SPS-KACA002-132

Indoor Air Cleaner

SPS-KACA002-132

Korea Air Cleaning Association

Established on March 31st, 1998

http://www.kaca.or.kr

Deliberation: Deliberation Board of Collective Standard Certification of Korea Air Cleaning Association

Deliberation: Deliberation Board of Collective Standard Certification of Korea Air Cleaning Association

	Name	Workplace	Position
Chairman	Hwang, Jeong-Ho	Yonsei University	Professor
Member	Kim, Taesung	Sungkyunkwan University	Professor
	Noh, Kwangchul	Creative Air Laboratory	CEO
	Han, Bangwoo	Korea Institute of Machinery and Materials	Lead Researcher
	Kwon, Soon-Bark	Korea Railroad Research Institute	Senior Researcher
	Park, Chan-Jeong	Coway Co., Ltd.	Director of Business Unit
	Jeon, Mun-Jae	Clean & Science Co., Ltd.	Managing Director
	Lee, Sung-Wha	LG Electronics Inc.	Chief Researcher
	Lee, Jun-Kyu	Korea Conformity Laboratories	Lead Researcher
	Ji, Jun-Ho	Eco Pictures Co, Ltd.	CEO
	Yuk, Sejin	Hanyang University	Professor
Assistant Administrator	Cha, Sung-il	General Management in Korea Air Cleaning Association	Executive Director

Perusal of Standards: Korean Standard Association (http://sps.kssn.net)

Establisher: Chairman of Korea Air Cleaning Association Established: March 31st, 1998
Revision: Confirmed : March, 2015
Deliberation: Deliberation Board of Collective Standard Certification of Korea Air Cleaning Association

For any inquiry or question regarding this standard, please contact Collective Standard Certification Department (02-553-4156) or refer to the homepage (http: //www.kaca.or.kr)

This standard is deliberated, confirmed, revised, and/or disposed by Deliberation Board of Collective Standard Certification of Korea Air Cleaning Association every 3 years in accordance with Article 27 of Industrial Standardization Act.

Table of Contents

Collective Standard

SPS-KACA002-132:2018

Indoor Air Cleaner

Indoor Air Cleaner

1 Scope of Application

This standard shall be applied to the safety and performance of air cleaner that is installed in a general house and office room to collect dust and deodorize odor.

2 Normative References

Being referred to in this standard, they shall be regarded as part of standard. These references shall be applied in the latest version.

KS A 0090 TEST POWDERS AND TEST PARTICLES
KS A 0701 MEASURING METHOD OF NOISE OF GEARS
KS B 6311 TESTING AND INSPECTING METHODS FOR TURBO-FANS AND BLOWERS
KS C 0262 LIMITS AND METHODS OF MEASUREMENTS OF RADIO INTERFERENCE CHARACTERISTICS OF ELECTRICAL, ELECTRONIC AND INFORMATION EQUIPMENTS
KS C 1302 INSULATION RESISTANCE TESTERS (BATTERY OPERATED)
KS C 1502 INTEGRATING-AVERAGING SOUND LEVEL METERS
KS C 3303 RUBBER CABLE/CORD
KS C 3304 VINYL CABLE/CORD
KS C 3317 600V RUBBER-INSULATING captire cable
KS C 3602 600V vinyl-INSULATING captire cable
KS C 9304 VENTILATING FANS
KS I 2200 NITROGEN OXIDES ANALYSIS METHOD OF NITROGEN OXIDES IN EXHAUST GAS
KS I 2200 SULFUR OXIDES ANALYSIS METHOD OF NITROGEN OXIDES IN EXHAUST GAS
KS M 2615 AIR FILTER OIL
KS M 7602 FILTER PAPER (FOR CHEMICAL ANALYSIS)
KS C IEC 60335-1 HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES - SAFETY-PART 1: GENERAL REQUIREMENTS
KS C IEC 60335-2-65 HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES - SAFETY-PART 1: INDIVIDUAL REQUIREMENTS FOR ELECTRICAL AIR CLEANER
JIS C 9615 Air Cleaner (空氣清淨機, Air Cleaners, 2000)
JEM 1467 HOUSEHOLD AIR CLEANER (家庭用空氣清淨機, Air cleaners of household and similar use, 1995)
ANSI/ASHRAE STANDARD 52.1-1992 GRAVIMETRIC AND DUST-SPOT PROCEDURES OR TESTING AIR-CLEANING DEVICES USED IN GENERAL VENTILATION FOR REMOVING PARTICULATE MATTER
ANSI/ASHRAE STANDARD 52.2-1999 METHOD OF TESTING GENERAL VENTILATION AIR-CLEANING DEVICES FOR REMOVING EFFICIENCY BY PARTICLE SIZE
AHAM AC-1-2015 ASSOCIATION OF HOME APPLIANCE MANUFACTURERS: METHOD FOR MEASURING PERFORMANCE OF PORTABLE HOUSEHOLD ELECTRIC CORD-CONNECTED ROOM AIR CLEANERS

3 Terminology and Definition

The terms used in this standard are defined as follows.

3.1 Air Cleaner

This product, whose main purpose is to purify indoor air and whose structure mainly consists of a dust chamber and a blower inside to collect dust and deodorize odor, can be divided into 3 types (mechanical, electric, and compound) and mechanical-type air cleaner can be sub-divided into 'dry type' and 'wet type'.

3.2 Nominal air flow rate

Air volume performed by an air cleaner running at rated frequency and rated voltage. For an air cleaner with a controller of air volume, it means maximum air volume.

3.3 Rated application area

Area size applied with air volume performed by an air cleaner running at nominal air flow rate.

3.4 Fine Dust Removal Unit (Dust collector)

In case it is an electric air cleaner, it is one-body structure equipped with an ionization section to charge dust with electricity, an dust collection section to gather dust, and other accessary parts to them. As for a mechanical air cleaner, it is one-body structure equipped with a filter media to catch dust and other accessary parts to it.

3.5 Hazardous Gas Removal Unit (deodorization unit)

It is one-body structure equipped with as removing section to adsorb, suck, resolve hazardous gas and other accessary parts to it.

