

# Seminar of Healthcare Engineering System of Day Procedure Centres Experience Sharing on specialized ventilation systems of day procedure centres (DPC)

Prepared by Mr. Harry Har (Chief Estate Manager)  
29 Nov 2019



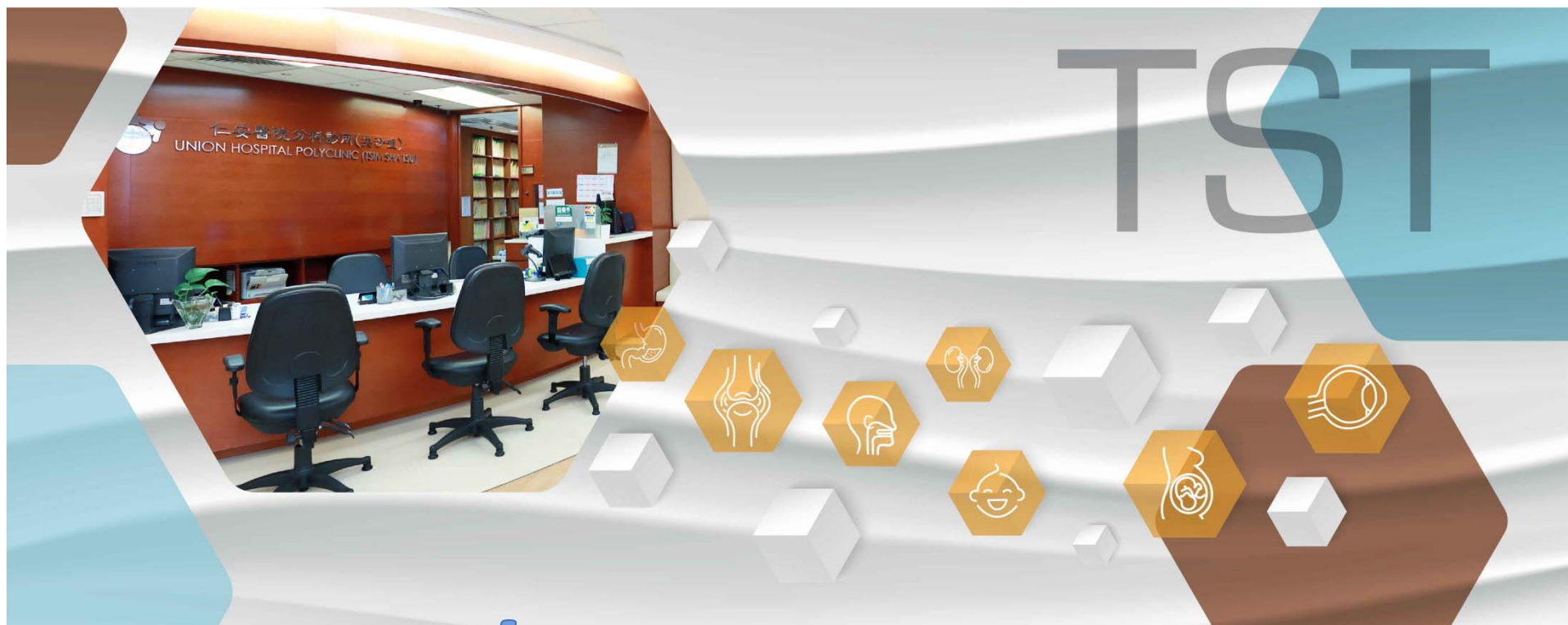
# Contents

- 1. Design & Setting Up of Specialized Ventilation Sys. in DPC**
- 2. Operation of Specialized Ventilation Sys. in DPC**
- 3. Maintenance of Specialized Ventilation Sys. in DPC**

# **1. Design & Setting Up of Specialized Ventilation Sys. in DPC**



## 1. Design & Setting Up



1802, 18/F



## Our Services



Cardiology



Surgery



Dermatology



Haematology & Haematological Oncology



Otorhinolaryngology (Ear, Nose and Throat)



