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SPS-KACA0020-7174

Healthy Building Material

SPS-KACA0020-7174

KOREA AIR CLEANING ASSOCIATION  
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Enacted: May 2016

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If you have any comments or questions about this standard, please contact the Korea Air Cleaners Association Standard Certification Team (02-553-4156) or contact us using the website. (<http://www.kaca.or.kr>)

This standard is reviewed, revised, or abolished every three years by the Korea Air Cleaning Association Standard Review Committee in accordance with Article 27 of the Industrial Standardization Act.

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## **Collective standard**

**SPS – KACA0020 -7174**

# **Healthy Building Material**

## **1 Scope**

This standard applies to indoor building materials (hereinafter referred to as "building materials") in which emissions of volatile organic compounds and aldehydes from the solid building materials used in buildings (flooring, wallpaper, panel) and liquid building materials (sealant, adhesive, paint, putty) are reduced.

## **2 Normative references**

The following normative references are essential for the application of this standard, in whole or in part. If there are normative references that include the year of publication, only the cited edition should be applied. If there are normative references that do not include the year of publication, the latest version (including all postscripts) should be applied.

KS M 1998, Measurement of Formaldehyde and Volatile Organic Compound Emission in Building Interior Materials

ES 02131.1, Indoor air quality process test standards - Test methods for volatile organic compounds and formaldehyde emitted by building materials - Small chamber method

## **3 Terms and Definitions**

For the purposes of this standard, apply the definitions of terms in KS M 1998 and ES 02131.1 and the following.

### **3.1 Healthy Building Material**

Environment-friendly indoor building materials that can reduce the generation of volatile organic compounds and aldehyde pollutants from building materials used in buildings.

### **3.2 5VOC (5 volatile organic compounds)**

Among volatile organic compounds, it is the sum of benzene, toluene, ethylbenzene, xylene, styrene.

### **3.3 aldehyde**

Formaldehyde (HCHO) and acetaldehyde (CH<sub>3</sub>CHO) as measured by liquid chromatography are targeted.

#### 4 Category

Using this standard, it is possible to determine the emissions of volatile organic compounds and aldehydes from the following building materials.

#### 4.1 Solid building materials

##### 4.1.1 Flooring

It is a building material used for floor finishing including synthetic resins, woody materials, inorganic materials, and fibers, and is classified as shown in Table 1 according to the constituent materials.

**Table 1 - Flooring Classification**

Material	Classification
Synthetic resin	PVC linoleum, PVC tile, monorium material, synthetic resin
Wooden	Solid wood flooring, plywood flooring, reinforced flooring
Inorganic	stone, cement, clay, steel
Textile	carpet tile
Complex	double flooring

##### 4.1.2 Wallpaper

It is a building material used for surface decorating and finishing including lining paper, synthetic resin, lamination, textile and classified as shown in Table 2 according to the constituent materials.

**Table 2 - Wallpaper classification**

Material	Classification
lining paper	Paper wallpaper, natural wallpaper
synthetic resin	PVC (silk) wallpaper, flame retardant wallpaper, foam wallpaper, fluorescent wallpaper, synthetic resin, decorative synthetic resin sheet
lamination	lamination
textile	textile wallpaper

##### 4.1.3 Panel

It refers to building materials used for wall and ceiling finishing including synthetic resin, wood, metal, inorganic materials, and fibers as raw materials and classified as shown in Table 3 according to the constituent materials.

**Table 3 - Panel Classification**

Material	Classification
Synthetic resin	SMC, BMC, ABS, synthetic resin, heat insulation and insulation
Wooden	Particle board, fiberboard, glued laminated wood, solid wood, plywood
Metal	Metal
Inorganic	Stone, artificial marble, steel, Gypsum board
Textile	Fabric, nonwoven fabric

## 4.2 Liquid building materials

### 4.2.1 Sealant

A building material used in the form of a joint to prevent the penetration of water or the passage of air from a gap of various members made of the same or different materials. It is classified as shown in Table 4 according to the constituent materials.