3.6 Power Supply Unit

Power supply section to supply input power to a dust collector and an air blower and a controlling section.

3.7 Hazardous Gas Removal Efficiency

The difference in hazardous gas concentration between 'at the air inlet' and 'at the air outlet' divided by hazardous gas concentration ‘at the air inlet’ when an air cleaner runs at rated air flow rate: It is calculated and expressed in percentage (%).

3.8 Clean Air Delivery Rate (CADR)

The amount of polluted air purification per unit time obtained when the air cleaner is operated at rated air flow rate.

3.9 Fine Dust Sensor for Air Cleaner

The integrated device in the air cleaner, which measures the number concentration of fine dust using light scattering and converts into mass contration.

4 Types

Air cleaners are divided in type as follows.

Table 1 - Type and Purpose

Type	Purpose
Electric Air Cleaner	Collect dust
	Collect dust and remove hazardous gas

Mechanical Air Cleaner	Collect dust
	Collect dust and remove hazardous gas
Compound Air Cleaner	Collect dust
	Collect dust and remove hazardous gas

5 Rated Voltage and Rated Frequency

The rated voltage shall be 250 V or less for single-phase AC and the rated frequency shall be 60 Hz.

6 General Requirements

The general requirements of an air cleaner shall be in compliance with **4** of **KS C IEC 60335-2-65**.

7 General Testing Conditions

The general testing conditions of an air cleaner shall be in compliance with **5** of **KS C IEC 60335-2-65.**

8 Structure

The structure of an air cleaner shall be in compliance with **22** of **KS C IEC 60335-2-65**.

9 Parts and Components

Parts and components shall be in compliance with **KS C IEC 60335-2-65 Safety of household and similar electrical appliances: Specific requirement of air cleaner.**

10 Performance Standard

10.1 Safety Performance

The safety performance of the air cleaner shall be in compliance with **KS C IEC 60335-2-65 Safety of household and similar electrical appliances: Specific requirement of air cleaner**.

10.2 Product Performance

10.2.1 Noise Level

The noise level is tested according to 11.3 and its criteris is shown in Table 3. The certification standard follows the latest edition of certification examination criteria.

Table 3 - Noise level according to CADR capability

CADR (m^3/min)	Noise Level (dB(A))
Below 4	45
4 - 8	50
8 - 16	55
16 or more	60

10.2.2 Clean Air Delivery Rate (CADR) capability
CADR capability of air cleaner is tested according to 11.4.

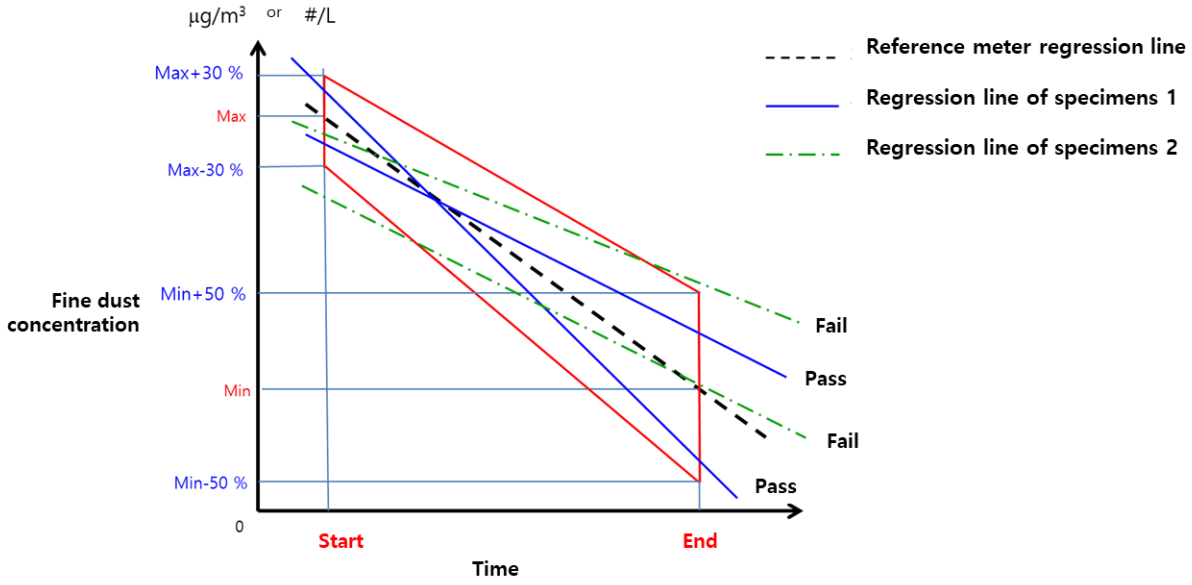
10.2.3 Hazardous Gas Removal (Deodorization) Efficiency
When it is tested according to 11.19, it shall be above 70%.

10.2.4 Ozone Generation Concentration
When it is tested according to 11.20, its maximum concentration shall be below 0.03ppm.

10.2.5 Fine dust sensor performance for air cleaner
The performance of the fine dust sensor attached to the air cleaner is tested according to 11.7, and the performance criteria are as shown in Table 4. The certification standard follows the latest edition of the certification examination standard.

Table 4 – Performance criteria of fine dust sensor

classification	Measurement performance (%) (Converted weight mesured by fine dust sensor / Fine dust weight meausured by reference instrument) x 100 or (Number concentration mesured by fine dust sensor / Fine dust number concentration meausured by reference instrument) x 100
Pass	When comparing with the reference instrument inside the measurement range, the difference is within ± 30% at the high concentration and within ± 50% at the low concentration See the figure below



Picture 1 – The performance evaluation results of the reference meter and the dust sensor are also shown in Fig. Refer to Table 1 for Min and Max values.
[The blue line indicates acceptance, and the green line indicates failure.]