Speech Therapy



Orthopaedics



Psychiatry



Ophthalmology



Internal Medicine / Nephrology



Neurology



Rheumatology



Gastroenterology & Hepatology



Internal Medicine / Respiratory Medicine



Internal Medicine / Endocrinology / Diabetes  
Metabolism



Clinical Psychology



Dietetics Consultation



Health Maintenance



Urology



Vascular Surgery



Colorectal Surgery

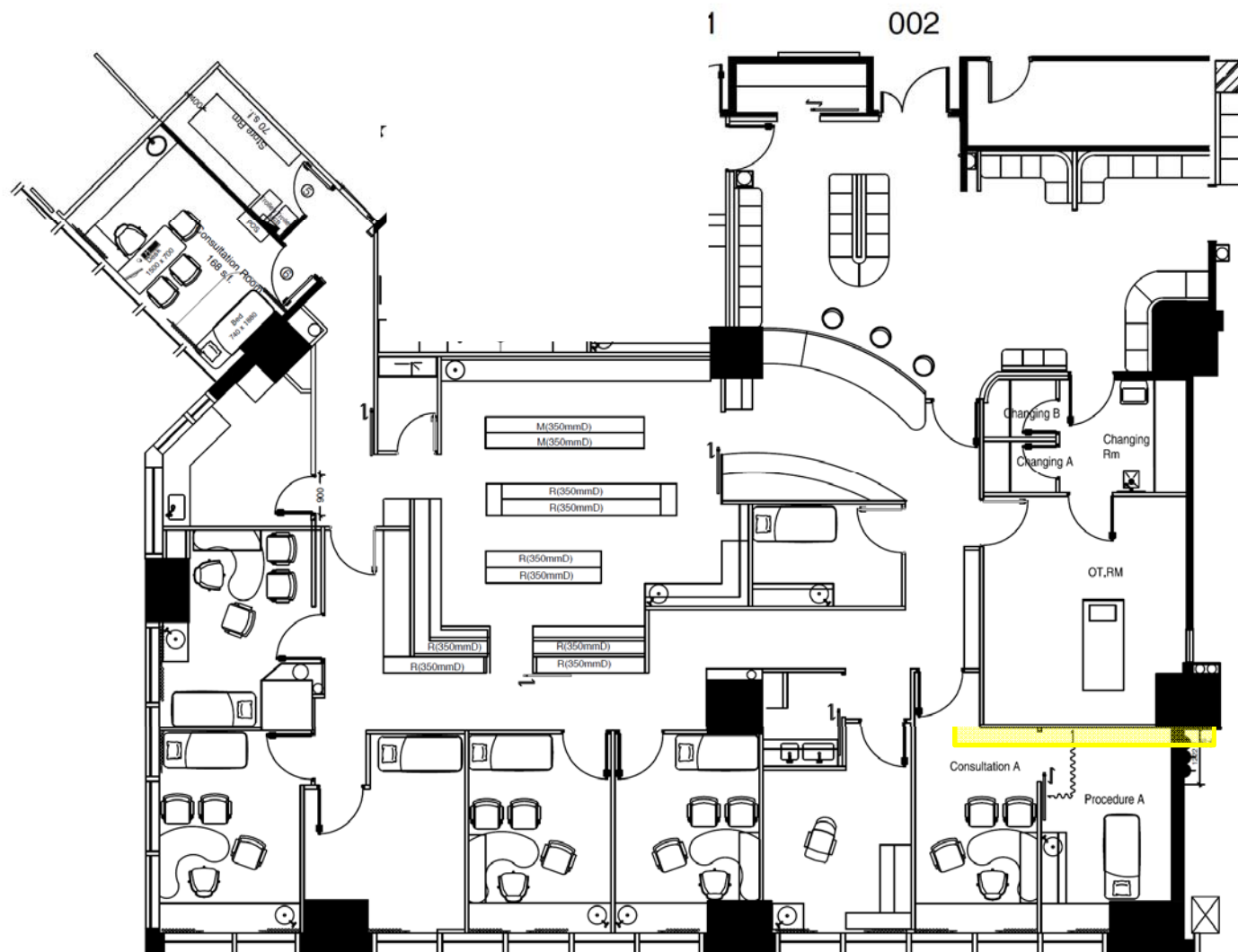
## 1. Design & Setting Up

## Services Provided by Operation Room

**Mainly minor operation under local anesthesia included**

- **Eye**
- **General Surgery**





## 1. Design & Setting Up



## Property Management Services provided:

- Air-conditioning Supply:  
Central chiller water
- Fire Service
- Water Supply
- Normal Electricity Supply

## T.S.T. 1802 operating room Design referenced from ASHRAE 2003 at year of 2007

### Requirements under COP for DPC at 2019

| Ventilation design parameters<br>Ventilation | Min outdoor ACH | Min total ACH | Min Filter Efficiency (%) | Design temp (°C) | Design humidity (%) |
|----------------------------------------------|-----------------|---------------|---------------------------|------------------|---------------------|
| Positive<br>(at least 2.5pa)                 | 4               | 20            | MERV14<br>(90%)           | 20 – 24          | 20 -60              |

### 1. Design & Setting Up

## Dimension of Procedure Room 1802

Area:  $(5.1 \times 4.3) \text{ m}^2 - (0.575 + 0.4) \text{ m}^2 = 21.75 \text{ m}^2$

Ceiling height: 2.5m

Volume of room: **54.36m<sup>3</sup>**

### **1. Calculation of room air change requirement**

a) Requirement of Fresh Air Supply:

