  
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA

Tested By :   
測試 : \_\_\_\_\_  
H T Wong  
Technical Officer

Certified By :   
核證 : \_\_\_\_\_  
K C Lee  
Project Engineer

Date of Issue : 2 February 2017  
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C170518

證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
2. The results presented are the mean of 3 measurements at each calibration point.
3. Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL130	Universal Counter	C163709
CL281	Multifunction Acoustic Calibrator	PA160023
TST150A	Measuring Amplifier	C161175

4. Test procedure : MA100N.

5. Results :

### 5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.2	± 0.2
114 dB, 1 kHz	114.0		

### 5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000 0	1 kHz ± 0.1 %	± 0.1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :

Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。



## **Appendix B**

### Photo Documentations of Noise Measurement

Photo 1 – Location of Nearest Noise Sensitive Receiver



Remark: View direction from TSPS to NSR

Photo 2 – Noise Measurement Setup



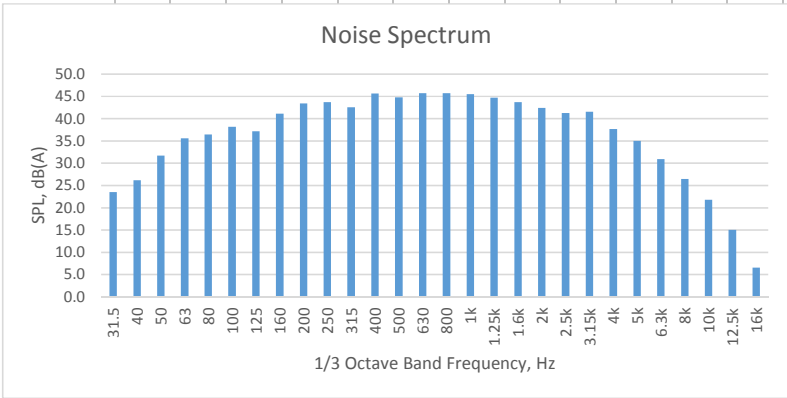
## **Appendix C**

### Tonal Characteristic Analysis

Project No.	9452	Prepared By	DIS	Sheet No.	1
Date Created	22-Sep-17	Date	22-Sep-17	Rev	0

Title	Calc Sheet Ref.
<b>Tonality Analysis - Source Noise (Daytime) (07:00 - 07:30)</b>	<b>N1-01</b>

1	Frequency (fi), Hz	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k
2	Sound Pressure Level (SPLfi), dB	63.1	60.8	62.0	61.8	58.9	57.3	53.4	54.4	54.3	52.4	49.2	50.5	48.1	47.6	46.5	45.5	44.1	42.8	41.3	40.0	40.4	36.7	34.5	31.1	27.6	24.3	19.3	13.3
3	A-weighting, dB	-39.5	-34.5	-30.3	-26.2	-22.4	-19.1	-16.2	-13.2	-10.8	-8.7	-6.6	-4.8	-3.2	-1.9	-0.8	0.0	0.6	1.0	1.2	1.3	1.2	1.0	0.6	-0.1	-1.1	-2.5	-4.3	-6.7
4a	Sound Pressure Level (SPLfi), dB(A)	23.5	26.2	31.8	35.6	36.5	38.2	37.2	41.2	43.5	43.8	42.6	45.7	44.8	45.7	45.5	44.7	43.7	42.5	41.3	41.6	37.7	35.1	31.0	26.5	21.8	15.1	6.6	
5	Sound Pressure Level of Highest Band (SPLfm), dB(A)	45.7	@	800	Hz																								
6	Difference between SPLfm and SPLfi, dB(A)	22.2	19.5	14.0	10.1	9.2	7.5	8.5	4.6	2.3	2.0	3.1	0.0	0.9	0.0	0.0	0.2	1.0	2.0	3.3	4.4	4.1	8.1	10.7	14.8	19.2	23.9	30.7	39.1
7	Condition (a): Is item 6 not > 15 dB?	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
8	Difference between SPLfi and SPLfi-1, dB		2.7	5.5	3.9	0.9	1.7	-1.0	4.0	2.3	0.3	-1.2	3.1	-0.9	0.9	0.0	-0.2	-0.8	-1.0	-1.3	-1.2	0.3	-3.9	-2.6	-4.1	-4.5	-4.7	-6.8	-8.4
9	Difference between SPLfi and SPLfi+1, dB	-2.7	-5.5	-3.9	-0.9	-1.7	1.0	-4.0	-2.3	-0.3	1.2	-3.1	0.9	-0.9	0.0	0.2	0.8	1.0	1.3	1.2	-0.3	3.9	2.6	4.1	4.5	4.7	6.8	8.4	
10	Condition (b): Are both item 8 and 9 > 1 dB(A)?		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
11	i) Tonal Factor, dB		1.4	0.8	1.5	0.4	1.3	2.5	0.8	1.0	0.7	2.1	2.0	0.9	0.4	0.1	0.3	0.1	0.2	0.1	0.7	2.1	0.7	0.7	0.2	0.1	1.1	0.8	
12	Condition (c): Is item 11 > 3 dB(A)?		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
13	Fulfil Condition (a), (b) and (c)?		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
14	Correction for Tonality (Ctone), dB(A)		<u>0.0</u>																										