11 Testing Method

11.1 Test Conditions

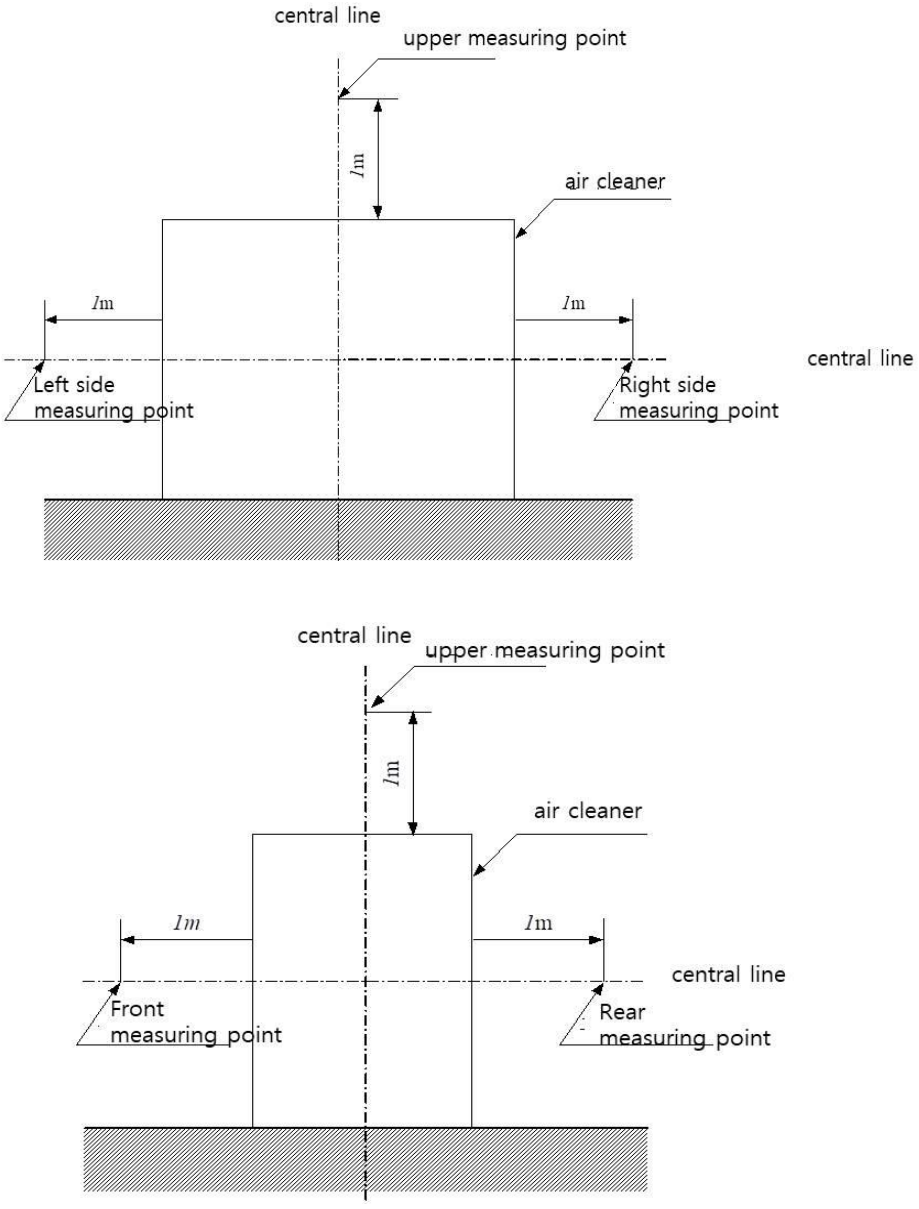
If specified otherwise, test shall be conducted where there is no wind; ambient temperature and barometric pressure maintain at 23±5℃ and 760±20mmHg, respectively.

11.2 Safety performance test

It shall be in compliance with **KS C IEC 60335-2-65 Safety of household and similar electrical appliances: Specific requirement of air cleaner**. However, insulation performance test shall be in compliance with **15** of **KS C IEC 60335-1 Safety of household and similar electrical appliances: General requirements**.

11.3 Noise Test

An air cleaner is placed on the supporter with no resonance and reverberations in a dead room and operated at rated air flow rate using rated frequency and rated voltage. As seen in Picture 4, noise level at the measuring points (5 points including air outlet) is measured by a noise meter specified in **KS C 1502** or **KS C 1505**, using 'A characteristics of weighting circuit for hearing sensitivity'. The test method is specified in **KS A ISO 1996-1~3**. When there is an effect of wind in the direction of air outlet, the test shall be managed not be affected by it.



Picture 2 - Noise test

11.4 Clean Air Delivery Rate (CADR) Capability Test

It shall be in compliance with the testing method specified in **Annex A.**

11.5 Hazardous Gas Removing (Deodorization) Efficiency Test

It shall be in compliance with the testing method specified in **Annex B.**

11.6 Ozone Generation Test

It shall be in compliance with the testing method specified in **Annex C.**

11.7 Fine Dust Sensor Test

The performance test of the fine dust sensor follows to the SPS-KACA0027-7269 " Test Method for Optically Equivalent PM Mass Concentration Sensing or Number Concentration counting Simple Dust Sensor".

12 Labeling

12.1 Labeling items

Labeling items which are in compliance with indoor air cleaner collective standard are as follows.

a) Clean Air Delivery Rate (CADR) capability (m^3/min or m^3/h)
b) rated applied area (m^2)
c) noise level (dB(A))
d) hazardous gas removing efficiency (%)
e) ozone concentration (ppm)
f) fine dust sensor performance
g) name of manufacturer or its initials
h) year of manufacturing or manufacturing number
i) model name or type

12.2 Instruction Manual

The following items shall be marked on an air cleaner and the instruction manual that describes the following items shall be attached.

a) applied area size and related information
b) handling, installation, and related information
c) maintenance management and related information
d) key hazardous gas that can't be removed
e) others necessary to express

Annex A
(Regulations)

Clean Air Delivery Rate (CADR) Test

A.1 Scope of Application

This standard shall be applied to the testing method of Clean Air Delivery Rate capability of "air cleaner".

