



TEST REPORT ANALYSIS

MICROBIOLOGY TEST REPORT


On behalf of: ATA S.A.S, 14 rue Jules Verne 44700 Orvault, France.

Carried on by:

Guangzhou Testing Center of Industrial Microbiology

Date received : Oct 31 2017

Date Analyzed: Nov 01 2017

Name of sample	Anion Air purifier	Source of sample	Delivery
Applicant	ATA S.A.S.	Client	H. Mismaque
Manufacturer	ATA S.A.S.	Brand	---
Type and specification	Multizone 488 KJ20171631-1	Quantity of sample	1 set
Date of production	---	State of sample	Machine
Batch number	---	Packing of sample	In box
Sample picture			
Standard and Methods	1. GB/T 18801-2015 Air cleaner 2. GB21551.3-2010 Antibacterial and cleaning function for household and similar electrical appliances – Particular requirements of air cleaner		
Items of analysis	1. CADR (Formaldehyde, particulate) 2. CCM (Formaldehyde, particulate) 3. Cleaning Energy Efficiency (Formaldehyde, particulate) 4. Standby Power, Input Power 5. Killing Rate (<i>Staphylococcus Albus</i> 8032) 6. Noise		
Remarks	---		

*** To be continued ***



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SUMMARY OF THE TEST RESULTS				
Test No.	Items of Analysis		Unit	Results
KJ20171631-1	CADR	Formaldehyde	m ³ /h	>400 (552.1)
		Particulate		
	CCM	Formaldehyde	Interval grading	F4
		Particulate		P4
	Cleaning Energy Efficiency	Formaldehyde	m ³ /(h W)	6.80 (High-efficiency grade)
		Particulate		11.11 (High-efficiency grade)
	Power	Standby Power	W	0.8
		Input Power		81.2
	Killing Rate	<i>Staphylococcus albus</i>	%	>99.99
	Noise (The highest grade)	Average sound pressure level	dB (A)	51.9
		Acoustic power level		65.9
	Noise (The lowest grade)	Average sound pressure level		26.0
		Acoustic power level		40.0

To be continued



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Method for Testing Air Delivery Rate of Gaseous Pollutant:

1. Testing Condition
 - 1) Environment temperature: (25 ± 2) °C
 - 2) Environment humidity: (50 ± 10) %RH.
2. Testing Equipment
Test chamber (30 m³), constant current atmospheric sampler, UV-VIS spectrophotometer.
3. Running State of the Machine
Set the switch to position “the highest grade”.
4. Test Procedure
 - 1) Place the air purifier into the chamber according to the standard’s requirements. Set the air purifier to the particular running state. Make sure the air purifier runs normally, and then turn off the air purifier.
 - 2) Purify the air in the chamber using the HEPA filter. Make sure the background concentration of the pollutants reaches a particular level, and then turn on the temperature and humidity control device. Keep the temperature and humidity control device running until the temperature and the humidity reaches the standard’s requirement.
 - 3) A certain amount of gaseous pollutant is added into the chamber using the gaseous pollutant generator. Turn off the gaseous pollutant generator while concentration of the pollutants reaches the standard’s requirement.
 - 5) Sample the initial concentration after the fan is stopped.
 - 6) Turn on the air purifier. Respectively collect samples at 1.5 min, 2.5 min, 4 min, 5 min, 6.5 min, etc.
 - 7) According to the step 1)~ 6), without the air cleaner, test the natural decay.
 - 8) The CADR should be test in the same way for 2 times, and it should be more than 24 h between every tests. The last test is taken for the final result.

Note 1. Before the test, the air purifier has been running for more than 1 h.
Note 2. The data less than the requirement of GB/T 18883 is invalid.
Note 3. If the valid data points is less than six, Crossed sampling can be used.
5. Computational Formula

$$CADR (m^3 / h) = 60 \times (k_e - k_n) \times V$$

Where: k_e = total decay constant; k_n = natural decay constant; V = volume of the test chamber, m³

Test Results

Number of Sample	Pollutant	Natural Decay Constant k_n (min ⁻¹)	Total Decay Constant k_e (min ⁻¹)	CADR (m ³ /h)	Cleaning Energy Efficiency η [m ³ /(h.W)]	Cleaning Energy Efficiency Grade
KJ20171631-1	Formaldehyde	0.0014	0.3081	>400	6.80	High-efficiency grade

Note1: Referring to the testing method in GB/T18801-2015 Air cleaner, the formaldehyde CADR is 552.1 m³/h.