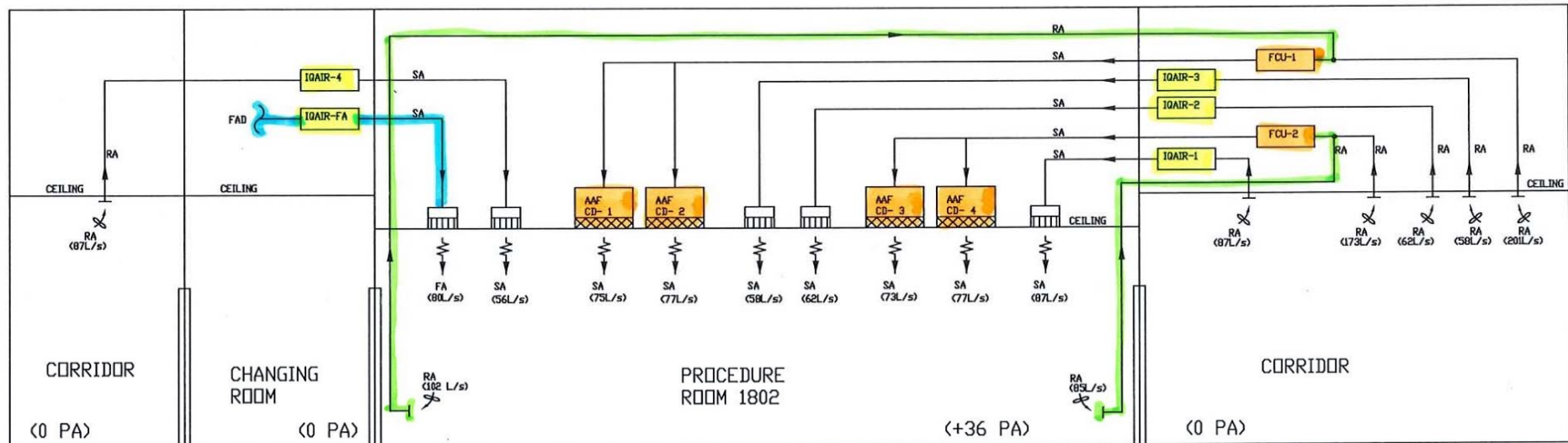
= 4 ACH x 54.36m<sup>3</sup>/3600

= 0.0604m<sup>3</sup>/s or **60.4 l/s**

b) Requirement of Total Air Supply:

= 20 ACH x 54.36m<sup>3</sup> /3600

= 0.302m<sup>3</sup>/s or **302 l/s.**



Air Flow Schematic Diagram

LEGEND

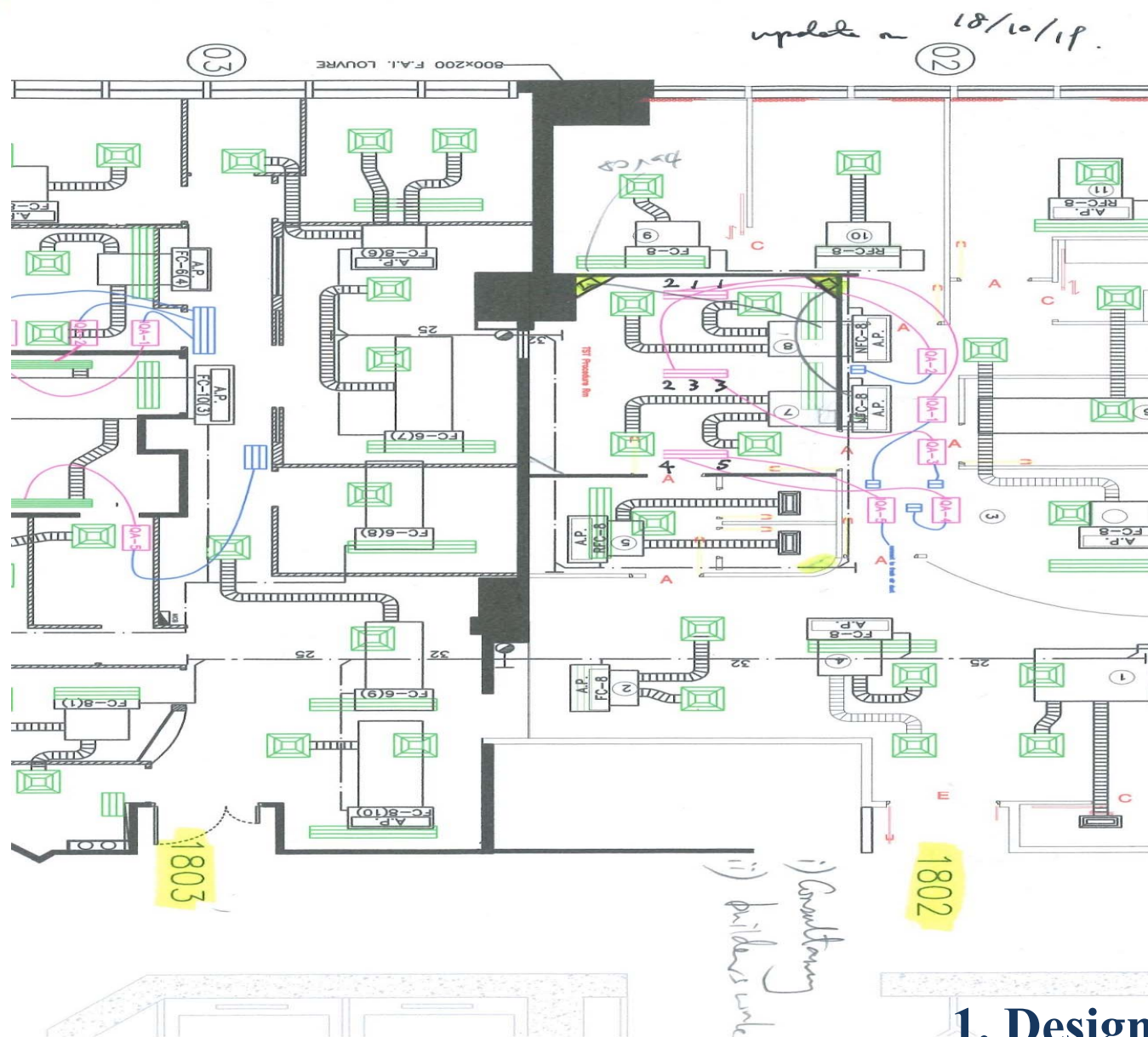
- FCU FAN COIL UNIT
- AAF HEPA FILTER BOX C/W PERFORATED DIFFUSER
- IQAIR HEALTH PRO 150NE
- CEILING DIFFUSER