A.2 Test Conditions

If not specified otherwise, air environment conditions for test are as follows.
a) temperature: 23±5°C
b) relative humidity: 55±15%

A.3. Clean Air Delivery Rate (CADR) capability

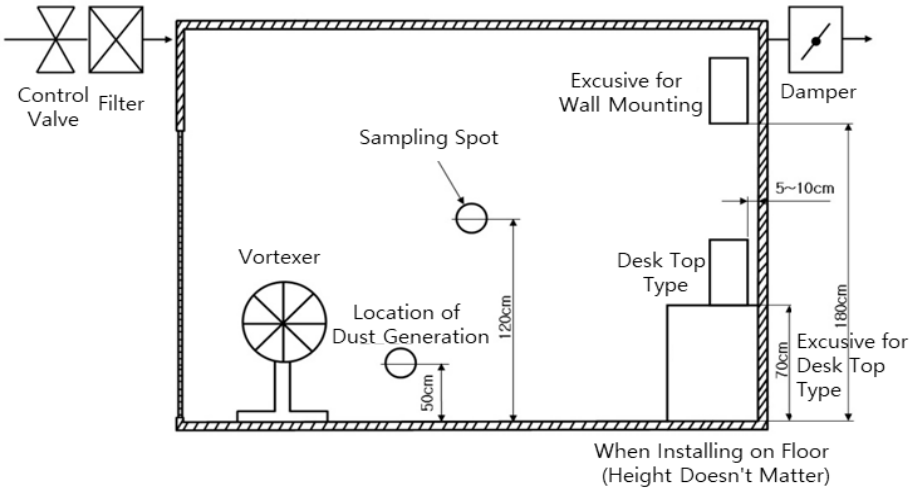
A.3.1. Test Device

Test device shall meet the requirements as below. For any items not specified in this annex, general methods are applied

A.3.1.1. Test Chamber

A.3.1.1.1. Structure and Shape

When Clean Air Delivery Rate (CADR) is more than 0.1 ㎥/min and less than 1.6 ㎥/min, it shall be tested in a chamber of 8.0±0.5 ㎥ and when it is more than 1.6 ㎥/min and less than 16.0 ㎥/min, it shall be tested in a chamber of 29.5±1 ㎥, when CADR more than 16.0 ㎥/min, it shall be tested in a chamber of 50.0±1 ㎥. The test chamber, as shown in Picture A1.4, shall be of a rectangular parallelepiped shape (regular hexahedron is possible).
The inside of the test chamber shall be structured with anti-static panels. The test chamber shall be equipped with high-performance (above HEPA) filter that can supply air that meets background concentration (4.1.1.2), an inlet connected with a control valve, and an outlet connected with a damper that discharges excessive indoor air automatically.



Picture A1.4. Diagram of Central Cross Section of Test Chamber

A.3.1.1.2. Concentration of Background Particles

Concentration of background particles inside the test chamber: It shall be below 3×10^5 Count/㎥ per particle of 0.3 ㎛.

A.3.1.1.3. Air Tightness

Air tightness of the test chamber shall meet more than 80% of initial particle concentration per particle of 0.3㎛ after 20 minutes. Here, measurement procedure shall in compliance with 4.2.2.

A.3.1.1.4. Concentration of Test Particles

In the test chamber, a particle generator and a vortexer shall be installed in a way that test particles can have uniform distribution of concentration spatially in a short time period. When measuring, the initial concentration of particles in the test chamber shall be 1~3 x 10^8 count/㎥.

A.3.1.1.5. Number of Test Specimen

The number of test specimens shall follow Table A1.1 by the rated air volume of test specimen.

Table A1.1.Number of Test Specimens

Rated Air volume (m^3/min)	Number of Specimens
Below 1.0	4
1.0 – 2.0	3
2.0 – 4.0	2
Above 4.0	1

A.3.1.1.6. Installation Position of Test Specimen

Test specimen shall be installed where is specified in the instruction manual of a product. In case it is not specified in the instruction manual of a product, the followings are applied.

a) A product (test specimen) of desktop type and desktop/wall mounting shall be installed near wall and on a desk top 70cm above from the floor.
b) Floor type shall be installed on the floor near a wall side.
c) For wall mounting-exclusive type, the bottom of the product shall be installed 180cm above from the floor.
d) In case of installation of 2 test specimens, the center of the test specimens' chambers shall be symmetric with each other.

A.3.1.2. Generation of Test Particles

A.3.1.2.1. Particles Generator

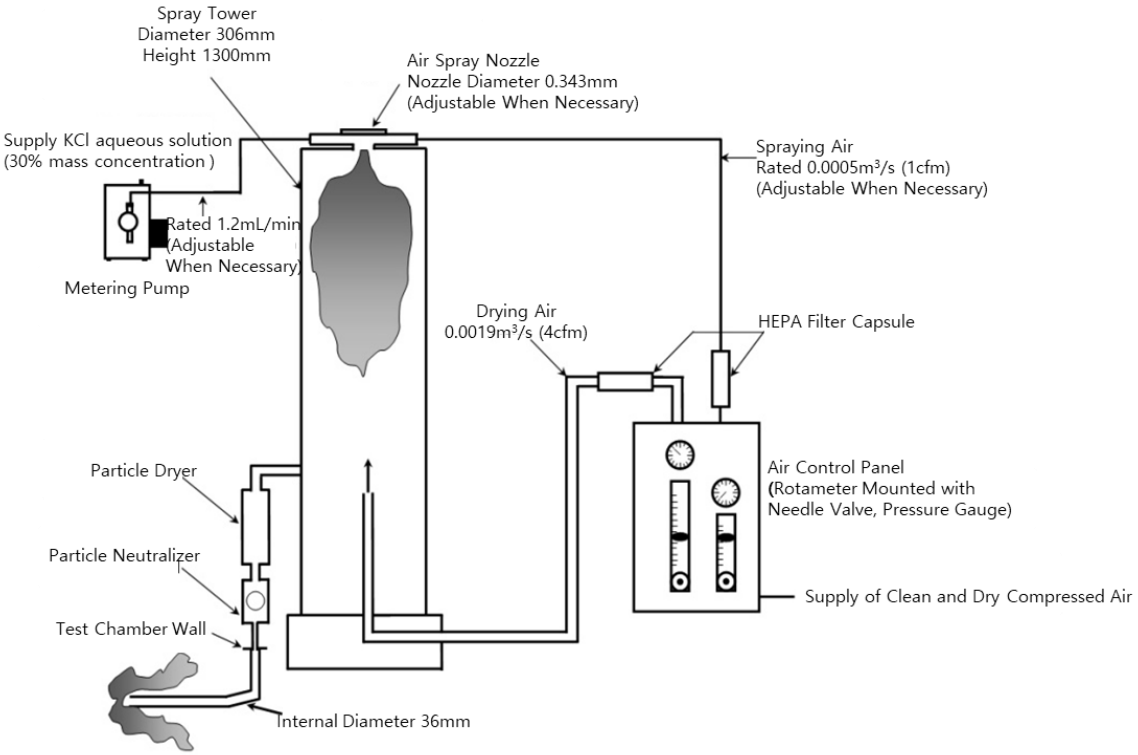
It shall be able to generate more than 10^7 counts of particle per second when potassium chloride solution is sprayed. Picture A1.5 shows the example of a particle generation device.