Note2: High-efficiency grade: $\eta_{\text{formaldehyde}} \geq 1.00$ Qualified grade: $0.50 \leq \eta_{\text{formaldehyde}} < 1.00$

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Method for Testing Gaseous Pollutant Cumulates Clean Mass:

1. Test Object
Formaldehyde
2. Test Conditions
 - 1) Environment temperature: (25±2) °C
 - 2) Environment humidity: (50±10) %RH.
3. Test Equipment
Test chamber (3 m³, 30 m³), constant current atmospheric sampler, UV-VIS spectrophotometer.
4. Operation Conditions of the Machine
Set the switch to position "the highest grade".
5. Test Procedure
 - 1) Testing the initial CADR of air cleaner based on the Appendix C of national standard GB/T 18801-2015.
 - 2) Place the air cleaner to be tested in the 3 m³ chamber according to the requirements of standard, turn on air cleaner and ceiling mixing fan, then close the chamber door.
 - 3) Formaldehyde gas is injected into the 3 m³ chamber with each injection amount no more than 30 mg for 5~6 times during 8 h. After adding the last time, run continuously for 1 h and test the concentration of residual formaldehyde. The actual mass of removal is the total injection amount to the amount of residual formaldehyde. Then turn off the air cleaner and hold it in the chamber environment for 16 h.
 - 4) Place the air cleaner in the 30 m³ chamber to test the CADR again.
 - 5) To repeat the step 2) ~ 4) and obtain the CADR of 300 mg, 600 mg, 1000 mg, 1500 mg, respectively. The experiment is over when the measured CADR is less than or equal to 50% of the initial value.
Note. If the continuous injection method of formaldehyde is adopted, the injection rate is 20 mg/h; If the single progressive injection method is adopted, each injection amount should not be greater than 30 mg for 5~6 times during 8 h.
6. Interval Grading

Interval grading	CCM _{formaldehyde} (mg)
F1	300 ≤ CCM < 600
F2	600 ≤ CCM < 1000
F3	1000 ≤ CCM < 1500
F4	1500 ≤ CCM

Note. The cumulate clean mass (CCM) of air cleaner should not be evaluated when the measured CCM is less than 300 mg.

To be continued



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Test Results

Number of Sample	Serial Number	Cumulate Mass (mg)	The Amount of Formaldehyde for CADR Test (mg)	Cumulate Clean Mass (mg)	CADR (m ³ /h)	Percentage to the Initial CADR (%)
KJ20171631-1	1	0	30	30	---	---
	2	0	30	60	552.1	---
	3	210	30	300	524.5	95.0
	4	270	30	600	498.4	90.3
	5	370	30	1000	428.9	77.7
	6	470	30	1500	379.3	68.7
CCM formaldehyde (mg)				>1500		
Interval Grading				F4		

To be continued



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Method for measuring Clean Air Delivery Rate of Particulate :

1. Test Object
Particulate ($\geq 0.3\mu\text{m}$)
2. Test Conditions
 - 1) Environment temperature: $(25 \pm 2)^\circ\text{C}$
 - 2) Environment humidity: $(50 \pm 10)\% \text{RH}$
3. Test Equipment
Test chamber (30m^3), Laser particle counter, Diluter
4. Operation Conditions of the Machine
Set the switch to position "The highest wind speed".
5. Test Procedures
 - 1) Place the air cleaner to be tested in the test chamber in accordance with standard request and set the air cleaner controls to the conditions for test. Test for proper operation, then turn off the air cleaner.
 - 2) Using the test chamber HEPA filter, allow the test chamber air to clean until the background concentration in the size range of $0.3\mu\text{m}$ to $10\mu\text{m}$ reaches a concentration of less than 1000 particles/L. Simultaneously operate the environmental control devices until the test chamber conditions.
 - 3) When an acceptable test chamber background concentration is achieved record the background concentration, turn off the test chamber environmental control system.
 - 4) Immediately light, then place one standard cigarette in the cigarette smoke generator, seal generator, open valve to chamber, to provide the required initial concentration ($2 \times 10^6 \sim 2 \times 10^7$ particles/L). Turn off air supply and close test chamber valve. Mix cigarette smoke for ten minutes after the initial concentration has been reached.
 - 5) Turning off ceiling mixing fan, begin to acquire the cigarette smoke particulate concentration. This test point is the initial concentration (C_0).
 - 6) Open the air cleaner and start the test as soon as the initial concentration of particulate matter is completed. Collect samples at one-minute intervals for 10 minutes.
 - 7) Test the natural decay according to the steps 1) ~ 6) , except that the air cleaner is unoperated.
6. Computational Formula

$$\text{CADR } Q \text{ (m}^3 \text{/h)} = 60 \times (k_e - k_n) \times V$$

Where: k_e = total decay constant; k_n = natural decay constant; V = volume of the test chamber, m^3