**Table 4 - Sealant Classification**

Material	Classification
Silicone series	Acetic acid type
	Non-acetic acid type - alcohol series, oxime series
Non-silicone series	Butyl rubber series, modified silicone series, acrylic series, polyurethane series, polysulfide series, SBR series

### 4.2.2 Adhesive

Refers to building materials used to bind two or more homogeneous or heterogeneous solids and is classified as shown in Table 5 according to the constituent materials

**Table 5 - Adhesive Classification**

Material	Classification	
Inorganic Adhesive	Sodium Silicate, Cement, Ceramic, Gypsum, Starch	
Organic adhesive	Natural - rubber, starch	
	Synthetic	Synthetic resins - melamine, epoxy, acrylic, phenol polyurethane, EVA, PVAc
		Synthetic rubber
		Mixed
Organic / Inorganic Mixed	Cement + Powder, Cement + Acrylic, Cement + EVA	

### 4.2.3 Paint

It refers to organic and inorganic liquid, semi-solid and powdery building materials that are coated with a solid surface to form a solid film to protect and decorate the surface of the object. It is classified as shown in Table 6

according to the constituent materials

**Table 6 - Paint classification**

Material	Classification
Water-based	water-based slurry, emulsion, water- acidity, water-soluble, water-based acrylic, water-based vinyl
Oil-based	Alkyd, acrylic, urethane, epoxy, vinyl, unsaturated polyester, phenol

#### 4.2.4 Putty

It refers to organic and inorganic liquid, semi-solid and powdered building materials which fill crack of solid surface and protect the surface of object by making solid film and classified as shown in Table 7 according to the constituent materials

**Table 7 - Putty Classification**

Material	Classification
Water-based	water-based slurry, emulsion, water- acidity, water-soluble, water-based acrylic, water-based vinyl
Oil-based	Alkyd, acrylic, urethane, epoxy, vinyl, unsaturated polyester, phenol

## 5 Sampling, transporting and storing samples

When a volatile organic compound or aldehydes emission test of building materials is conducted using a small emission test chamber, the product under test should be protected from heat and humidity so as not to affect the test results. The method of sampling, transporting and preserving the test specimen shall be in accordance with the method of sampling of ES 02131.1 5.2 product samples and the transport, storage of samples.

### 5.1 How to collect product samples

The building materials to be tested must be produced, packaged and handled by a common manufacturing process. Samples taken by random sampling shall be packaged within one hour and sent to the laboratory as soon as possible.

### 5.2 Products in solid form

#### 5.2.1 Products in roll form

A roll-shaped product that has not been opened is used as a sample. However, if the product is difficult to handle, take samples as shown below.

- 1) Samples are to be taken 1 m inside the roll or inside from the outermost layer.
- 2) Samples are taken from the central part of the product.
- 3) In the case of products with repetitive patterns, the pattern should be sampled at the center of the specimen

### 5.2.2 Products in the form of plates

The unopened product is used as a sample. However, if the product is difficult to deliver by hand, take samples at 165 mm width and 165 mm length from the center of the product.

### 5.3 Products in liquid form

The unopened product is used as a sample. The sample shall be collected from the product packaging unit sufficient for the sample volume

### 5.4 Sample packaging and transportation

The sample shall be protected against contamination by chemical substances or heat and moisture. Each collected solid sample is wrapped with a low-emission tape or aluminum foil and sealed in a polyethylene or equivalent bag. Add one sample per bag. The liquid sample is sealed with unsealed barrel, tube or the like. The emission characteristics of the material may be influenced by the transportation situation. Especially, it should not be influenced by temperature.

### 5.5 Seal of sample

The seal shown in Table 8, which lists the company name, receipt number, product name, model / specification, date of manufacture, testing laboratory, etc. of the product, is marked on the bag, barrel and tube sealed with the sample. Care should be taken that the sample is not affected by the marking of the seal.