A.3.1.2.2. Handling of Generated Particles

A particle generator shall be designed in a way particles of potassium chloride can dry up before they enter the test chamber. Dried particles shall be neutralized through a particles neutralizer such as a beta or gamma radioactivity generator or a corona discharge (air) ionizer. The generating element of radioactivity shall have more than 5millicurie of radioactive energy.

A.3.1.3. Particle Counter

A particle counter shall be auto light-scattering particle counter specified in **KS B 6336** or the same or better kind than that in terms of performance. It needs noting that a particle counter shall have more than 4 size channels of particle between 0.3㎛ ~ 3㎛.



Picture A1.5. Particle Generator

A.3.1.4. Measuring Concentration of Particles

A.3.1.4.1. Sampling Point

Sampling point for measuring concentration of particles shall be one point 120cm above the central bottom of the test chamber.

A.3.1.4.2. Sampling Line

Sampling line consists of a sampling probe located at the point of 3.1.4.1. and a sampling tube connecting to the gate of the particle counter. The sampling tube shall be made of material that can minimize particle loss in the tube due to static.

A.3.1.4.3. Sampling Probe

It shall be set or fixed well so that the position of the sampling probe can't change due to indoor air current or such.

A.3.1.4.4. Use of Dilutor

When it is expected that concentration of particles in the test chamber gets close to or surpasses the upper limit of measurement of a particle counter, a concentration dilutor can be used. Here, the dilutor shall be one certified of its performance such as dilution ratio and particle loss.

A.3.2 Test Method

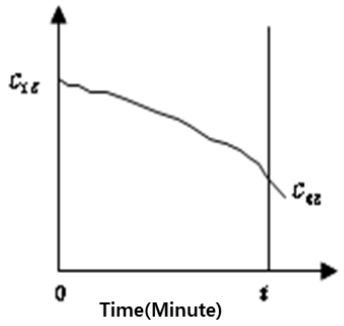
A.3.2.1 Measuring Concentration of Particles Under Running Decrement

a) Right before measuring concentration of particles under running decrement, let clean air through a high-performance filter to the inlet. Discharge the air inside the test chamber through the damper. Make sure that background concentration of particle of 0.3㎛ meets the requirements of 3.1.1.2 before generating test particles.

b) With the particle generator specified in 3.1.2, generate test particles and mix it well with a vortexer such as a fan at the same time. While particles are being generated, let excessive air in the test chamber naturally discharge by over-pressure. Start to measure concentration of particles in the chamber consecutively from the generation of particles. When concentration of particles in the test chamber reaches the range of est concentration (3.1.1.4), terminate particle generation. After the termination, stop vortexer when the concentration of particles in the particle size channel (in other case, the arithmetic mean of concentration of particles in adjacent particle size channels) containing the particles of 0.3㎛ in size passes the maximum concentration point and starts to decrease, close the outlet.

c) At the point when concentration of particles starts to decrease, run the air cleaner. Set '3 minutes later' as 't=0'. Here, the concentration of particles at this time shall be initial concentration of particles and it shall stay within the range of concentration of particles (3.1.1.4).

d) While running the air cleaner, operate a test on the concentration of particles in particle size channel containing particles of 0.3㎛ (in size) for 20 minutes, or until the point that the concentration of particles reaches 1/10 of the initial concentration of particles of the channel. And calculate and get particle concentration curve under running decrement, until the time point, for all the particle size channels of the particle counter as seen in Picture A1.6.



Picture A1.6. Particle Concentration Curve at A Random Particle Size Channel Under of Running Decrement

e) Sampling time can be set to 6 seconds or one minute. On the particle concentration curve under running decrement, mark more than 20 measuring points per minute or until the time point when it reaches 1/10 of the initial concentration of particles.

A.3.2.2 Measuring Concentration of Particles Under Natural Decrement

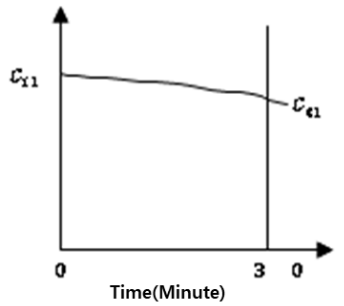
a) Right before measuring concentration of particles under natural decrement, let clean air through a high-performance filter to the inlet, as in 3.2.1(1).

b) With the particle generator specified in 3.1.2., generate test particles and follow the same process as in 3.2.1(2).

c) Set the time point when concentration of particles start to decrease as t=0 and set the concentration of particles at the point as initial concentration. The initial concentration of particles shall stay within the range of concentration of particles (3.1.1.4).

d) While not running the air cleaner, calculate particle concentration curve under natural decrement for all the particle size channels of the particle counter for 30 minutes as in Picture A1.7. In case measuring test time for concentration of particles under running decrement (3.2.1(4)) surpasses 30 minutes, calculate particle concentration curve under natural decrement during measuring test time of concentration of particles under running decrement.

e) Sampling shall follow the same procedure as in 3.2.1(5) and calculate measured data. Measured values are expressed on the beginning time of sampling.