Test Results

Number of Sample	Pollutant	Natural Decay Constant k_n (min^{-1})	Total Decay Constant k_e (min^{-1})	CADR (m^3/h)	Cleaning Energy	Cleaning Energy
					Efficiency [$\text{m}^3/(\text{h} \cdot \text{W})$]	Efficiency Grade
KJ20171631-1	Particulate	0.0023	0.5034	> 488	11.11	High-efficiency grade

Note1: High-efficiency grade: $\eta_{\text{particulate}} \geq 5.00$ Qualified grade: $2.00 \leq \eta_{\text{particulate}} < 5.00$

Note2: Referring to the testing method in GB/T18801-2015 Air cleaner, the Particulate CADR of KJ20171631-1 is $592.0\text{m}^3/\text{h}$.

To be continued



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The cumulative amount of cigarette smoke purification test :

1. Test Object
Particulate ($\geq 0.3\mu\text{m}$)
2. Test Equipment
Test chamber (3m^3 , for the acceleration test; 30m^3 , for the amount of clean air test), Dust detector, Laser particle counter, Diluter
3. Operation Conditions of the Machine
Set the switch to position "The highest wind speed".
4. Test Procedures
 - 1) Testing the initial CADR of air cleaner based on the Appendix B of national standard GB/T 18801-2015.
 - 2) Place the air cleaner to be tested in the 3 m^3 chamber according to the requirements of standard. Turn on air cleaner and ceiling mixing fan, then close the chamber door.
 - 3) Fifty cigarettes are continuously injected into 3 m^3 chamber until the particle concentration to less than $0.035\text{ mg}/\text{m}^3$, close the purifier, let stand at least 30 min, take out the purifier.
 - 4) Put air cleaner in 30 m^3 test chamber, test the amount of clean air again.
 - 5) To repeat the step 2) ~ 4), obtain results of CADR with number of cigarettes 50, 150.
5. Interval Binning

Interval Binning	CCM _{particulate} (mg)
P1	$3000 \leq \text{CCM} < 5000$
P2	$5000 \leq \text{CCM} < 8000$
P3	$8000 \leq \text{CCM} < 12000$
P4	$12000 \leq \text{CCM}$

Note : The cumulate clean mass (CCM) of air cleaner should not be evaluated when the measured CCM is less than 3000 mg.

Test Results

Number of Sample	Test Number	Cumulative Consumption of Cigarettes (piece)	Cumulate Clean Mass of Cigarettes PM _{2.5} Weight (mg)	CADR (m ³ /h)	Percentage to the Initial CADR (%)
KJ20171631-1	1	0	0	902.0	100.00
	2	50	4165	794.5	88.08
	3	150	12505	568.8	63.06
CCM _{particulate} (mg)				>12000	
Interval Binning				P4	

*** To be continued ***



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Method for Testing Air Disinfection:

1. Test Equipment
 - 1) Test microorganism: *Staphylococcus albus* 8032
 - 2) Microbial aerosol generator: PLG 2000
 - 3) Culture media: NA
 - 4) Sampling equipment: six-stage sieve sampler
2. Test Conditions
 - 1) The volume of the test chamber: 30m³
 - 2) Environment temperature: (20~25) °C
 - 3) Environment humidity: (50~70) % RH
3. Operation Conditions of the Machine
Set the switch to position "The highest wind speed".
4. Test Procedures
 - 1) Get a Bacteria slant culture (4~7 generation) which is incubated at 37 °C for 24 h, wash the culture from this slant with 10mL NB, filter the liquid culture by aseptic cotton buds, and dilute this inoculums with NB as appropriate.
 - 2) The equipment are placed in the test chambers respectively, close the door, and open the HEPA filter. Simultaneously operate the environmental control devices until the experimental cabin temperature to be 20~25 °C, relative humidity to be 50~70 %RH, Turn off the chamber environmental control system.
 - 3) Release microbial aerosol: turn on the microbial aerosol generator, release the microbial aerosol 15~20 min at 0.2MPa, operate the ceiling mixing fan, then turn off the fan after 10 min, and let stand for 15 min.
 - 4) Original Bacteria aerosols collected by six-stage sieve sampler.
 - 5) The air cleaner are adjusted to the highest air cleaning mode setting for test (Test group), Bacteria aerosols (control group and test group) are collected at 60 min respectively.
 - 6) Choose 2 NA plates (the same batch) as the negative control, and culture them on the same condition with the samples.
 - 7) Run the test three times and take the mean as the final result.
5. Computational Formula

