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SUBJECT

Test of Poiema Air Purifier Model SGT450/SGT450S of Its Performance on Clean Air Delivery Rate (CADR) in terms of PM2.5 Removal

CLIENT

Vicky's Import & Export Pte. Ltd.
7 Tuas Bay Walk
Singapore 637756

Attn: Mr. Roger Jung

TEST DATE

05 May 2017

DESCRIPTION OF PRODUCT

The photo of Poiema Air Purifier Model SGT450/SGT450S tested is showed in Annex A.

METHOD OF TEST

The Clean Air Delivery Rate (CADR) in terms of PM_{2.5} removal is performed by referring to AHAM AC-1-2015 Method for Measuring Performance of Portable Household Electric Room Air Cleaners and China GB/T 18801-2015 Air Cleaner.

Smoke is generated and introduced to a test chamber (Annex B). The Poiema Air Purifier Model SGT450/SGT450S is adjusted to maximum fan speed mode. The concentration of PM_{2.5} is monitored by a particle counter for every 1 minute in 15 minutes in both natural decay condition and operation condition.



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RESULTS

1. Results of PM_{2.5} Concentration Monitored in Clean Air Delivery Rate (CADR) Test

Table 1 Results of PM_{2.5} Concentration Monitored in Clean Air Delivery Rate (CADR) Test

Time, Minute	PM _{2.5} -Natural Decay unit: µg/m ³	PM _{2.5} - Poiema Air Purifier Model SGT450/SGT450S, unit: µg/m ³	Apparent Removal
0	3,334	3,315	0.0%
1	3,225	2,835	14.5%
2	3,125	2,283	31.1%
3	3,054	1,799	45.7%
4	2,975	1,412	57.4%
5	2,920	1,120	66.2%
6	2,858	886	73.3%
7	2,814	689	79.2%
8	2,745	538	83.8%
9	2,714	419	87.4%
10	2,673	333	90.0%
11	2,637	263	92.1%
12	2,584	213	93.6%
13	2,537	161	95.1%
14	2,509	126	96.2%
15	2,482	104	96.9%

2. Calculation of Clean Air Delivery Rate (CADR) in term of PM_{2.5} removal

The calculation of Clean Air Delivery Rate (CADR) in terms of PM_{2.5} removal is referring to AHAM AC-1-2015 Method for Measuring Performance of Portable Household Electric Room Air Cleaners. Detail calculation steps are listed in Annex C. The result of Clean Air Delivery Rate (CADR) of Poiema Air Purifier Model SGT450/SGT450S in term of PM_{2.5} removal is expressed as follows.

CADR_{PM_{2.5}} of Poiema Air Purifier Model SGT450/SGT450S= **5.25** m³/Minute Or

CADR_{PM_{2.5}} of Poiema Air Purifier Model SGT450/SGT450S= **185.4** Cubic Feet/Minute (CFM)



DR. YANG LEI
EXECUTIVE CONSULTANT
CHEMICAL CENTRE



DR. CHEN HUAYI
ASSISTANT VICE PRESIDENT
CHEMICAL CENTRE

Annex A:

Product Name Air Purifier

Photo



Brand Poiema

Model SGT450/SGT450S

Annex B: Schematic of test chamber

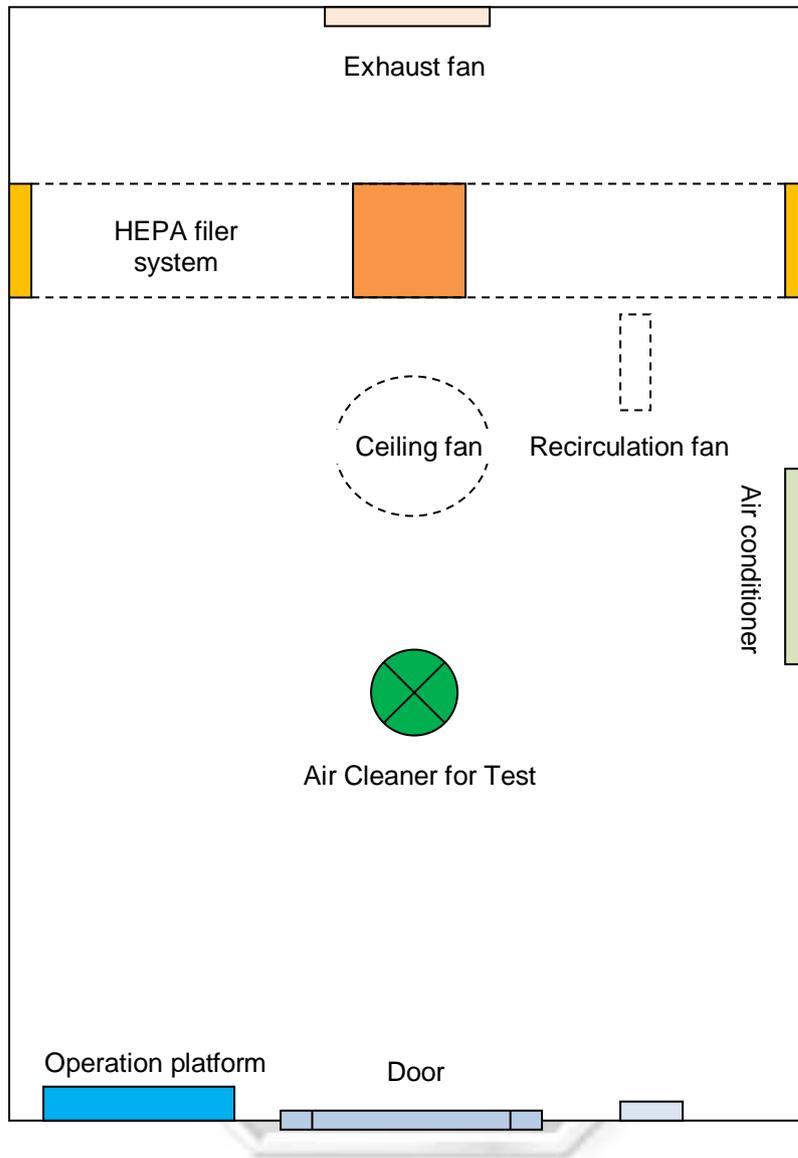


Figure 1 Schematic layout of the test chamber

Annex C: CADR Calculation method

(By referring to AHAM AC-1-2015 Section 8: Method for measuring performance of portable household electric room air cleaners)

8.2.1 The decay constant, k, for particulate matter is based on the formula:

$$C_{t_i} = C_i e^{-kt_i} \quad (\text{equation 1})$$

where:

C_{t_i} = concentration at time t_i (particles/cc)

C_i = concentration at $t = 0$ minutes

k = decay rate constant (minutes⁻¹)

t_i = time (minutes)

8.2.2 The decay constant, k, is obtained using the linear regression on the $\ln C_{t_i}$ and t_i using the formula:

$$k = \frac{S_{xy}}{S_{xx}} \quad (\text{equation 2})$$

where:

$$S_{xy} = \sum_{i=1}^n t_i \ln C_{t_i} - (1/n) \left(\sum_{i=1}^n t_i \right) \left(\sum_{i=1}^n \ln C_{t_i} \right) \quad (\text{equation 3})$$

$$S_{xx} = \sum_{i=1}^n (t_i)^2 - (1/n) \left(\sum_{i=1}^n t_i \right)^2 \quad (\text{equation 4})$$



8.4 Performance Calculation.

The performance of an air cleaner is represented by a clean air delivery rate (CADR). The method for calculating the clean air delivery rate is:

$$\text{CADR} = V(k_e - k_n) \quad (\text{equation 7})$$

where:

CADR = clean air delivery rate (cu. ft/min)

V = volume of test chamber, cu. ft.

k_e = total decay rate, min⁻¹

k_n = natural decay rate, min⁻¹



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