



Test Certificate

on Air cleaning capacity test
of Air purifier
prepared for ATNS GROUP, Inc.


- Note: 1. The results contained herein apply only to the particular specimens tested and to the specific tests carried out, as detailed in this test report.)
2. Only the original report is guaranteed.)
3. No extract, abridgement or abstraction from this test report can be used to institute legal proceedings and to advertise without the written consent of the corresponding technical manager.)

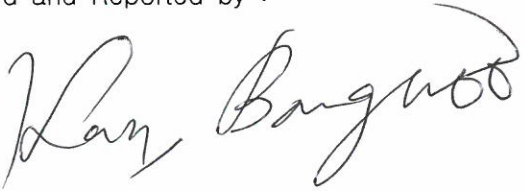



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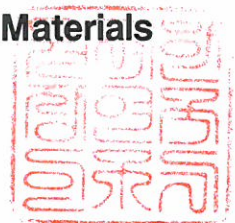
Test Certificate

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1	Name of Test	Air cleaning capacity test	
2	Name and Address of Client	LEE WOO HUN 5th Floor, Samheung Bldg. 1451-79, Seocho-dong, Seocho-gu, Seoul, Republic of Korea	
3	Name and Address of Maker	ATNS GROUP, Inc. 5th Floor, Samheung Bldg. 1451-79, Seocho-dong, Seocho-gu, Seoul, Republic of Korea	
4	Test Specimen	1) Name/Model	Air Purifier/ BF2025, TD1866
		2) Specification	
5	Test Method	According to SPS-KACA 002-132	
6	Test Date	2014.01.09 ~ 2014.01.29	
7	Test Environment	Refer to the test report	
8	Test Results	Refer to the test report	
9	Issue Date	2014. 2. 21	
10	Report No.	KIMM-14-0029	
11	Use of Report	To test the performance of the sample	
12	Tested and Reported by :		Reviewed and Approved by :
			

2014. 02. 21.

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Test Results

1. Objective

This test is performed to measure the performance of the test specimen for air cleaning capacity on the applied standard, SPS-KACA 002-132 (Korean Air Clean Associate Standard)

2. Test Specimen and Instruments

- Test Specimen : Air purifiers of the ATNS GROUP, Inc. - Fig. 1
- Instruments : A chamber for the air cleaning capacity test (30.4 m³), An optical particle counter (Particle Aerosol Spectrometer, Model 1.109, Grimm Instrument co., Germany), An atomizer (Model 3076, TSI, USA)
- Test particle : 0.3 μm KCl particles

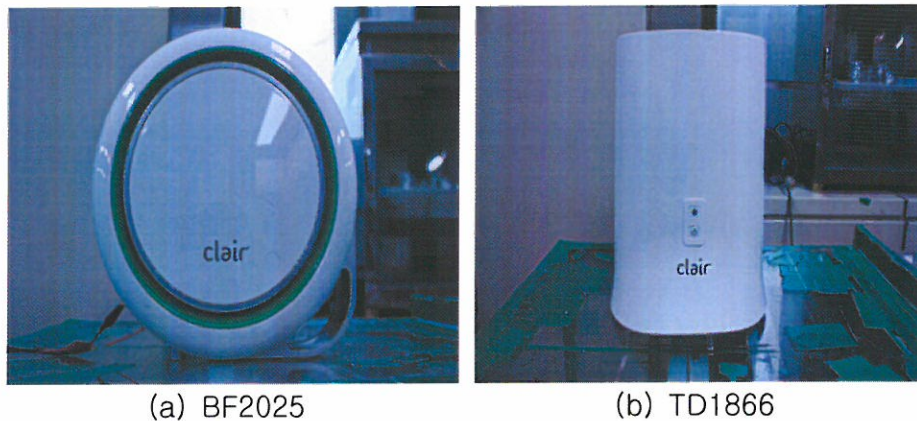


Fig. 1 Test specimen



3. Test method and condition

The measuring test for the specimen is air cleaning capacity test. The following shows the test standard for the test item.