## 1. Design & Setting Up



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## 1. Design & Setting Up





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20 AUG 2019



Better Air is Our Business

## AmericanAirFilter AstroFan AC FFU

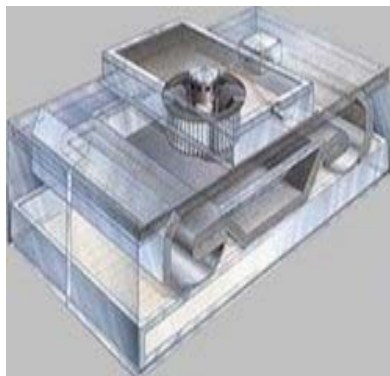
- Low off-gassing components
- Low energy consumption to save cost
- High total static pressure at full airflow
- Easy installation between the skeleton of cleanroom ceiling
- Low noise



AAF AstroFan AC FFU is one ceiling unit equipped with fan used in turbulence and laminar flow cleanroom. FFU is one of the most silent and the highest cost performance units. It can be used to transfer high clean lines and even walls.

With its flexible designing, it can be used with AAF 60mm I size slot, AstroDry HD skeleton and other appropriate ones. When the filter spots into edge, the unit can also be used in AstroDry HD to get sealed ceiling skeleton. It can adapt to any ceiling skeleton according to the designing standard to reach Level 100, 10 and 1.

AAF AstroFan FFU is designed to be easily set in place on ceiling grids without any hold-down clamping. Room Side Replaceable (RSR) is available with an optional adapter panel, for quick and easy filter replacement.



### Low off-gassing components

All components are low off-gassing to meet stringent requirements of specific industries.

### High total static pressure at full airflow

The low pressure drop of the MPAAC filter, in combination with the high total static pressure of the fan, provides an external static pressure of 53 to 150 Pa at full rated airflow. It allows for additional attachment of an optional pre-filter.

### Easy installation

AAF AstroFan FFU is designed to be easily set in place on ceiling grids without any hold-down clamping.

Room Side Replaceable (RSR) is available with an optional adapter panel, for quick and easy filter replacement.

## AmericanAirFilter AstroFan AC FFU

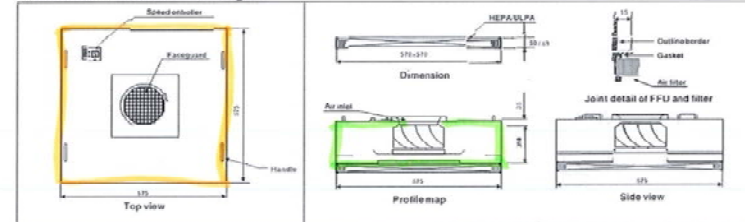
### AC FFU Specifications

AstroFan AC FFU Specifications (fiberglass filter/PTFE)

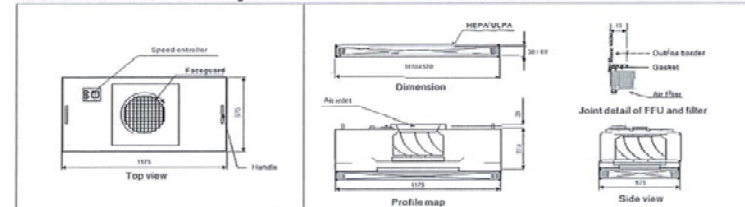
| Model                          | AstroFan AC FFU-AF   | AstroFan AC FFU-AK | AstroFan AC FFU-AL |
|--------------------------------|----------------------|--------------------|--------------------|
| Size (length x wide mm)        | 575 x 575            | 1175 x 575         | 1175 x 1175        |
| Inlet cone diameter (mm)       | 250+25(inlet cone)   | 275+35(inlet cone) | 310+35(inlet cone) |
| Total pressure drop (Pa)       | 160                  | 250                | 230                |
| Power consumption (W)          | 130-170              | 122-160            | 228-255            |
| Power (A)                      | 0.56-0.78            | 0.55-0.74          | 1.06-1.20          |
| Cabinet material               | SUS/AL/GL            |                    |                    |
| Power supply                   | 220V 1 50/60Hz       |                    |                    |
| Appropriate temperature (°C)   | -25~40               |                    |                    |
| Air velocity (m/s)             | 0.3-0.5              |                    |                    |
| Filter / Filter thickness (mm) | glassfiber filter/60 |                    |                    |
| Efficiency                     | H13-U15              |                    |                    |
| External pressure drop (Pa)    | 90                   |                    |                    |
| Speed regulator                | 10files              |                    |                    |
| Noise level (dBA)              | 49-54                |                    |                    |
| Weight(kg)(GL)                 | 31-35                |                    |                    |