Table 8 - Seal of test sample

- 시험시료봉인 -			
회 사 명		접수번호	
제 품 명		모델/규격	
제조년월일		시험기관	
비 고		시험구분	<input type="checkbox"/> 최초인증 <input type="checkbox"/> 정기심사
인증심사원 :		(인)	
		201 . . .	
○○○○○○○ 단체명			

## **5.6 Storage of samples**

The emission test should be started immediately after the product sample is taken. However, when samples are stored until the beginning of the measurement, in order to prevent the aging of the products, the samples should be kept in the same packing temperature as the test and kept at the same temperature and humidity (maximum 4 weeks).

NOTE During storage, the sample may aging and affect the emission characteristics. It is desirable to minimize the storage period of the sample before preparing the test piece.

## **6 Performance standards**

### **6.1 List**

#### **6.1.1 Total volatile organic compounds (TVOC)**

Total volatile organic compounds (TVOC) emitted from building materials shall comply with 6.2 when tested in accordance with Section 7 Test Method.

#### **6.1.2 5V OC**

5 VOCs emitted from building materials shall comply with 6.2 when tested in accordance with Section 7 Test Method.

#### **6.1.3 Toluene (Toluene)**

Toluene emitted from building materials shall comply with 6.2 when tested in accordance with Section 7 Test Method.

#### **6.1.4 Formaldehyde (HCHO)**

Formaldehyde (HCHO) emitted from building materials shall comply with 6.2 when tested in accordance with Section 7 Test Method.

#### **6.1.5 Acetaldehyde (CH<sub>3</sub>CHO)**

Acetaldehyde (CH<sub>3</sub>CHO) emitted from building materials shall comply with 6.2 when tested in accordance with Section 7 Test Method.

### **6.2 Standards**

The criteria for volatile organic compounds and aldehydes emitted from building materials are in accordance with Eco-friendly building materials Group standard certification and are shown in Annex C.

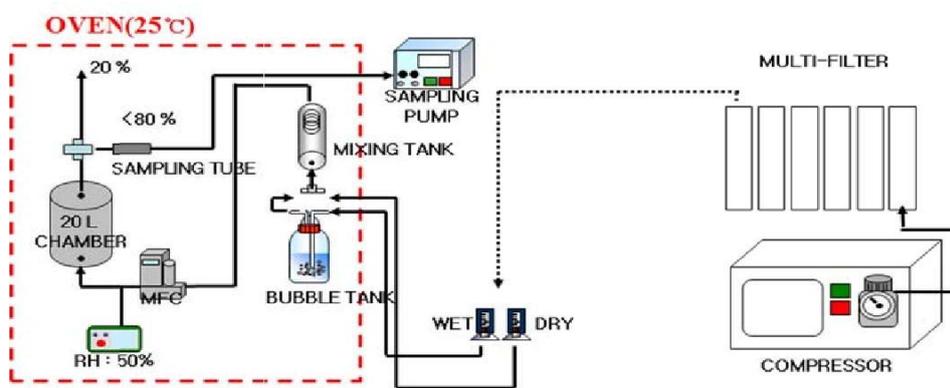
## 7 Test Methods

Test methods for measuring emissions of volatile organic compounds and aldehydes emitted from building materials are in accordance with ES 02131.1 volatile organic compounds and formaldehyde test methods - small chamber methods.

### 7.1 Test equipment

#### 7.1.1 Principle

The test principle of the small chamber is shown in Fig.1



**Figure 1 - Test principle composition diagram of small chamber**

#### 7.1.2 Equipment

Equipment designed to measure the unit area emissions of volatile organic compounds and aldehydes emitted from architectural linings is in accordance with ES 02131.1 3.0 Analytical instruments and appliances.



Small chamber



Small chamber interior



Small chamber fixture

**Figure 2 - Small chamber example**

The equipment required to conduct the emission test is as follows.