Note: 1) Analysis procedure is referred to S3.3.2 of TM-IND published by EPD (HKSARG)

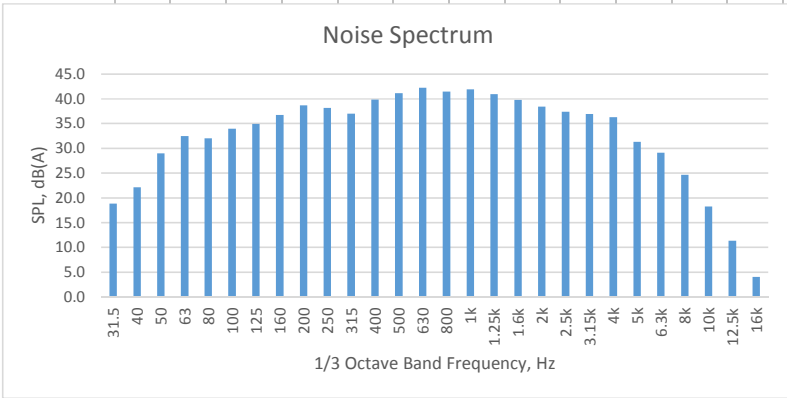
2) Noise data is rounded to 1 decimal place

Project No.	9452	Prepared By	DIS	Sheet No.	1
Date Created	22-Sep-17	Date	22-Sep-17	Rev	0

Title	Calc Sheet Ref.
<b>Tonality Analysis - Source Noise (Night-time) (05:45 - 06:15)</b>	<b>N1-02</b>

1	Frequency (fi), Hz	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	6.3k	8k	10k	12.5k	16k
2	Sound Pressure Level (SPLfi), dB	58.4	56.7	59.3	58.7	54.5	53.1	51.1	50.0	49.5	46.9	43.7	44.7	44.4	44.2	42.3	42.0	40.4	38.8	37.2	36.2	35.8	35.3	30.8	29.3	25.8	20.8	15.6	10.8
3	A-weighting, dB	-39.5	-34.5	-30.3	-26.2	-22.4	-19.1	-16.2	-13.2	-10.8	-8.7	-6.6	-4.8	-3.2	-1.9	-0.8	0.0	0.6	1.0	1.2	1.3	1.2	1.0	0.6	-0.1	-1.1	-2.5	-4.3	-6.7
4a	Sound Pressure Level (SPLfi), dB(A)	18.9	22.2	29.0	32.5	32.1	34.0	34.9	36.8	38.7	38.2	37.0	39.9	41.2	42.3	41.5	42.0	41.0	39.8	38.4	37.4	37.0	36.3	31.4	29.2	24.7	18.3	11.4	4.1
5	Sound Pressure Level of Highest Band (SPLfm), dB(A)	42.3	@	630	Hz																								
6	Difference between SPLfm and SPLfi, dB(A)	23.4	20.1	13.3	9.8	10.2	8.3	7.3	5.5	3.6	4.0	5.2	2.4	1.1	0.0	0.8	0.3	1.3	2.4	3.8	4.8	5.3	6.0	10.9	13.1	17.6	24.0	30.9	38.2
7	Condition (a): Is item 6 not > 15 dB?	N	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N
8	Difference between SPLfi and SPLfi-1, dB		3.3	6.8	3.5	-0.4	1.9	1.0	1.8	1.9	-0.5	-1.2	2.9	1.3	1.1	-0.8	0.5	-1.0	-1.1	-1.4	-1.0	-0.5	-0.7	-4.9	-2.2	-4.5	-6.4	-6.9	-7.3
9	Difference between SPLfi and SPLfi+1, dB	-3.3	-6.8	-3.5	0.4	-1.9	-1.0	-1.8	-1.9	0.5	1.2	-2.9	-1.3	-1.1	0.8	-0.5	1.0	1.1	1.4	1.0	0.5	0.7	4.9	2.2	4.5	6.4	6.9	7.3	
10	Condition (b): Are both item 8 and 9 > 1 dB(A)?		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
11	i) Tonal Factor, dB		1.7	1.7	2.0	1.2	0.5	0.4	0.1	1.2	0.4	2.0	0.8	0.1	1.0	0.7	0.8	0.1	0.1	0.2	0.3	0.1	2.1	1.4	1.1	1.0	0.3	0.2	
12	Condition (c): Is item 11 > 3 dB(A)?		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
13	Fulfil Condition (a), (b) and (c)?		N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