### AC FFU Dimension Figure (mm)

AstroFan AC FFU-AL Dimension Figure



AstroFan AC FFU-AK Dimension Figure



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ISO 9001

AAF has a policy of continuous product research and improvement and reserves the right to change design and specifications without notice.

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www.aafchina.com

www.aafasia.com

Better Air is Our Business

AAF (Shenzhen) Co., Ltd.

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Tel: +86-755-28457069

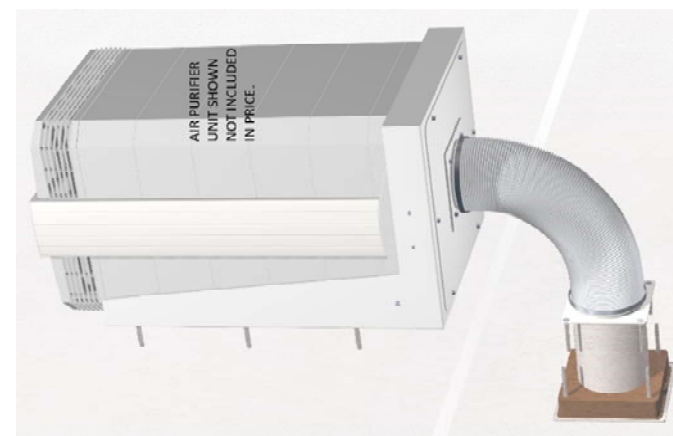
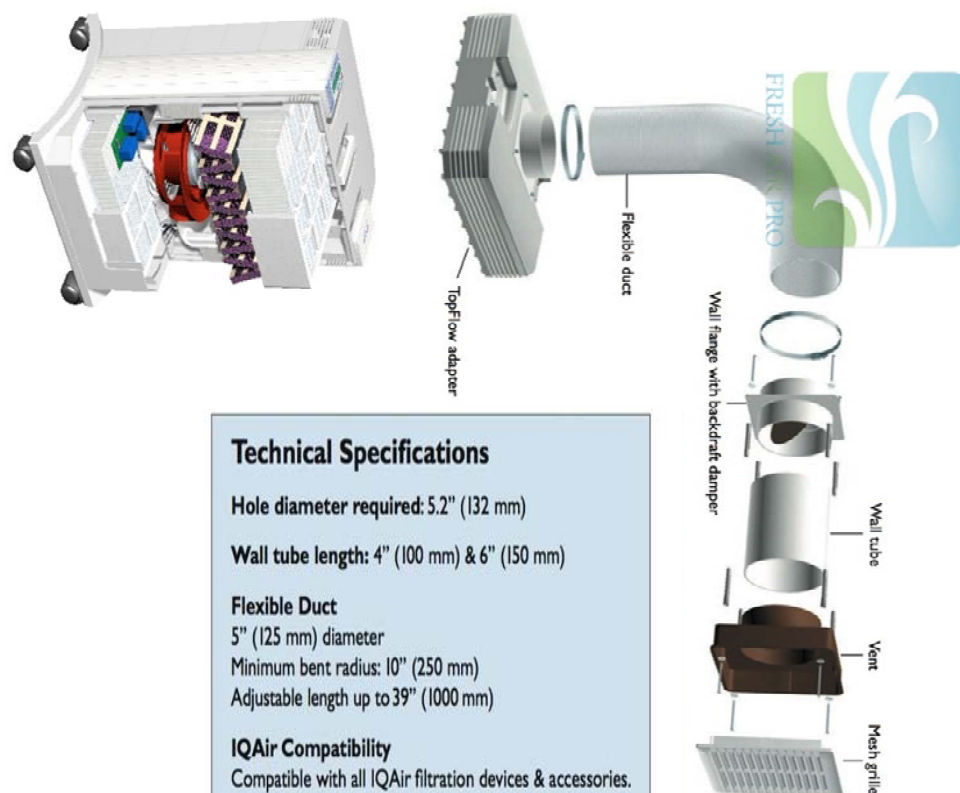
E-mail: shenzhen@aaafchina.com

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# 1. Design & Setting Up



## 1. Design & Setting Up



## 1. Design & Setting Up





## 1. Design & Setting Up

## Testing & Commissioning



### 1. Design & Setting Up

### Site measurement results of Fresh air :

Fresh air change rate per hour: Fresh air supply flow rate/volume of room

Fresh air change rate per hour (ACH) :  $0.08\text{m}^3 \times 3600 / 54.36\text{m}^3$