Picture A1.7. Particle Concentration Curve at A Random Particle Size Channel Under of Natural Decrement

A.3.2.3. Calculation of Clean Air Delivery Rate (CADR)

Clean Air Delivery Rate (CADR) capability test specimen is calculated with the following equation.

$$P = \frac{V}{Nt}\left(\ln\frac{C_{i2}}{C_{t2}} - \ln\frac{C_{i1}}{C_{t1}}\right) \quad (2)$$

Here,

P : dust cleaning Efficiency (m^3/min)

V : test chamber volume (m^3)

t : measuring time (min) under running decrement

C_{i1} : concentration of particles (count/cm^3) at initial measuring time point (t=0) under natural decrement

C_{i2} : concentration of particles (count/cm^3) at initial measuring time point (t=0) under running decrement

C_{t1} : concentration of particles (count/cm^3) at measuring time point (t) under natural decrement

C_{t2} : concentration of particles (count/cm^3) at measuring time point (t) under running decrement

N : number of test specimen

Note: measuring time is test time of concentration of particles under running decrement. Concentration of particles under natural decrement at this point is calculated by interpolating concentration of particles at the adjacent time into 't'.

A.4 Calculation of Applied Area Size

The applied area of the test specimen is difficult to specify because the air cleanliness varies greatly depending on various environmental factors such as the place and position where the air cleaner is used. However, in order to prevent confusion of the consumer when purchasing the product, it is calculated according to the calculation method considering the domestic operating environment as much as possible.

Applied area size means the size of room in which indoor concentration of particles goes below 50% of initial concentration of particles when an air cleaner runs 10 minutes and natural ventilation is applied once every hour. Here, ceiling height is set to 2.4m. It is calculated with the following equations.

$$A = 7.7 \times P \qquad (3)$$

Here,

A : applied area size (m^2)

P : dust cleaning Efficiency(m^3/min)

Annex B
(Regulations)

Hazardous Gas Removing (Deodorization) Test

B.1 Scope of Application

This standard shall be applied to the testing method of hazardous gas removing performance of “air cleaner” (“test specimen” hereinafter).

B.2. Test Conditions and Target Gas

B.2.1. Test Conditions

Air environment conditions for test shall be as follows.

a) temperature: 23±5℃

b) relative humidity: 55±15%

c) fine dust and gas concentration: lower than the indoor environment standard of Public Health Act

B.2.2. Test Target Gas

Test shall be given on the following 5 gases.

a) ammonia (NH_3)

b) acetate (CH_3COOH)

c) acete aldehyde (CH_3CHO)

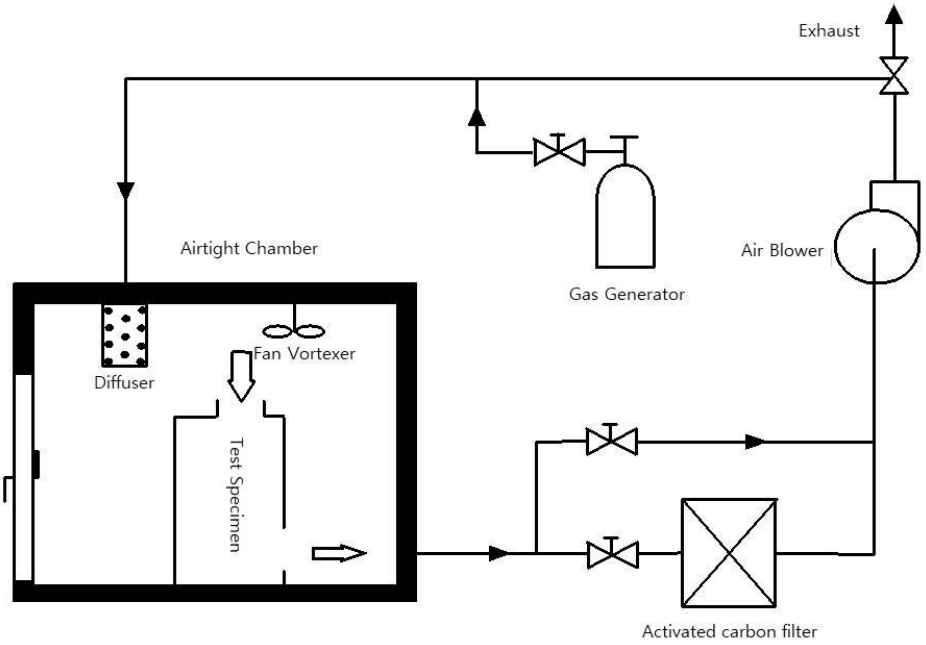
d) toluol (C_7H_8)

e) formaldehyde (HCHO)

B.3. Test Device

B.3.1. Test Chamber

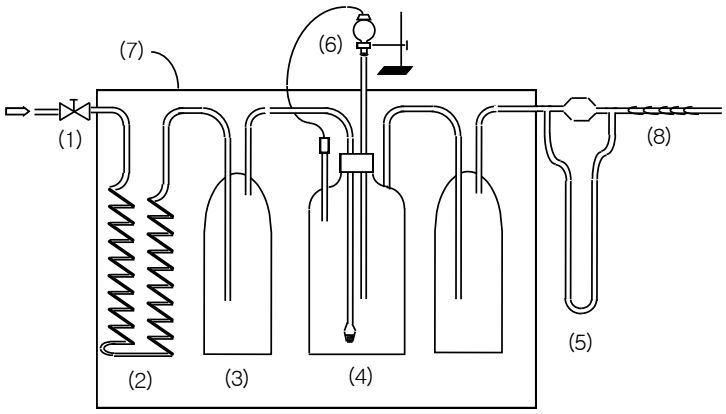
The size of the test chamber shall be 8.0±0.2m^3 (standard: 2m×2m×2m) and it is airtight container (made of glass or acrylic (resin)). A test specimen is placed at the center of the test chamber as seen in **Picture A2.1.** When the specimen is a desktop type, it shall be installed 75cm above the floor. It shall be equipped with a fan vortexer inside the chamber to evenly distribute test target gas.



