



Test No.KJ20170644

GUANGZHOU TESTING CENTER OF INDUSTRIAL MICROBIOLOGY

TEST REPORT

Date Received: June 19, 2017

Date Analyzed: July 10, 2017

Name of Sample	Air Purifier	Source of Sample	Delivery
Applicant	Air Quality Technology (shanghai) Co., Ltd.	Client	Wang Haifan
Manufacturer	Air Quality Technology (shanghai) Co., Ltd.	Brand	Air Quality
Type and Specification	KJ1200F-01A	Quantity of Sample	1PC
Date of Production	—	Sample Description	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 (Particulate) 2. CCM (Particulate) 3. Cleaning Energy Efficiency (Particulate) 4. Killing Rate (<i>Staphylococcus albus</i> 8032) 5. Input Power 6. Harmful Substances Release Amount (Ozone) 7. Noise		
Remark	—		

To be continued



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SUMMARY OF THE TEST RESULTS

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SUMMARY OF THE TEST RESULTS						
Number of Sample	Items of Analysis			Unit	Results	
KJ20170644-1	CADR	Particulate	High Grade	m³/h	>800 (850.7)	
			Max Grade		>800 (1192.5)	
	CCM	Particulate		Interval division	P4	
	Cleaning Energy Efficiency η	Particulate	High Grade	m³/(W·h)	15.14	
			Max Grade		9.48	
	Power	Input Power	High Grade	W	56.2	
			Max Grade		125.8	
	Killing Rate	Staphylococcus albus 8032		%	>99.99	
		Harmful Substances Release Amount		Ozone (5 cm away from the air outlet)	mg/m³	<0.003
		Noise	Sleep Grade	Average Sound Pressure Level	dB(A)	≤21.1
Acoustic Power Level				≤35.4		
High Grade			Average Sound Pressure Level	43.6		
			Acoustic Power Level	57.8		
Max Grade			Average Sound Pressure Level	52.1		
			Acoustic Power Level	66.3		
Remark		The air purifier was test under max grade except the grades noted above.				

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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 (30 m^3), Aerosol Spectrometer (TSI 3340), Aerosol Diluter (TSI 3302 A)
4. Operational Conditions of the Machine
The air purifier was tested under several grades.
5. Test Procedure
 - 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) Turn 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 two-minute intervals for 20 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	Testing Grade	Natural Decay Constant k_n	Total Decay Constant k_e	CADR Q (m^3/h)	Cleaning Energy Efficiency η [$\text{m}^3/(\text{W} \cdot \text{h})$]	Cleaning Energy Efficiency Grade
KJ20170644-1	Particulate	High grade	0.0021	0.4747	>800	15.14	High-efficiency grade
		Max grade	0.0021	0.6646	>800	9.48	High-efficiency grade

Note1: Referring to the CADR calculating method of GB/T 18801-2015 Air Cleaner, the CADR_{high grade} of

KJ20170644-1 is $850.7 \text{ m}^3/\text{h}$, and the CADR_{max grade} is $1192.5 \text{ m}^3/\text{h}$.

Note2: High-efficiency grade: $\eta_{\text{particulate}} \geq 5.00$ Qualified grade: $2.00 \leq \eta_{\text{particulate}} < 5.00$

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The Cumulate Clean Mass of Cigarette Smoke Test:

1. Test Object
Particulate ($\geq 0.3 \mu\text{m}$)
2. Test Equipment
Test chamber (3 m^3 , for the acceleration test; 30 m^3 , for the amount of clean air test), Dust detector (TSI 8530), Aerosol Spectrometer (TSI 3340), Aerosol Diluter (TSI 3302 A)
3. Operational Conditions of the Machine
The air purifier was tested under "Max grade".
4. Test Procedure
 - 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) Some cigarettes are continuously injected into 3 m^3 chamber until the particle concentration to less than 0.035 mg/m^3 , close the cleaner, let stand at least 30 min, then take out the cleaner.
 - 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、100、150.
5. Interval Binning

Interval Grading	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 the Cigarette (piece)	Cumulate Clean Mass (mg)	CADR (m³/h)	Percentage to the Initial CADR (%)
KJ20170644-1	1	0	0	1192.5	100.00
	2	50	4055	1171.8	98.26
	3	100	8085	1158.8	97.17
	4	150	12100	1135.4	95.21
	CCM _{particulate} (mg)			>12000	
Interval Grading				P4	

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Method for Measuring Air Disinfection:

1. Test Equipment

- 1) Strain: *Staphylococcus albus*
- 2) Microbial aerosol generator: TK-3
- 3) Culture media: NA
- 4) Sampling equipment: six-stage sieve sampler

2. Test Conditions

- 1) The volume of the test chamber: 30 m³
- 2) Environment temperature: (20~25) °C
- 3) Environment humidity: (50~70) %RH

3. Operational Conditions of the Machine

The air purifier was tested under "Max grade".