**= 5.3 ACH > 4 ACH (Passed)**





## Site measurement results of volume flow rate of IQA & AAF AstroFan

### Supply Air Flow from IQA



| Air Diffuser no. | Velocity of air (m/s) | Surface Area (m <sup>2</sup> ) | Volume Flow rate (m <sup>3</sup> /s) |
|------------------|-----------------------|--------------------------------|--------------------------------------|
| 1.               | 3.53                  | 0.0246                         | 0.087                                |
| 2.               | 2.51                  | 0.0246                         | 0.062                                |
| 3.               | 2.35                  | 0.0246                         | 0.058                                |
| 4.               | 4.59                  | 0.0123                         | 0.056                                |

Total volume flow: **0.268** m<sup>3</sup>

### Supply Air Flow from AAF AstroFan AC FFU



| Air Diffuser no. (CD) | Velocity of air (m/s) | Surface Area (m <sup>2</sup> ) | Volume Flow rate (m <sup>3</sup> /s) |
|-----------------------|-----------------------|--------------------------------|--------------------------------------|
| 1.                    | 0.38                  | 0.198                          | 0.075                                |
| 2.                    | 0.39                  | 0.198                          | 0.077                                |
| 3.                    | 0.37                  | 0.198                          | 0.073                                |
| 4.                    | 0.39                  | 0.198                          | 0.077                                |

Total volume flow: **0.302**m<sup>3</sup>

### Total air change rate per hour

Total air change rate: Total volume flow rate/volume of rm.

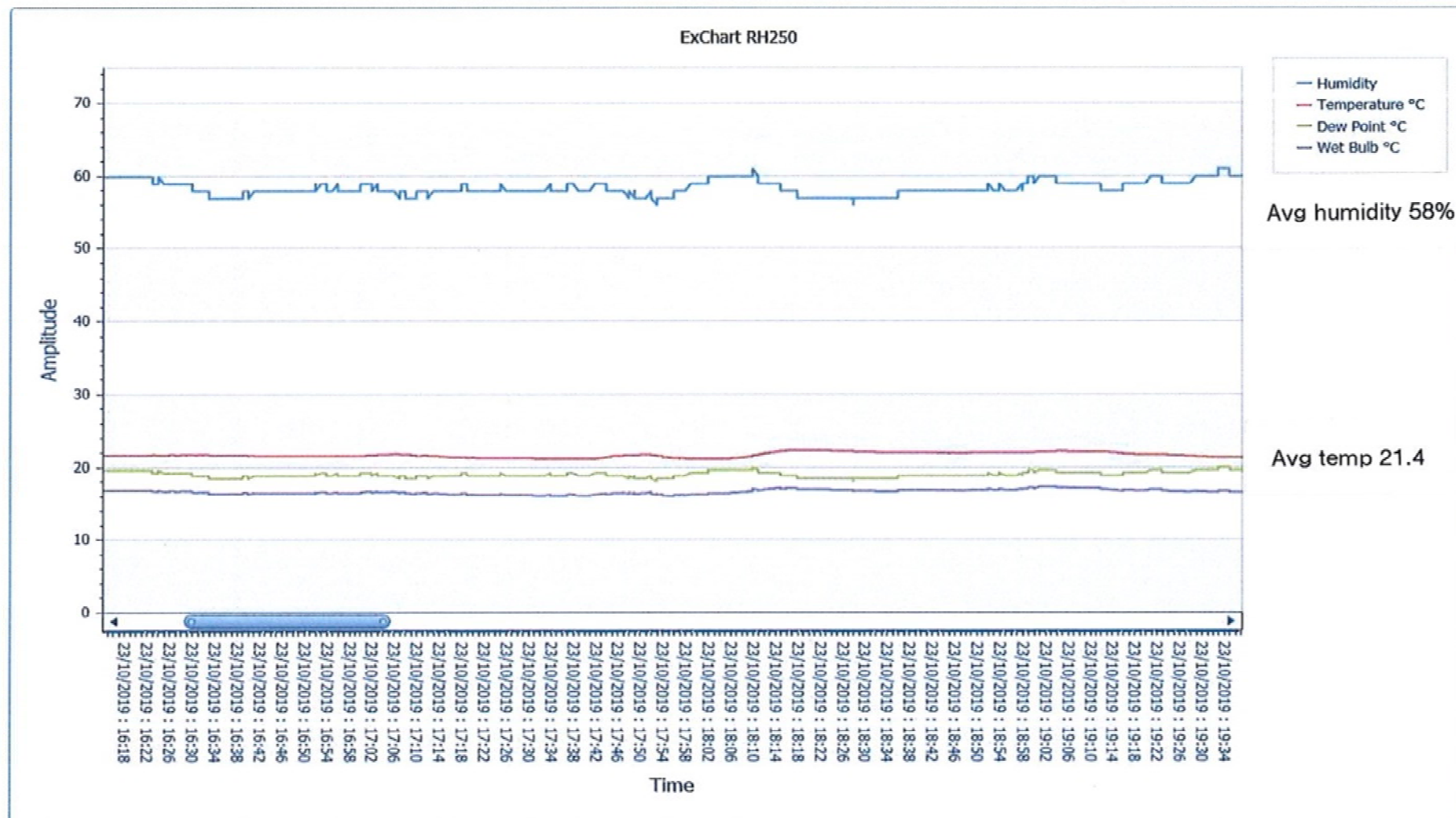
$$=\{(0.268+0.302+0.08) \times 3600\} / 54.36\text{m}^3$$