Picture A2.1. Composition of Test Chamber and Gas Supply Line for Deodorization Test

B.3.2. Gas Supply Device

Test gas supply device shall mix and dilute test gas using a gas tank or the gas generator as seen in Picture A2.2 and supply uniform amount of gas in the chamber. The supply line shall be structured to adjust gas concentration in the chamber.



(1) airflow control valve (5) flow meter
(2) temperature control tube (6) solvent storage
(3) buffer tank (7) constant-temperature water tank
(4) test gas generator (8) warming heater

B.3.3. Measuring Device

The device shall be qualified as FT-IR or better.

B.4. Test Method

B.4.1 Measuring Condition

a) test target gas shall be finely controlled with a needle valve and supplied into the chamber in uniform amount.

b) test specimen shall be in no operation when test target gas is supplied.
c) test specimen shall be able to run (on and off) without opening the chamber be control.
d) fan vortexer shall keep running and stop when the test specimen gets into operation.

B.4.2. Measuring Initial Gas Concentration

a) measure initial gas concentration 2 to 5 minutes after a certain amount of gas is injected in the method (Picture A2.1). Here, the initial concentration of each test target gas shall be 10ppm and its tolerance shall be ±10%.
b) Measuring order is as follows: formaldehyde -> ammonia -> acetaldehyde -> acetate -> toluol, respectively.

B.4.3. Measuring Gas Concentration Under Running Condition

a) run the test specimen 30 minutes at rated air volume.
b) stop running the test specimen and measure the concentration of residual gas in the same method as initial gas concentration (4.2 b)).

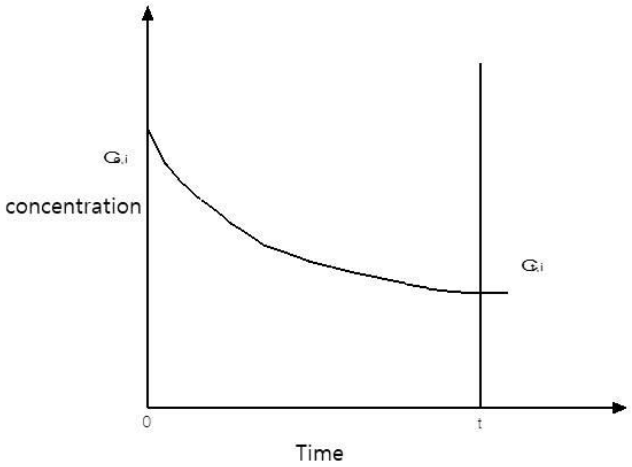
B.5 Calculation of Hazardous Gas Removing Efficiency

a) removing efficiency ηi(%) of each polluted i gas is calculated with the following equation. (refer to Picture A2.4)

$$\eta_i = 1 - \frac{C_{i,30}}{C_{i,0}} \times 100 \quad (1)$$

Here,

$C_{i,30}$: concentration(ppm) of i gas 30 minutes after operation
$C_{i,0}$: initial concentration(ppm) of i gas after operation



Picture A2.3 - Decrement of Gas Concentration

b) hazardous gas removing efficiency of the test specimen is calculated with this equation.

$$\eta_g = \frac{\eta_{am} + \eta_t + \eta_f + \eta_a + \eta_c}{5}$$

Here,

η_g : hazardous gas removing efficiency(%)
η_{am} : ammonia gas removing efficiency(%)
η_t : toluol gas removing efficiency(%)

η_f : formaldehyde gas removing efficiency(%)

η_a : acetaldehyde gas removing efficiency(%)

η_c : acetate gas removing efficiency(%)

B.6 Result Report

This standard does not specify the form of hazardous gas removing test on test specimen. But, it shall contain the follows in the report.

a) test place
b) test date
c) name and signature of tester
d) name of air cleaner manufacturer
e) detailed description of air cleaner
  (1) product name and model name
  (2) information of air cleaner
  (3) hazardous gas removing method: mechanical, electric
  (4) rated airflow
f) test conditions
  (1) product name and model of gas meter
  (2) temperature and relative humidity of test air
g) hazardous gas removing efficiency

Annex C
(Regulations)

Ozone Generation Test

C.1 Scope of Application
This standard shall be applied to the testing method of ozone generation for “air cleaner” (“test specimen” hereinafter) in case it is an electric type.

C.2. Test Procedure and Conditions

C.2.1. Test Procedure
Ozone generation test shall be conducted before dust collection test and deodorization test of test specimen.

C.2.2. Test Conditions
The test shall be conducted under the air environment conditions as follows.
a) temperature: 23±5℃
b) relative humidity: 55±15%
c) fine dust and gas concentration: lower than the indoor environment standard of Public Health Act

C.3. Test Device

C.3.1. Installation of Test Chamber and Test Specimen
The test chamber shall be dust collection test chamber (Para. 2.1 of Annex 1) that meets environment requirements specified in Para. 2.2 of this annex, or shall be of indoor spatial volume 30±5m3 (ceiling height is 3m or lower). A test specimen is placed at the center of the test chamber**.** When the specimen is a desktop type, it shall be installed 75cm above the floor.

C.3.2. Ozone Concentration Gauge
The ozone concentration gauge of the test specimen shall be one that can conduct such test method as chemiluminescence method as specified in KS I ISO 10313 or a better method.

C.4. Test Method

C.4.1. Measuring Initial Ozone Concentration
Measure the initial ozone concentration in the test room before starting the test.

C.4.2. Measuring Ozone Concentration
a) While the test specimen is running at rated air volume and discharge/dust chamber is running at rated voltage, collect (suck) the air at 50mm from the air outlet of the test specimen at 1l/min and measure concentration for 24 hours. Set the value as ozone concentration.

b) Here, in case the initial ozone concentration of the test indoor is above 0.01ppm, subtract initial concentration from the average concentration measured above the test specimen to get oozone concentration.
c) When testing an air cleaner whose electric discharge/dust chamber runs even when a fan does not run or dust collection filter is removed, repeat the tests (4.1 - 4.2(2)) to measure ozone concentration.