4. Test Procedure

- 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 10 mL 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 °C~25 °C, relative humidity to be 50%~70%, Turn off the chamber environmental control system.
- 3) Release microbial aerosol: turn on the microbial aerosol generator, release the microbial aerosol 15 min ~20 min at 0.2 MPa, 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 1 h 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

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

Where: V_0 = original bacteria count of control group; V_t = bacteria count after treatment of control group.

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

Where: V_1 = original bacteria count of test group; V_2 = bacteria count after treatment of test group.

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Test Results

Number of Sample	Test Time (h)	Test Strain	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)	
KJ20170644-1	1	<i>Staphylococcus albus</i>	1	1.19×10^5	9.51×10^4	20.08	1.16×10^5	<7	>99.99
			2	1.11×10^5	8.86×10^4	20.18	1.08×10^5	<7	>99.99
			3	1.30×10^5	1.04×10^5	20.00	1.26×10^5	<7	>99.99
			Mean						>99.99

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Measuring of Power:

1. Test Equipment
Power measuring instrument
2. Test Conditions
 - 1) Environment temperature: 23.1 °C
 - 2) Environment humidity: 56%RH.
3. Operational Conditions of the Machine
The air purifier was tested under several grades.
4. Test Procedure
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	Testing Grade	Input Power (W)
KJ20170644-1	High grade	56.2
	Max grade	125.8

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Method for Testing Harmful Substances Release Amount:

1. Test Equipment
Ozone Analyzer
2. Operation Conditions of the Machine
The air purifier was tested under "Max grade".
3. Test Procedure
 - 1) Put the test sample into a clean space.
 - 2) Test the background concentration.
 - 3) Turn on the test unit. Test the ozone concentration at 5 cm away from the air outlet.

Test Results

Number of Sample	Items	Units	Background Concentration	Testing Concentration	Results	Standard Request (GB 21551.3-2010)
KJ20170644-1	Ozone (5 cm away from the air outlet)	mg/m ³	0.007	0.008	< 0.003	≤ 0.10

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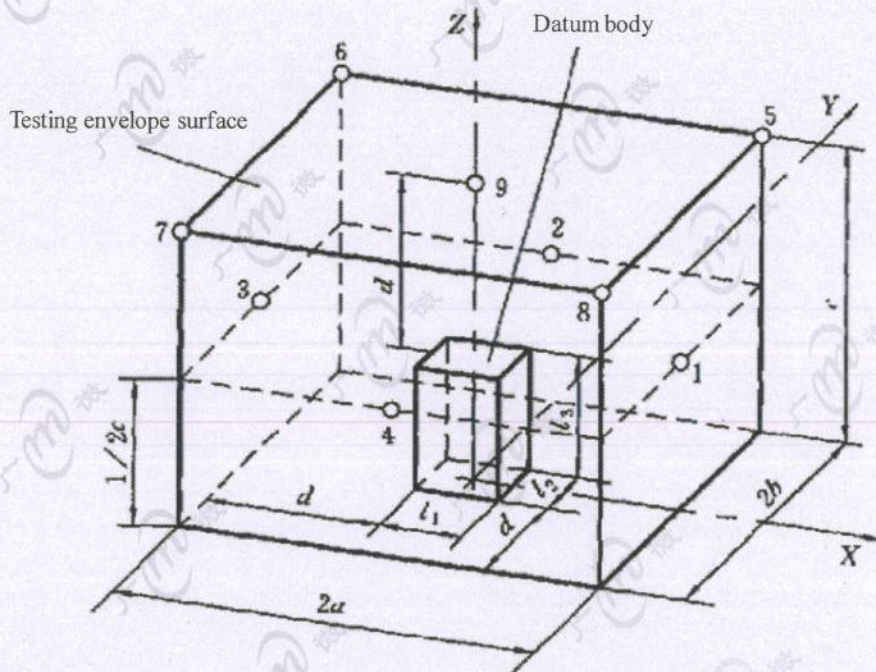
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Measuring of Noise:

1. Test Environment: semi-anechoic chamber; Background Noise: 16.5 dB(A)
2. Environment Temperature: 23.9 °C; Environment Humidity: 59.4%RH
3. Operational Conditions of the Machine
The air purifier was tested under several grades.
4. Testing Envelope Surface: rectangular hexahedron; Testing Distance: $d=1$ m. Test schematic diagrams are showed as follows:



Test Results

Number of Sample	Testing Grade	Average Sound Pressure Level	Acoustic Power Level
		dB(A)	dB(A)
KJ20170644-1	Sleep Grade	≤ 21.1	≤ 35.4
	High Grade	43.6	57.8
	Max Grade	52.1	66.3

End of report

Editor

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