$$=2340\text{m}^3/\text{hr} / 54.36\text{m}^3$$

$$=\underline{43 \text{ ACH} > 20\text{ACH (Passed)}}$$



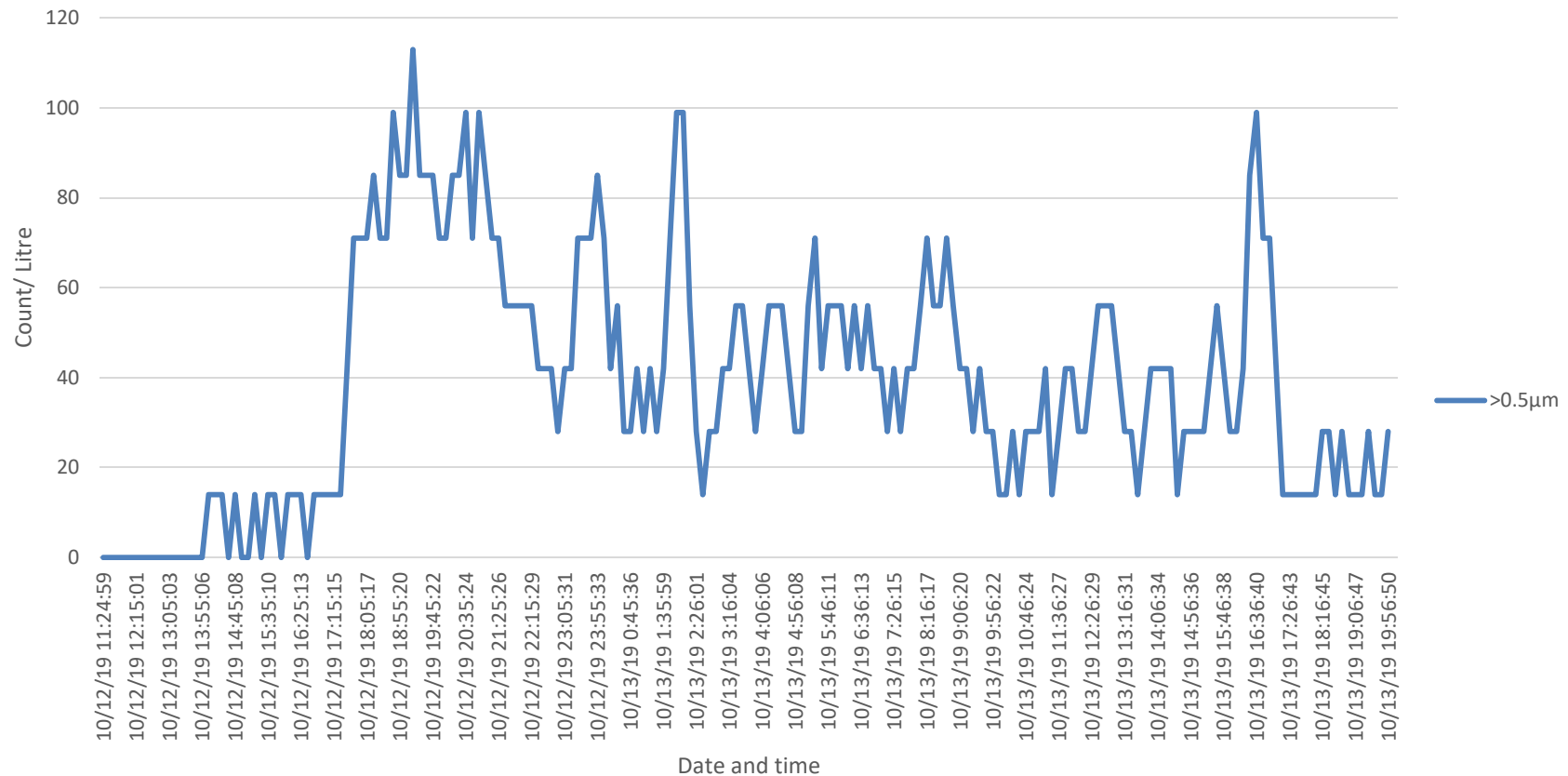
## 1. Design & Setting Up



## 1. Design & Setting Up



Particle Count of TST Operating Room 1 ( Average 40 counts for 32 hours)



## 1. Design & Setting Up





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#TST  
TST  
O Dy 11/10/19 TST Clinic  
Attn. Doctor:  
Cons. Doctor:

CLINICAL LABORATORY REPORT  
Lab No.: 19A04305

Collect Date/Time: 11/10/2019 17:58  
Arrive Date/Time: 11/10/2019 19:45

樣本 Specimen: Air Samples  
air sample 1802

測試名稱 Test Name  
細菌培養 Bacterial Culture#

結果 Result  
Location BA (1): Count 0 cfu per 1000L (m3) of air  
Location BA (2): Count 0 cfu per 1000L (m3) of air  
Location SAB (3): Count 0 cfu per 1000L (m3) of air

Final report to follow.