14	Correction for Tonality (Ctone), dB(A)	<u>0.0</u>																												
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Note: 1) Analysis procedure is referred to S3.3.2 of TM-IND published by EPD (HKSARG)

2) Noise data is rounded to 1 decimal place

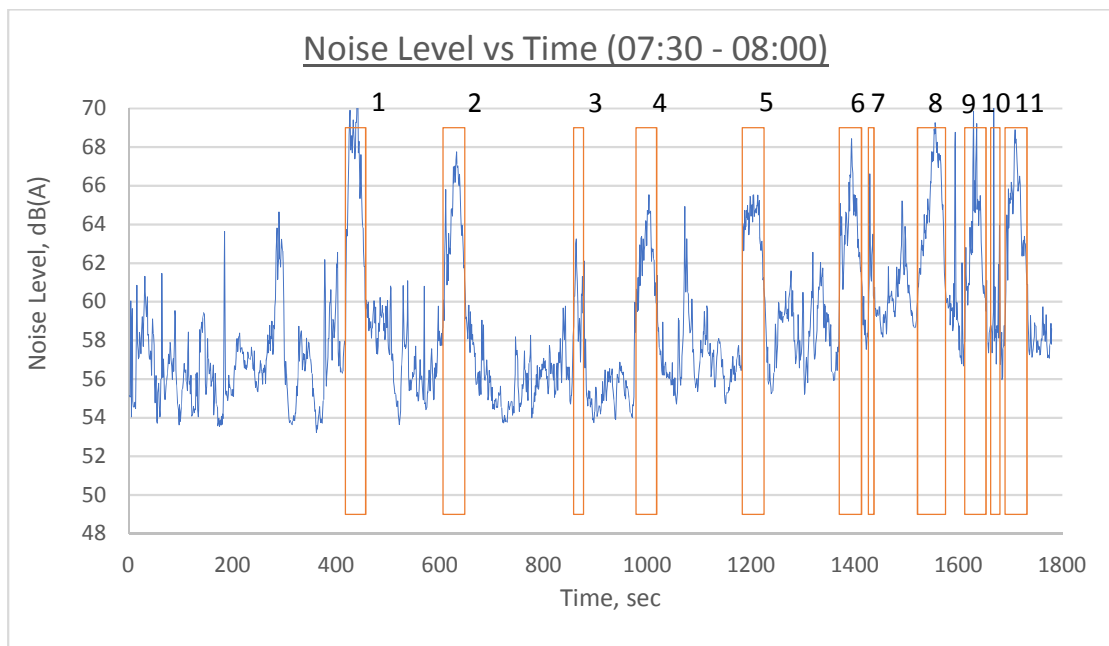
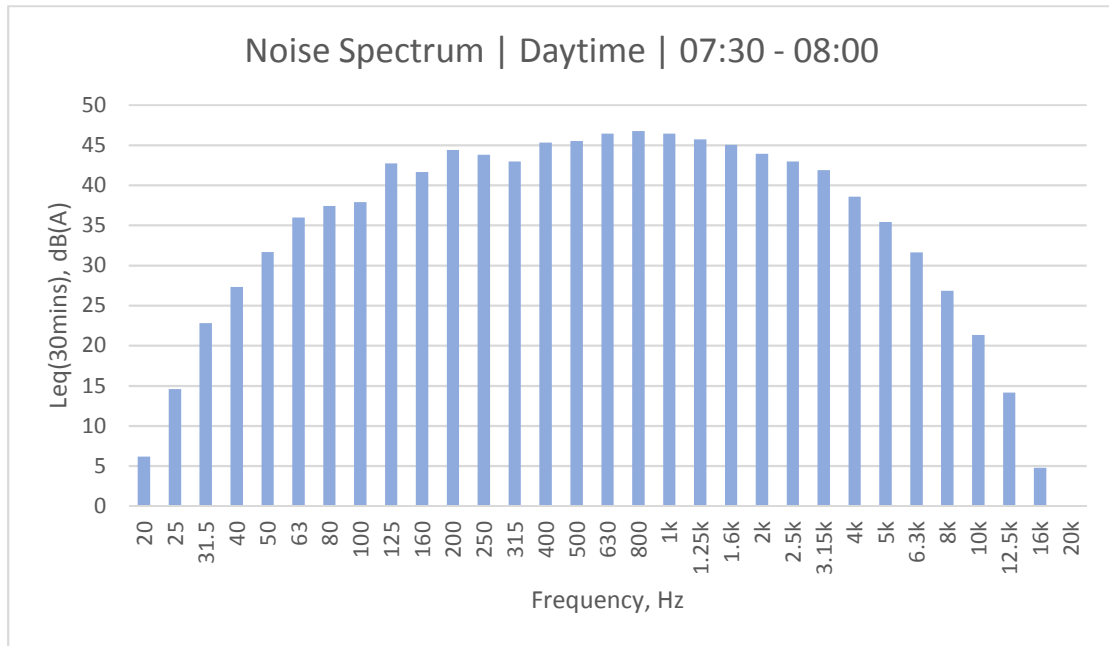
3) Noise level at 3150Hz was corrected by arithmetic average of adjacent band due to the identified background tonal signal