C.5 Result Report

This standard does not specify the form of zone generation test on test specimen. But, it shall contain the follows in the report.

a) test place
b) test date
c) name and signature of tester
d) name of air cleaner manufacturer
e) detailed description of air cleaner
  (1) product name and model name
  (2) information of air cleaner
  (3) rated airflow
f) test conditions
  (1) product name and model of ozone meter
  (2) temperature and relative humidity of test air
g) ozone concentration
h) expression of ozone concentration
- measured value shall be expressed up to 2 decimal places. (but result value shall be rounded up to 3 decimal places)
- TR (Trace): it means the value is below 0.01.

Annex D
(Regulations)

Small-scale Air Cleaner

D.1 Scope of Application

This standard specifies methods for testing the performance of small-scale air cleaners.
Application Scope of small-scale air cleaner is applied to products whose Clean Air Delivery Rate (㎥/min) is 0.1 or more and less than 1.6.

D.2 Test items

a) Clean Air Delivery Rate (CADR)
b) Noise level
c) Ozone Concentration
d) Efficiency of removing harmful gas (deodorizing)
However, the efficiency test for removal of harmful gas (deodorization) is only applied to the applicant.

D.3. Performance

D.3.1 Clean Air Delivery Rate (CADR)
The results of the Clean Air Delivery Rate test shall conform to the D.1 scope of application.

D.3.2 Noise level
The noise standard is under 45dB(A), and the latest edition of the certification examination standard is applied as the certification standard.

D.3.3 Ozone Concentration
The standard of ozone generation concentration should be less than 0.03ppm, and the latest edition of the certification examination standard is applied as the certification standard.

D.3.4 Efficiency to remove harmful gas (deodorization)
The criterion of harmful gas removal efficiency is more than 60%, and the latest edition of the certification examination standard is applied as the certification standard

D.4. Test method

D.4.1 Clean Air Delivery Rate (CADR)
The test of the Clean Air Delivery Rate shall be carried out in accordance with the test of Annex A Clean Air Delivery Rate except for the following items.
a) The test chamber size shall be tested in a chamber of 8.0 ± 0.5 ㎥.
b) Installation location of specimen
(1) Desk-top and tabletop / wall-mounted type shall be installed on the table adjacent to the wall and about 75cm above the floor.
(2) For the wall-mounted type, install the product so that the bottom surface of the product is 50 cm from the bottom surface.
c) Sampling location

(1) The sampling position for particle concentration measurement shall be one point 100 cm above the center floor of the test chamber.

D.4.2 Noise level

The noise test shall be in accordance with 11.3 Noise Test.

D.4.3 Ozone Concentration

The ozone concentration test shall be in accordance with Annex C ozone generation test.

D.4.4 Efficiency to remove harmful gas (deodorization)

Efficiency to remove Harmful gas tests shall be carried out in accordance with the test of Annex B Efficiency to remove harmful gas except for the following items.

a) The test chamber size shall be tested in a chamber of 1.0 ± 0.5 m3.

b) Target gas

1) ammonia (NH3)
2) acetic acid (CH3COOH)
3) acetaldehyde (CH3CHO)

Annex E
(Regulations)

Large-scale Air Cleaner

E.1 Scope of Application

This standard specifies methods for testing the performance of large-scale air cleaners.
Application Scope of large-scale air cleaner is applied to products whose Clean Air Delivery Rate (㎥/min) is 16.0 or more.

E.2 Test items

a) Clean Air Delivery Rate (CADR)
b) Noise level
c) Ozone Concentration
d) Efficiency of removing harmful gas (deodorizing)

E.3. Performance

E.3.1 Clean Air Delivery Rate (CADR)
The results of the Clean Air Delivery Rate test shall conform to the E.1 scope of application.

E.3.2 Noise level
The noise standard is shown in Table 3, and the latest edition of the certification examination standard is applied as the certification standard.

E.3.3 Ozone Concentration
The standard of ozone generation concentration should be less than 0.03ppm, and the latest edition of the certification examination standard is applied as the certification standard.

E.3.4 Efficiency to remove harmful gas (deodorization)
The criterion of harmful gas removal efficiency is more than 70%, and the latest edition of the certification examination standard is applied as the certification standard.

E.4. Test Method

E.4.1 Clean Air Delivery Rate (CADR)
The test of the Clean Air Delivery Rate shall be carried out in accordance with the test of Annex A Clean Air Delivery Rate except for the following items.
a) The test chamber size shall be tested in a chamber of 50.0 ± 1 ㎥.

E.4.2 Noise level
The noise test shall be in accordance with 11.3 Noise Test.

E.4.3 Ozone Concentration
The ozone concentration test shall be in accordance with Annex C ozone generation test.

E.4.4 Efficiency to remove harmful gas (deodorization)
Efficiency to remove Harmful gas tests shall be in accordance Annex B Efficiency to remove harmful gas test.

Annex F
(Regulations)

Air Cleaner for school

F.1 Scope of Application

This standard specifies methods for testing the performance of air cleaners for school.
Application Scope of air cleaner for school is applied to products whose Clean Air Delivery Rate (㎥/min) is 10.0 or more higher and that is applied to school classrooms, special rooms, and affiliated rooms

F.2 Test items

a) Clean Air Delivery Rate (CADR)
b) Noise level
c) Ozone Concentration

F.3. Performance

F.3.1 Clean Air Delivery Rate (CADR)
The results of the Clean Air Delivery Rate test shall conform to the F.1 scope of application.

F.3.2 Noise level
The noise standard is under 55dB(A), and the latest edition of the certification examination standard is applied as the certification standard.

F.3.3 Ozone Concentration
The standard of ozone generation concentration should be less than 0.01ppm, and the latest edition of the certification examination standard is applied as the certification standard.

F.4. Test Method

F.4.1 Clean Air Delivery Rate (CADR)
The test of the Clean Air Delivery Rate shall be carried out in accordance with the test of Annex A Clean Air Delivery Rate.

F.4.2 Noise level
The noise test shall be in accordance with 11.3 Noise Test.

F.4.3 Ozone Concentration
The ozone concentration test shall be in accordance with Annex C ozone generation test.