○ Air cleaning capacity : Refer to the appendix 1 (clause 4) of SPS-KACA 002-132

Table 1 Test conditions

Test type	Temperature (°C)	Relative Humidity (%)
Air cleaning capacity	23 ± 2	48 ± 5

* The flow rate of the specimen was less than 1 m³/min. So four specimens were used for the test.

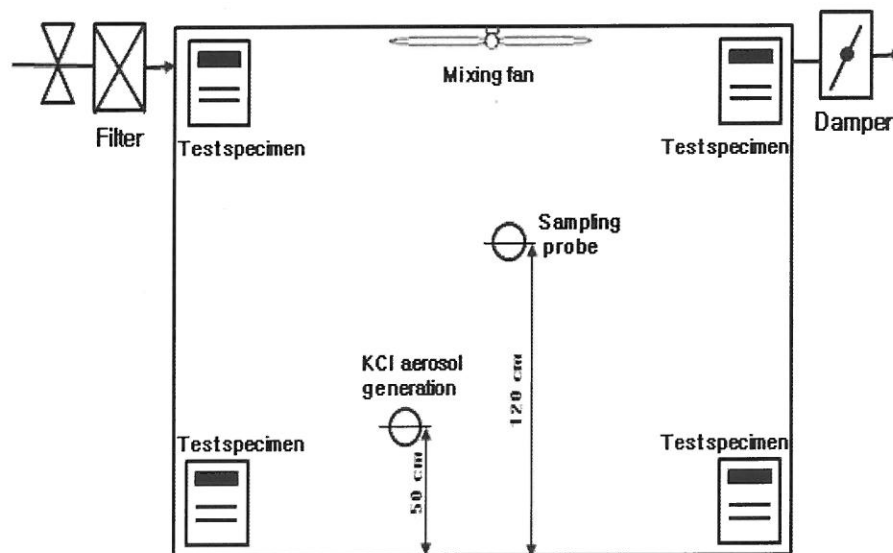


Fig 2. Experimental setup of air cleaning capacity test



4. Test Results

○ The particle degradation ratio was calculated according to the equation 1)

$$\eta = \frac{(N_{Initial} - N_{Residual})}{N_{Initial}} \times 100(\%) \quad 1)$$

where, η : Particle degradation ratio at time t (min) from an initial particle concentration (%)

$N_{Initial}$: Initial concentration of particles in a test chamber (30.4 m³) at t=0 (min) (particles/m³)

$N_{Residual}$: Residual concentration of particles in a test chamber (30.4 m³) after t (min) (particles/m³)

Table 2-3 and Fig 3-4 show the results of the test.

Table 2. Particle concentration ratio as a function of time (min) for BF2025 model. (* Result of the operation of four specimens)

Time (min)	Particle concentration (#/m ³)	Particle degradation ratio (%)
0	4.79.E+08	0.00
15	3.18.E+08	33.56
30	2.12.E+08	55.80
45	1.49.E+08	68.99
60	9.39.E+07	80.41
75	5.97.E+07	87.54
90	4.11.E+07	91.42
105	2.64.E+07	94.48
120	1.85.E+07	96.13
135	1.24.E+07	97.42
150	8.47.E+06	98.23
165	7.89.E+06	98.35
180	7.38.E+06	98.46
195	7.24.E+06	98.49
210	6.96.E+06	98.55
225	7.13.E+06	98.51
240	6.91.E+06	98.56
255	6.59.E+06	98.63
270	6.60.E+06	98.62