$$\text{Natural decay rate } N_r(\%) = \frac{V_0 - V_t}{V_0} \times 100$$

Where: V_0 = Original Bacteria Count of Control group; V_t = Bacteria Count after Treatment of Control group.

$$\text{Killing Rate } K_r(\%) = \frac{V_1 \times (1 - N_r) - V_2}{V_1 \times (1 - N_r)} \times 100$$

Where: V_1 = Original Bacteria Count of test group; V_2 = Bacteria Count after Treatment of test group.

*** To be continued ***



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Test Results

Number of Sample	Test Bacteria	Test Time (min)	Test Number	Control group			Test group		Killing Rate K_t (%)
				Original Bacteria Count V_0 (cfu/m ³)	Bacteria Count after Treatment V_t (cfu/m ³)	Natural Decay Rate N_t (%)	Original Bacteria Count V_1 (cfu/m ³)	Bacteria Count after Treatment V_2 (cfu/m ³)	
KJ20171631-1	<i>Staphylococcus albus</i> 8032	60	1	1.16×10^5	9.03×10^4	22.16	1.11×10^5	<7	>99.99
			2	1.22×10^5	9.23×10^4	24.34	1.15×10^5	<7	>99.99
			3	1.21×10^5	9.27×10^4	23.39	1.13×10^5	<7	>99.99
			mean						>99.99

*** To be continued ***



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Method for Testing Power:

1. Test Equipment
Power measuring instrument
2. Test Conditions
 - 1) Ambient temperature: 24.6 °C
 - 2) Ambient humidity: 48 %RH.
3. The Working Status of the Machine
Set the switch to position: "The highest grade".
4. Test Procedure
 - 1) Connecting the power and air purifier by power tester, stable in standby mode for at least 10 min after testing the standby power.
 - 2) Connecting the power and air purifier by power tester, stable under rated condition for at least 30 min after testing the input power

Test Results

Number of Sample	Standby Power (W)	Input Power (W)
KJ20171631-1	0.8	81.2

*** To be continued ***



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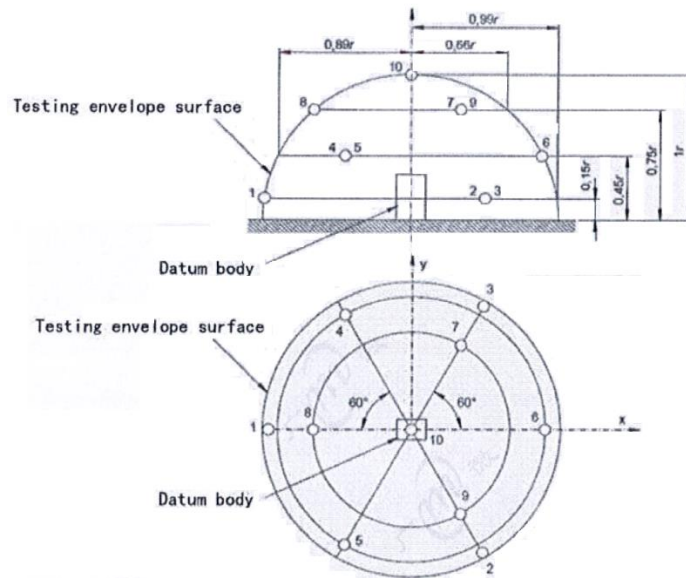
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Noise Test Method:

1. Test environment: semi-anechoic chamber; Background noise: 16.6 dB(A)
2. Environment temperature: 23.4 °C; Environment humidity: 57.1 %RH
3. Testing envelope surface: rectangular hexahedron; testing radius: $r=2$ m. Test schematic diagrams are showed as follows:



Test Results

Number of Sample	Test gear	Average sound pressure level	Acoustic power level
		dB(A)	dB(A)
KJ20171631-1	The highest grade	51.9	65.9
	The lowest grade	26.0	40.0

*** End of report ***



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