- a) Clean air supply (e.g. compressed air in compressed air or synthetic air in a gas cylinder)
- b) Small chamber systems
- c) Humidification system
- d) Air humidity, temperature and air velocity monitoring system
- e) Air flow meter
- f) Cleaner for small chamber walls or heat absorbing devices
- g) Air mixing measurement device
- h) Recovery rate test facility
- I) Oven

### **7.1.3 Emission chamber blank concentration measurement**

Emission chamber background concentration measurements are based on ES 02131.1 5.1 emission chamber blank concentration measurements

## **7.2 Manufacture of test specimens**

### **7.2.1 Solid Building Materials**

The production of specimens of solid building materials is basically according to ES 02131.1 5.3.1 Solid building materials

The solid building materials are divided into a roll form and a plate form and prepare test specimens 165 mm long and 165 mm long. The sample loading rate shall be  $2.0 \text{ m}^2 / \text{m}^3 \pm 0.2 \text{ m}^2 / \text{m}^3$ .

#### **7.2.1.1 Products in roll form**

Samples of roll-type products are to be in accordance with the samples of ES 02131.1.1 5.3.1.3. roll form products.

#### **7.2.1.2 Products in plate form**

Samples of plate form products are to be in accordance with the samples of ES 02131.1 5.3.1.2 plate form products.

### **7.2.2 Liquid building materials**

Test specimens of liquid building materials are basically according to ES 02131.1 5.3.2

Liquid building materials are divided into paint, adhesive, sealant, and putty. The sample loading rate shall be  $0.4 \text{ m}^2 / \text{m}^3 \pm 0.04 \text{ m}^2 / \text{m}^3$ . However, the sample loading rate of  $0.4 \text{ m}^2 / \text{m}^3 \pm 0.04 \text{ m}^2 / \text{m}^3$  is not applied to the sealant.

#### **7.2.2.1 Paint**

The preparation of paint specimens is in accordance with ES 02131.1 5.3.2.1 paint.

#### **7.2.2.2 Adhesive**

The preparation of the test specimen of the adhesive is in accordance with ES 02131.1 5.3.2.2 Adhesive.

#### **7.2.2.3 Sealant**

The preparation of the sealant specimens shall be in accordance with ES 02131.1 5.3.2.3 sealant.

#### **7.2.2.4 Putty**

The preparation of specimens of putty shall be in accordance with 5.3.2.4 putty of ES 02131.1.

### **7.3 Position of specimen in small chamber**

The location of the test specimens in the small chamber depends on the location of the specimens in the ES 02131.1 5.4 Small emission test chamber.

### **7.4 Sampling of air samples**

The collection of air samples is carried out by the sampling of ES 02131.1 5.5 air samples.

### **7.5 Emission test period**

The duration of the emission test is in accordance with the duration of the ES 02131.1 5.6 emission test.

### **7.6 Test conditions and verification**

Test conditions and verification are in accordance with ES 02131.1 6.0 degree of guarantee / quality control.

### **7.7 Analysis method**

The analytical method is in accordance with the analytical procedure of ES 02131.1 7.0.

#### **7.7.1 Analysis of volatile organic compounds**

The method for analyzing volatile organic compounds is according to ES 02131.1 7.1 VOC analysis.

#### **7.7.2 Analysis of aldehydes**

Aldehydes analytical methods are according to ES 02131.1 7.2 formaldehyde analysis.

## **8 Result Report**

The result report shall be in accordance with the results report of ES 02131.1 8.0.

## **8.1 How to calculate the emission and express the results**

The calculation of emissions and the presentation of results shall be in accordance with ES 02131.1 8.1 Calculation of emissions and the presentation of results.

## **8.2 Test report**

The test report should include the following information and an example of the report is given in Annex A.

NOTE The test report form of the testing laboratory may be used.

### **8.2.1 Testing organization**

Record the name and location of the test laboratory, the person in charge of the test, and the person in charge.

### **8.2.2 Types of products**

History and status of test products, such as product type, product name, request basis, receipt number, sampling location, sampling date and time, sampling method,

(Date of manufacture, batch number, date of arrival of test institution, date of unpacking, date of preparation of test specimen)

### **8.2.3 Result**

Record the total volatile organic compounds, 5 VOC, toluene and aldehyde emission intensity at sampling time.