## **Appendix D**

Noise Measurement Results (Background Noise and Source Noise)

Appendix D – Noise Measurement Result (Background Noise and Source Noise)

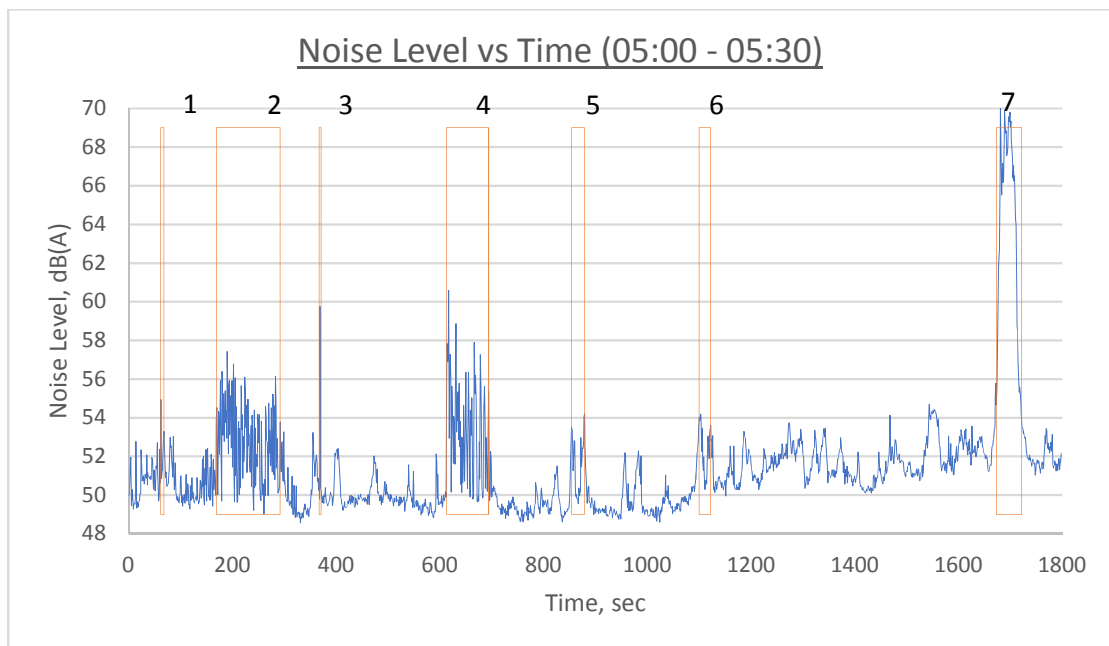
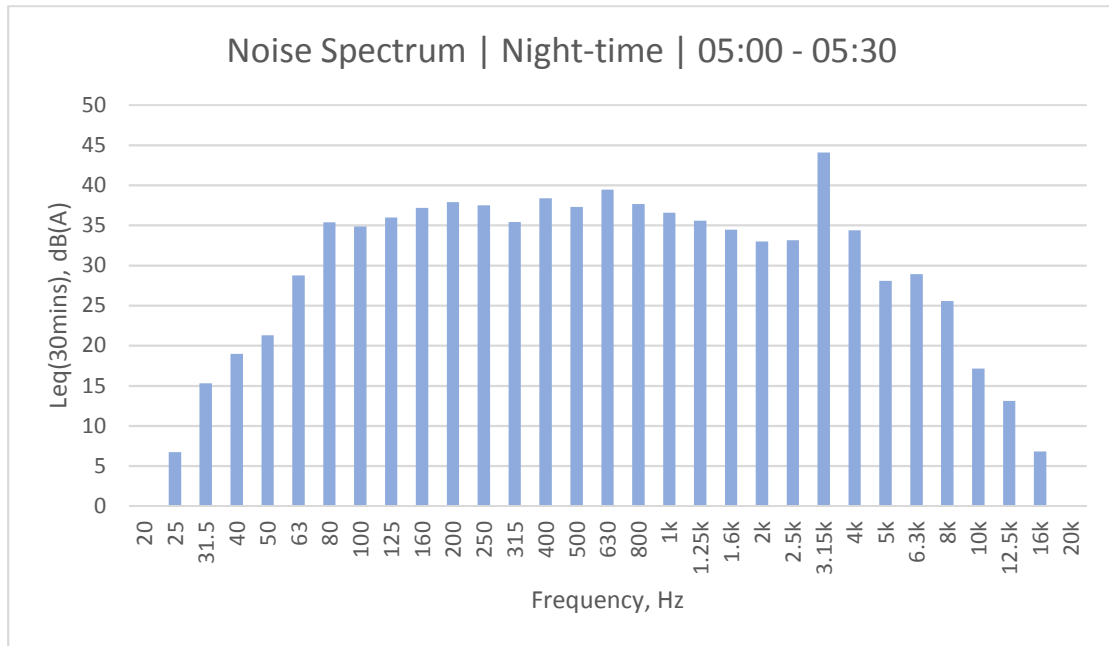
1. Background Noise Measurement - Daytime