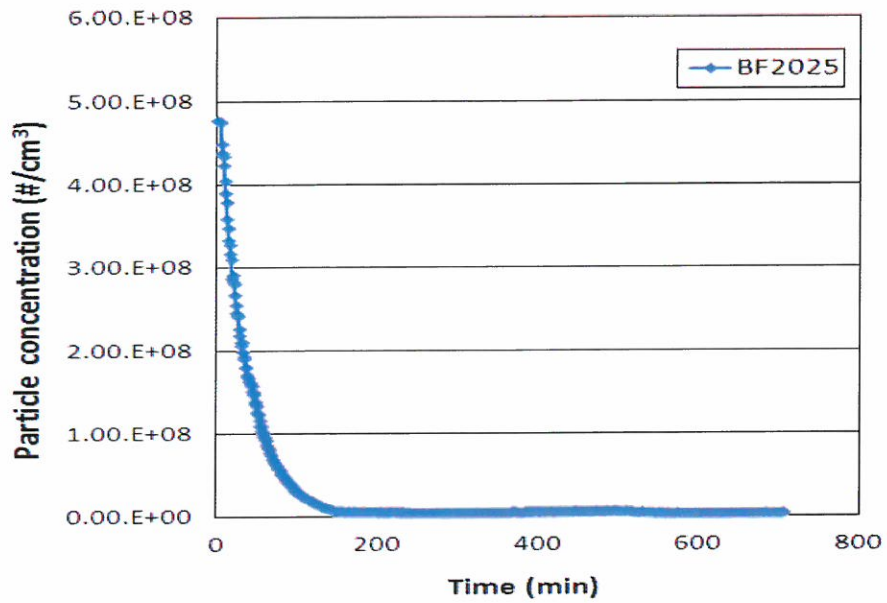


Fig.3 Particle regression curve as a function of time(min) for BF2025 model (* Result of the operation of four specimens)

Table 3. Particle concentration ratio as a function of time(min) for TD1866 model (* Result of the operation of four specimens)

Time (min)	Particle concentration (#/m³)	Efficiency (%)
0	4.61.E+08	0.00
15	2.17.E+08	52.92
30	1.25.E+08	72.89
45	1.12.E+08	75.74
60	9.48.E+07	79.44
75	3.70.E+07	91.98
90	2.18.E+07	95.28
105	1.82.E+07	96.05
120	1.23.E+07	97.33
135	9.50.E+06	97.94
150	7.49.E+06	98.38
165	5.46.E+06	98.82
180	3.61.E+06	99.22
195	2.39.E+06	99.48
210	1.66.E+06	99.64
225	1.34.E+06	99.71
240	6.88.E+05	99.85
255	5.93.E+05	99.87
270	4.25.E+05	99.91

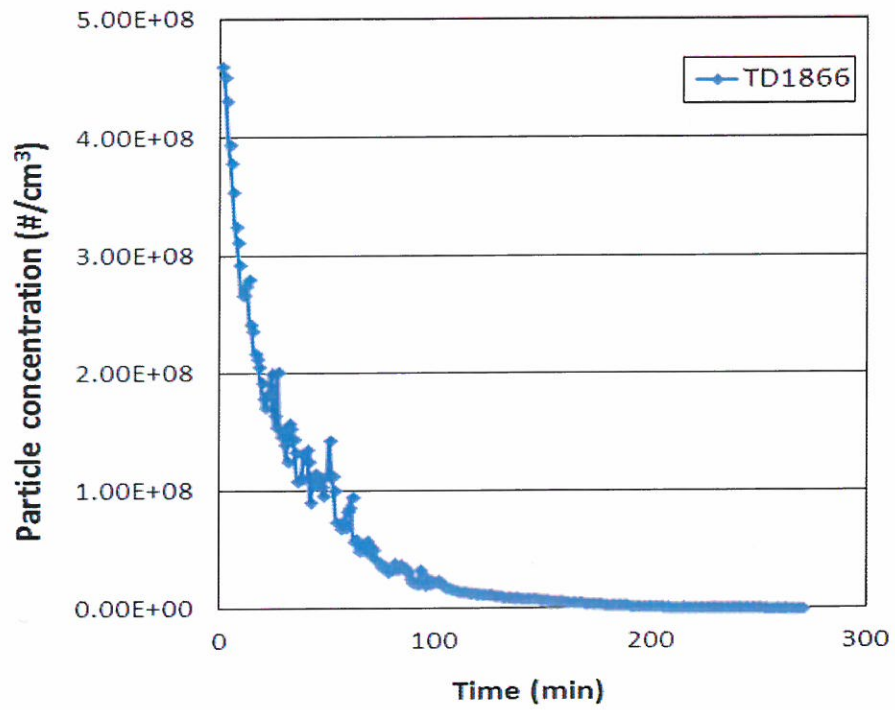


Fig.4 Particle regression curve as a function of time(min)
for TD1866 mode

I (* Result of the operation of four specimens)