10 of the detected VOCs with a large response of the peaks are reported as qualitative, quantified with individual substances or expressed as equivalent concentrations of toluene.

The major peaks that appeared when analyzing the background samples are also indicated and reported as toluene equivalents. Emissions of volatile organic compounds and aldehydes are indicated by the third decimal place.

### **8.2.4 Attachment of analysis data**

Attach the necessary materials to secure the objectivity of the test that the chromatogram of the n-C6 and n-C16 retention time, blank concentration, travel blank concentration, chromatogram of the emission concentration of the sample, peak area data, MS spectra of 10 peaks with large response, Library identification data, calibration curve

Additional QC data (control chart) and the toluene calibration curve should be attached.

### **8.2.5 Test condition**

Record the conditions of the test chamber (temperature, relative humidity, number of ventilation, air flow rate), area of specimen and sample loading rate.

Record information about the air sampling of the target VOCs and aldehydes (such as used sampling pipe, air sampling, elapsed time and number of times from entering the emission test chamber to the start of air sampling).

### **8.2.6 Analysis equipment**

Record information about the instruments and methods used (eg, emission test chambers, fixation methods, fixtures, air purifiers, temperature and humidity measuring instruments, integrated flow meters, ovens, air sampling instruments, analytical instruments, etc.).

### **8.2.7 Additional records**

In the case of liquid building materials, the following shall also be added.

- a) the number of test specimens, mass per m<sup>2</sup>, thickness, and other conditions that may affect the results of the test, such as drying conditions, time lapse, storage, moisture content,
- b) Type of adhesive used (raw and non-volatile)
- c) Record the amount of liquid building material, application method, application and surface area, and time until adhesion.
- d) Record the type of base material, specimen characteristics, MSDS data, and specifics when making specimens.
- e) Fill in the date of sampling and analysis.

### **8.3 Marking requirements**

Marking requirements of healthy building material that meet emission standards of volatile organic compounds and aldehydes emitted from building materials are as follows.

- a) Product name and model and specification
- b) Manufacturer name, address, phone number
- c) Date of manufacture and warranty period
- d) Instructions for use and precautions
- e) Certification level and certification number

Annex A  
(Reference)

Test Report

시험 기관명

시험기관의 소재지  
연락처

시험 성적서

발급번호 :  
의뢰자 :  
주소 :  
접수번호 :  
시험일자 :  
업체명 :  
제품명 :  
분류 :  
시료치수 :  
시험방법 :  
용도 : 친환경 건축자재 단체표준인증용  
불함 : 시험조건 1부

시험 결과

시험항목	시험결과	단위	시험방법
총휘발성유기화합물(TVOC)		mg/m <sup>3</sup> .h	
SVOC / Toluene	/		
포름알데하이드(HCHO)			
아세트알데하이드(CH <sub>3</sub> CHO)			

시험 담당자

시험 책임자

년 월 일

시험 기관명 (직인)

본 시험성적서는 용도이외에 사용을 금하며, 시험 기관의 승인 없이 무단복사를 금함.