Event ID	Influencing Noise Event
1	Aircraft Noise
2	Aircraft Noise
3	Construction Work
4	Aircraft Noise
5	Aircraft Noise
6	Aircraft Noise
7	Construction Work
8	Aircraft Noise
9	Aircraft Noise
10	Construction Work
11	Aircraft Noise

Appendix D – Noise Measurement Result (Background Noise and Source Noise)

2. Background Noise Measurement - Night-time

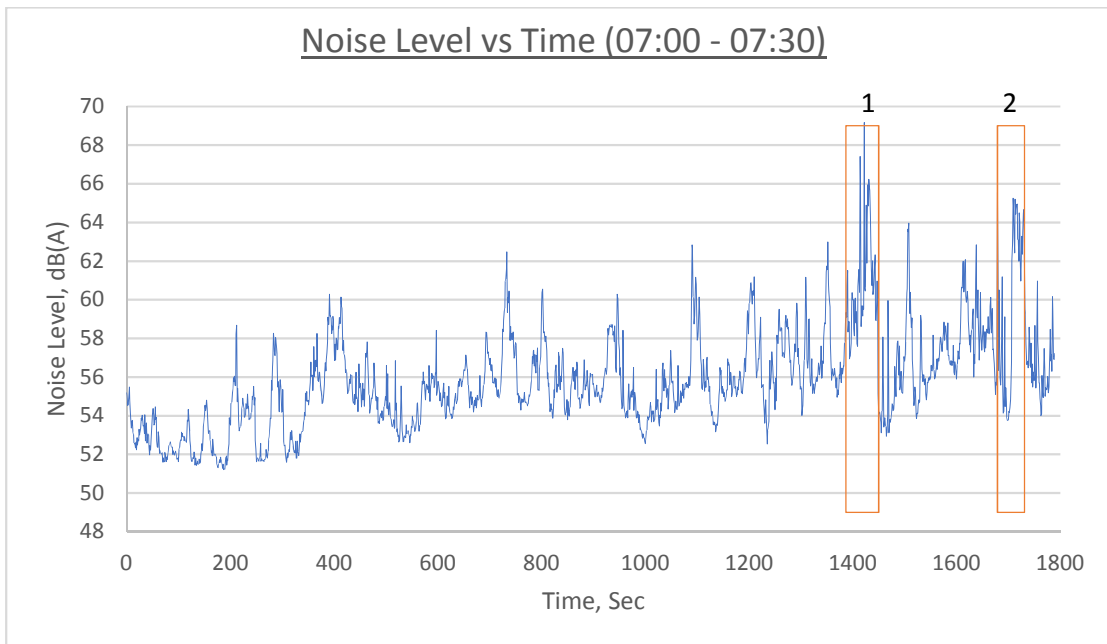
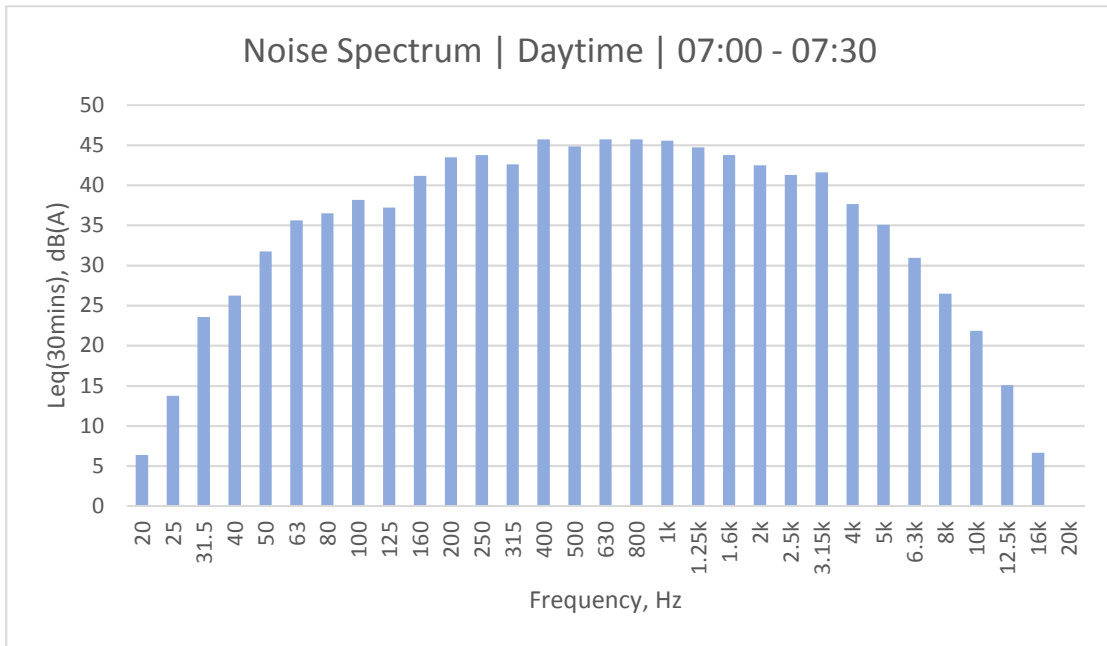


Event ID	Influencing Noise Event
1	Dog Barking
2	Dog Barking
3	Dog Barking
4	Dog Barking
5	Dog Barking
6	Dog Barking
7	Aircraft Noise



Appendix D – Noise Measurement Result (Background Noise and Source Noise)