Remark: Aerobic cultures on non-selective media should not exceed 10 bacterial and or fungal CFUs per 1000L (m3) of air.  
Reference: Health Technical Memorandum 03.01.

**Preliminary Report**

Released by: Chan Ka Man, Reg. MLT

Authorized by:

Report date & time: 13/10/2019 12:55

Our Laboratory is accredited (IQMH Accreditation No.: 4343) for compliance with ISO 15189 Plus by IQMH, the Institute for Quality Management in Healthcare (Canada). Tests marked with # are not included in the scope of accreditation by IQMH.

Effective Since 15-08-2003

Generated on: 14/10/2019 09:01

\*\*\* Page: 1, End of Report \*\*\*

PAT-011-03-830(R2) MR-C003

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醫療化驗報告  
CLINICAL LABORATORY REPORT  
Lab No.: 18O06846

#TST  
TST  
O Dy 23/10/18 TST Clinic  
Attn. Doctor:  
Cons. Doctor:

Collect Date/Time: 16/10/2018 15:00  
Arrive Date/Time: 16/10/2018 17:35

樣本 Specimen: Air Samples  
RM1802

測試名稱 Test Name  
細菌培養 Bacterial Culture

結果 Result  
Location (BA) 1: Count 2 cfu per 1000L (m3) of air  
Location (BA) 2: Count 2 cfu per 1000L (m3) of air  
Location (SAB) 3: Count 0 cfu per 1000L (m3) of air

Remark: Aerobic cultures on non-selective media should not exceed 10 bacterial and or fungal CFUs per 1000L (m3) of air.  
Reference: Health Technical Memorandum 03.01.

**Final Copy**

Released by: Wong Lai Sim, Reg. MLT

Authorized by: Lee Chiu Fai, Reg. MLT

Report date & time: 23/10/2018 16:37

Effective Since 15-08-2003

\*\*\* Page: 1, End of Report \*\*\*

Generated on: 23/10/2018 17:12  
PAT-011-03-830(R2) MR-C003

1. Design & Setting Up

## 2. Operation

- Maintain not less than +2.5pa positive pressure (7 x24 hrs) & Daily log the pressure readings;
- Periodically (suggested monthly) test the function of pressure sensor with alert lamp.



## 2. Operation

## 3. Maintenance



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尖沙咀(TST)分科診所每月檢查 IQA 系統

| TST    | 隔塵網剩餘時間 |                  |                    | 備註 |
|--------|---------|------------------|--------------------|----|
| IQA 系統 | 運行風速    | 隔塵網 (Pre-filter) | 隔塵網 (HEPA -filter) |    |
| NO. 1  | 6       |                  |                    |    |
| NO. 2  | 6       |                  |                    |    |
| NO. 3  | 6       |                  |                    |    |
| NO. 4  | 6       |                  |                    |    |
| NO. 5  | 6       |                  |                    |    |

備註：按以下步驟檢查 Filter 剩餘時間

1. 按下 ▲ 鍵選取適當風速，例如 SPEED1, 2, ..., 6.
2. 在該風速下，按 MENU 鍵一下檢查 Pre-Filter 剩餘時間，按 ▲ 鍵一下檢查 HEPA-Filter 剩餘時間。例如 Pre-Filter 剩餘時間為 3000 小時，HEPA-Filter 剩餘時間為 1000 小時。
3. 如發現風速指示燈轉為橙紅色，或者 Pre-Filter 及 HEPA-Filter 剩餘時間不足 800 小時，須立即通知上級並盡快更換 Filter。
4. MultiGas filter 每半年更換一次

技術員簽署：     日期：

高級技術員簽署：     日期：

| TST    | 隔塵網剩餘時間 |                  |                    | 備註 |
|--------|---------|------------------|--------------------|----|
| IQA 系統 | 運行風速    | 隔塵網 (Pre-filter) | 隔塵網 (HEPA -filter) |    |
| NO. 1  | 6       |                  |                    |    |
| NO. 2  | 6       |                  |                    |    |
| NO. 3  | 6       |                  |                    |    |
| NO. 4  | 6       |                  |                    |    |
| NO. 5  | 6       |                  |                    |    |

備註：按以下步驟檢查 Filter 剩餘時間

1. 按下 ▲ 鍵選取適當風速，例如 SPEED1, 2, ..., 6.
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4. MultiGas filter 每半年更換一次

## 3. Maintenance



### 3. Maintenance

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# THANK YOU