**Annex B**  
**(Reference)**

**Reference standard**

KS F 3111, natural patterned flooring

KS F 3126, Wooden parquet flooring

KS M 3802, PVC (vinyl) flooring material

KS F 4760, double floors

KS M 7305, wallpaper

KS F 3101, ordinary plywood

KS F 3107, natural patterned plywood

KS F 3104, Particleboard

KS F 3504, gypsum board products

KS F 3200, Fiberboard

KS F 3103, Flooring board

KS F 4740, thermosetting resin ceiling board

KS L 5509, gypsum cement board

KS L 9105, Mineral Wool Soundproofing Ceiling Plate

KS D 7081, Colored metal ceiling for architectural use

KS F 5660, Polyester Sound Absorption Insulation

KS F 4739, silica artificial marble plate

KS I 3104, recycled glass wool insulation

KS L 9102, artificial mineral fiber insulation

KS L 9106, mineral wool insulation

KS M 3808, foamed polystyrene (PS) insulation

KS M 3809, rigid polyurethane foam insulation

KS M 3862, foamed polyethylene insulation

KS M 6962, rubber foamed insulation

KS F 4910, Building sealant

KS F 3213, adhesive for wall board

KS F 3214, ceiling board adhesive

KS F 3217, starch adhesive for wallpaper

KS F 3218, adhesive for vinyl flooring

KS F 3219, adhesive for plastic foam boards

KS L 1593, adhesive for ceramic tile

KS M 3700, Vinyl Acetate Emulsion Wood Adhesive

KS M 3701, Urea Resin Wood Adhesive

KS M 6010, water-based paint

KS M 6020, oil paint

KS M 6030, Anti-rust paint

KS M 6070, powder coating

KS M 6090, colorful paint

KS I ISO16000-3, indoor air - Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air - Active sampling method

KS I ISO16000-6, Indoor air - Part 6: Active sample sampling with adsorbent (Tenax TA), thermal desorption and MS

Measurement of volatile organic compounds in indoor and test chamber air by gas chromatography using MS-FID

KS I ISO16000-9, indoor air - Part 9: Measurement of emission of volatile organic compounds - Emission test chamber method

KS I ISO16000-11, Indoor air - Part 11: Measurement of emission of volatile organic compounds - Sampling, storage and preparation of test specimens

**Annex C**  
**(Reference)**

**Healthy building materials collective standards certificate evaluation Criteria**

In Healthy building materials collective standards certificate evaluation Criteria , the certification criteria according to the product test results are shown in Table 1, and the latest certification standards apply.

**Table 1 - Certification Criteria Based on Product Test Results**

Unit : mg/m<sup>2</sup>·h

Item		Flooring, wallpaper, panel, paint, putty	Adhesive	sealant (단위 : mg/m.h)
Very best	TVOC	less than 0.100	less than 0.100	less than 0.050
	5VOC	less than 0.030	less than 0.030	less than 0.020
	HCHO	less than 0.008	less than 0.008	less than 0.002
	CH <sub>3</sub> CHO	less than 0.008	less than 0.008	less than 0.002
Great	TVOC	0.100 or more and less than 0.200	0.100 or more and less than 0.300	0.050 or more and less than 0.200
	5VOC	less than 0.060	less than 0.090	less than 0.060
	HCHO	0.008 or more and less than 0.015	0.008 or more and less than 0.015	0.002 or more and less than 0.005
	CH <sub>3</sub> CHO	0.008 or more and less than 0.015	0.008 or more and less than 0.015	0.002 or more and less than 0.005
Good	TVOC	0.200 or more and less than 0.400	0.300 or more and less than 0.600	0.200 or more and less than 1.500
	5VOC	less than 0.120	less than 0.180	less than 0.450
	HCHO	0.015 or more and less than 0.020	0.015 or more and less than 0.020	0.005 or more and less than 0.010
	CH <sub>3</sub> CHO	0.015 or more and less than 0.020	0.015 or more and less than 0.020	0.005 or more and less than 0.010

NOTE Toluene in 5 VOC should be less than 0.080 mg / m<sup>2</sup> h.

# SPS-KACA0020-7174

## Commentary

This commentary explains the requirements and related contents of this standard and is not part of the standard

### 1 Enactment

#### 1.1 Purpose of Enactment

As the quality of life has improved, interest in comfortable and healthy indoor living space has been increased. Domestic and overseas standard setting of indoor environment has been suggested, and indoor pollution has become a serious social problem. In addition to the need for energy conservation, new pollutants are being emitted from new construction materials created by various industrial technologies, and a large amount of pollutants are being detected in various household goods, causing damage to weak children, elderly people and pregnant women. And the number of people suffering from various allergic diseases is increasing, which is a serious problem.