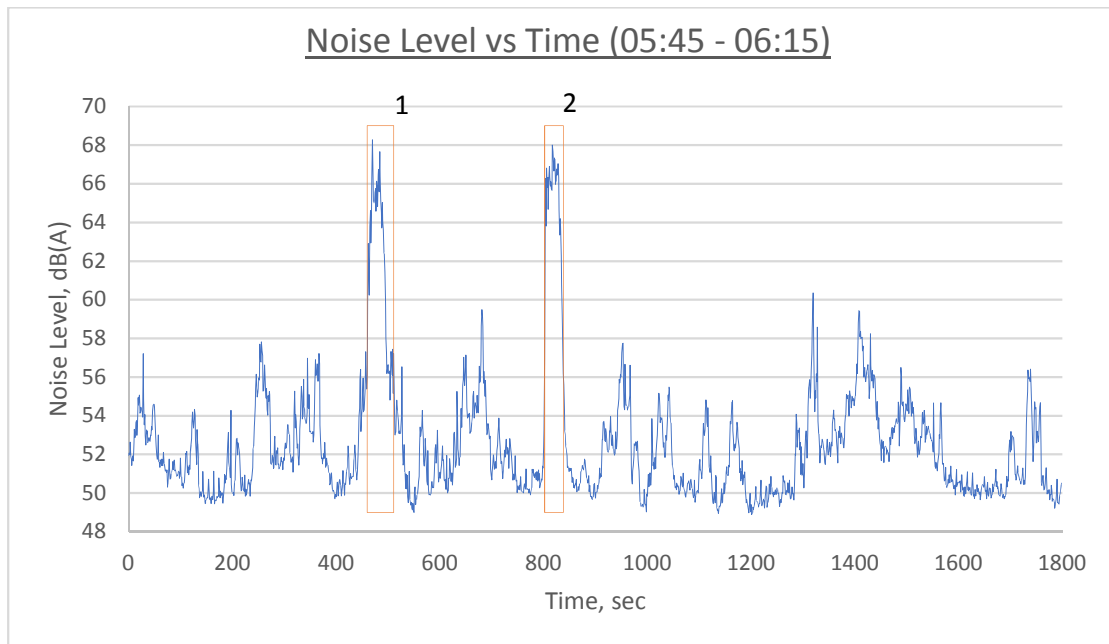
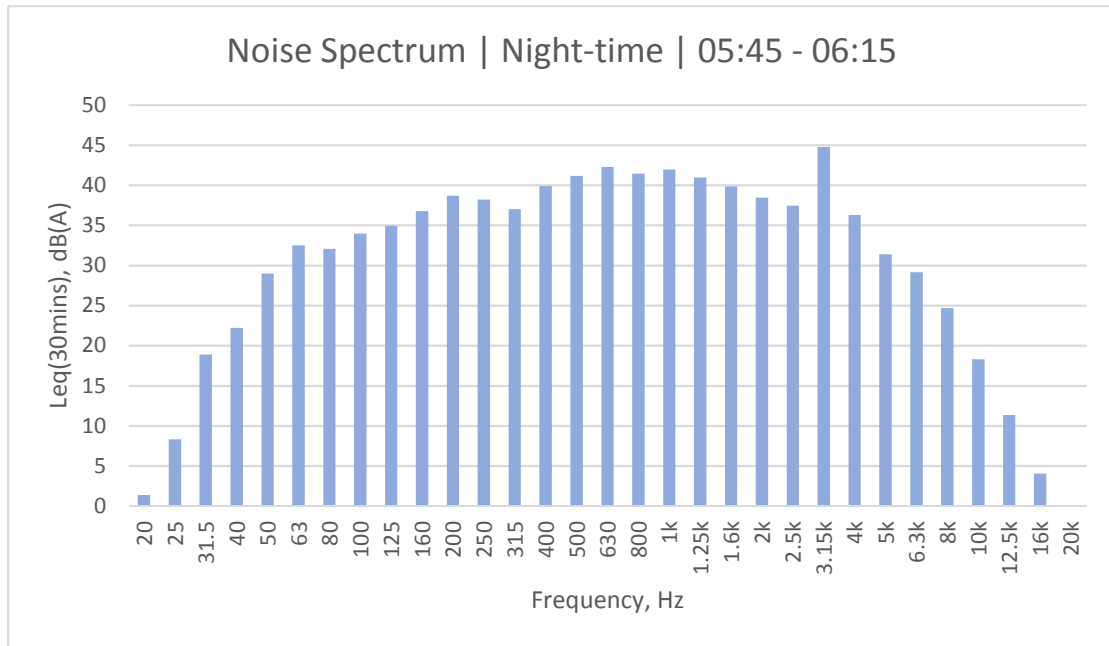
3. Source Noise Measurement - Daytime



Event ID	Influencing Noise Event
1	Aircraft Noise
2	Aircraft Noise

Appendix D – Noise Measurement Result (Background Noise and Source Noise)

4. Source Noise Measurement - Night-time



Event ID	Influencing Noise Event
1	Aircraft noise
2	Aircraft noise

## **APPENDIX F**

---

### Waste Flow Table

**Temporary Sewage Pumping Station  
Ancillary to Tung Chung Area 56 Public Housing Development  
Waste Flow Table**

Month	Estimated Annual Quantities of Inert C&D Materials (in '000 Kg)					Estimated Quantities of C&D Waste					
	Total Quantity Generated	Suitable for Recycled Aggregates	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Metals	Paper/cardboard packaging	Plastics (see Note 2)	Chemical Waste	Others, e.g. general refuse	Timber
	(a)	(b)	(c)	(d)	(e=a-b-c-d)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000litre)	(in '000 Kg)	(in '000 Kg)
2014											
November	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.160	0.000
December	4.910	0.000	0.000	0.000	4.910	0.000	0.000	0.000	0.000	5.830	0.000
2015											
January	5.970	0.000	0.000	0.000	5.970	0.000	0.000	0.000	0.000	2.880	0.000
February	4.540	0.000	0.000	0.000	4.540	0.000	0.000	0.000	0.000	2.450	0.000
March	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.480	0.000
April	1097.040	0.000	0.000	0.000	1097.040	0.000	0.000	0.000	0.000	1.930	0.000
May	467.250	0.000	0.000	0.000	467.250	0.000	0.000	0.000	0.000	6.520	0.000
June	1237.690	0.000	0.000	0.000	1237.690	0.000	0.000	0.000	0.000	9.720	0.000
July	61.480	0.000	0.000	0.000	61.480	0.000	0.000	0.000	0.000	8.680	0.000
August	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.210	0.000
September	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.170	0.000
October	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.180	0.000
November	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.940	0.000
December	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.380	0.000
2016											
January	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.820	0.000
February	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.230	0.000
March	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.640	0.000
April	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.100	0.000
May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.830	0.000
June	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	9.310	0.000
July	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.820	0.000
August	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.690	0.000
September	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.880	0.000
October	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	5.720	0.000
November	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.580	0.000
December	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.020	0.000
2017											
January	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.680	0.000
February	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.450	0.000
March	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.190	0.000
April	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	4.640	0.000
May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.420	0.000
June	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.600	0.000
July	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.180	0.000