In the meantime, the awareness of the emission of pollutants to building materials has been insufficient, and due to the indifference of related industries, development of new toxic and pollution-free building materials has been in a sluggish state. The creation of a pleasant and healthy indoor environment and the establishment of the technology for the development of low-pollution building materials and the effective control of pollutants had to be established. It is very urgent to establish a performance evaluation technique for pollutants of building materials and to measure and evaluate the emission characteristics of pollutants. This can lead to the development of new materials in the field of building materials, to promote the development of low pollution emission building materials, and to secure the international competitiveness of domestic construction materials.

The indoor air quality management law of the multi-use facilities in Korea limits the use of pollution-emission building materials, Article 11 (Limitation on the Use of Pollutant Emission Building Materials) of the Indoor Air Quality Control Act revised on December 22, 2015 requires construction materials that have been checked for pollutant emission to be supplied to multiple use facilities or apartment houses. Table 1 shows the contents.

**Table 1 - Law on indoor air quality management**

Article 11 (Limitation on the Use of Pollutant Emission Building Materials)

① A person who establishes(Including the number and repair of existing facilities or housing, the same shall apply in this Article) a multi-use facility or a apartment houses(except for health-friendly housing pursuant to Article 2 Clause 2 of the "Law on Housing", the same shall apply in this Article) shall consult with the head of the relevant central administrative agency. Construction materials that emit pollutants in excess of the criteria set out in Ordinance of Ministry of Environment shall not be used.

1. Adhesive 2. Paint 3. Sealant 4. Putty 5. Wallpaper 6. Flooring 7. Other building materials used in the interior of the building, such as wood products, etc. (as specified by Ordinance of Ministry of Environment

(2) A person who manufactures or imports the building materials referred to in paragraph (1) shall be verified by a testing institute that establishes by the Ordinance of the Ministry of Environment whether the building material exceeds the criteria set forth in paragraph 1 and releases pollutants.

Thereafter, it shall be supplied to the person who installs the multi-use facility or apartment houses.

However, in the case of confirmation under this law or other laws and regulations and in the case of presidential decree, construction materials may be supplied without confirmation under this article.

③ ~ ⑥ omitted

The pollutant emission standards in Article 11 (1) of the Indoor Air Quality Control Act are included in the standards of pollutants emitted from building materials(Enforcement Rule of Indoor Air Quality Control Act for Multi-use Facilities [star mark 5]), the criteria are shown in Table 2.

**Table 2 - Pollutants emitted from building materials**

Item	Type of Pollutant	Formaldehyde		toluene	Total volatile organic compounds
		Until 2016	From 2017		
	Adhesive	0.05	0.02	0.08	2.0
	Paint				2.5
	Sealant				1.5
	Putty				20.0
	Wallpaper				4.0
	Flooring				4.0

NOTE In the above table, the unit for each type of pollutant is  $\text{mg} / \text{m}^3 \cdot \text{h}$ . However, the unit of pollutant for sealant is  $\text{mg} / \text{m} \cdot \text{h}$ .

In the case of foreign countries, Scandinavian countries including Sweden, Finland, Norway and Denmark, as well as the European Community (EC), have decided to classify indoor and indoor finishing materials in consideration of pollutant emission characteristics of building materials, It is utilized as a design guideline that can be maintained comfortably. With this tendency, emission characteristics of pollutants to building materials will be highlighted as a very important issue in the future, and the spread of low pollution emission building materials will be expanded and utilized as a standard for selection of building materials in the design and construction of buildings have. These regulations generally evaluate the environmental performance of building materials and various products by introducing various types of certification systems by voluntary participation in each country. It also provides materials needed by architects, builders, architects, and building materials producers.