August	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.740	0.000
September	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.500	0.000
<b>Grand Total</b>	<b>2878.880</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>2878.880</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>191.570</b>	<b>0.000</b>

Notes: (1) The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.

(2) Plastics refer to plastic bottles / containers, plastic sheets / foam from packaging material

## **APPENDIX G**

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### Environmental Licenses and Permits

## Summary of Environmental Licences and Permits Application and Status

### Environmental Permit (EP)

EP No.	EP Holder	Date of EP Issued	Expiry Date	Area Coverage	Status
EP-452/2013	Hong Kong Housing Authority	6 Jun 2013	N/A	TSPS Only	Active

### Notification of Carrying Out Notifiable Works under Air Pollution Control (Construction Dust) Regulation

Notification Ref. No.	Area Coverage	Valid Since	Expiry Date
367052	Entire Site of the Contract (include TSPS)	13 Nov 2013	N/A

### Billing Account for Disposal of Construction Works

Billing Account No.	Area Coverage	Valid Since	Expiry Date
7018949	Entire Site of the Contract (include TSPS)	16 Dec 2013	N/A

### Chemical Waste Producer Registration

Waste Producer No.	Area Coverage	Major Chemical Waste Type	Valid Since	Expiry Date
5213-950-H2913-43	Entire Site of the Contract (include TSPS)	Spent lubricant, Spent Flammable Liquid, Spent organic solvent, contaminated rags	19 Nov 2014	N/A

### Wastewater Discharge Licence

Licence Number	Area Coverage	Valid Since	Expiry Date
WT00018218-2014	Entire Site of the Contract (include TSPS)	30 Jan 2014	31 Jan 2019

**Construction Noise Permit (CNP)**

<b>CNP Number</b>	<b>Area Coverage</b>	<b>Valid Since</b>	<b>Expiry Date</b>	<b>Current Status</b>
GW-RS1162-14	Entire Site of the Contract (include TSPS)	24 Oct 2014	23 Apr 2015	Expired
GW-RS0418-15	Entire Site of the Contract (include TSPS)	24 Apr 2015	23 Oct 2015	Expired
GW-RS1088-15	Entire Site of the Contract (include TSPS)	24 Oct 2015	23 Apr 2016	Expired
GW-RS1379-15	Entire Site of the Contract (include TSPS)	29 Dec 2015	28 Jun 2016	Expired
GW-RS0525-16	Entire Site of the Contract (include TSPS)	29 Jun 2016	28 Dec 2016	Expired, as replaced by GW-RS0796-16
GW-RS0796-16	Entire Site of the Contract (include TSPS)	29 Jul 2016	28 Jan 2017	Expired, as replaced by GW-RS0010-17
GW-RS0010-17	Entire Site of the Contract (include TSPS)	29 Jan 2017	28 Jun 2017	Expired, as replaced by GW-RS0489-17
GWORS0489-17	Entire Site of the Contract (include TSPS)	29 Jun 2017	28 December 2017	Active

## **APPENDIX H**

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### **Statistics on Environmental Complaints, Notification of Summons and Successful Prosecutions**



**Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions**

Reporting period	Complaints	Notifications of Summons	Successful Prosecutions
35 <sup>th</sup> Reporting Month (1 September 2017 – 30 September 2017)	0	0	0
Cumulative Statistics (19 Nov 2014 – 30 September 2017)	0	0	0