## 1.2 Background of enactment

In order to promote research on pollutant emission from building materials, the Korea Air Cleaning Association organized "indoor VOC research society" composed of industry, academia and research institute in 2000 and held 10 research meetings. This research group has discussed the status and direction of indoor air quality and felt the necessity to certify eco-friendly building materials. Since 2001, "Indoor VOC Study Group" has been established as "Healthy Building Material Certification Committee". From Oct. 2001 to the end of 2003, 15 committees, 5 expert advisory meetings, stakeholder hearings, etc. were held. Through the survey of relevant domestic and international materials, visits to overseas related organizations, And rating standards were drafted. On August 30, 2002, "SPS-KACA008-0138 Healthy Building Material Test Method" was enacted and from

2004, "Healthy Building Material Standard Certification" was implemented.

At the gathering meeting of group standard certification comprehensive maintenance plan opinion, as a test method standard, we have been informed of the maintenance plan to revise and operate the group standard certification as the product standard, and the test method standard was set as the "Healthy building material" product standard. The major differences from the test method standard are the addition of the product type, the performance item and the performance criterion according to the product standard. Table 3 compares table of contents of the standard.

**Table 3 - Test Method Standard and Product Standard Contents Comparison**

SPS-KACA008-0138 Healthy Building Material Test Method (Test Standard)	SPS-KACA0020-7174 Healthy Building Material (Product Standard)
1. Scope	1. Scope
2. Normative references	2. Normative references
3. Definitions, abbreviations, symbols, units	3. Definition of Terms
4. Principle	4. Category
5. Equipment	4.1 Solid building materials
6. Test conditions	4.2 Liquid building materials
7. Verification of Test Conditions	5. Sampling and transporting and storing samples
8. Sampling of products and transportation and preservation of samples	6. Performance standard
9. Preparation of emission test chambers	6.1 List
10. Preparation of Test Specimens	6.2 Standard
11. Test method	7. Test Methods
12. Analysis method	8. Report results
13. Calculation of emission intensity and expression of results	9. Annexes A, B, C
14. Test Report	10. Commentary

### 1.3. Main contents of enactment

#### 1.3.1 Scope

We have developed a range of applications to use environmentally friendly building materials to ensure pleasant indoor air quality with solid building materials that can be used in buildings, and applicable liquid building materials (Sealant, adhesive, paint, putty)

#### 1.3.2 Definition of Terms

The definition of the terms applies the definitions of the terms given in the standards KS M 1998 and ES 02131.1 for the purpose of testing the emission of volatile organic compounds and aldehydes in building materials. The definition of terms used in other standards was made by referring to KS I ISO16000-3, Korean dictionary and so on.

The abbreviation of ES is Environment Standard, which is an environmental standard according to the "Law on Environmental Testing, Inspection, etc."

#### 1.3.3 Category

The classification system of solid building materials (Flooring, wallpaper, panel) and liquid building materials (Sealant, adhesive, paint, putty) is made using related reference standards such as Table 4, and reference standards are given in Annex B.

**Table 4 - Reference standards by classification**

Material	Classification	Reference standards
solid building materials	Flooring	KS F 3111, KS F 3126, KS M 3802, KS F 4760
	wallpaper	KS M 7305
	panel	KS F 3101, KS F 3107, KS F 3104, KS F 3504, KS F 3200
liquid building materials	Sealant	KS F 4910
	adhesive	KS F 3213, KS F 3214, KS F 3217, KS F 3218, KS F 3219
	paint	KS M 6010, KS M 6020, KS M 6030, KS M 6070
	putty	KS M 6010

#### **1.3.4 Sampling and transporting and storing samples**

Sampling and transport and storage of samples are made in accordance with the method of sampling of ES 02131.1 5.2 product samples and the transport and storage of samples

#### **1.3.5 Performance standard**

The pollutant emission performance standard was set as the first performance criterion through the study of "Research on the Selection of Pollutant Emission Building Materials / Ministry of Environment ". In 2003, Korea Air Cleaning Association and Kyungwon University participated as a research institute.

Since then, the standard has been strengthened through Amendment and research of pollutant standards released from building materials of indoor air quality control law of Ministry of Environment to present the present performance standard.

#### **1.3.6 Test Methods**

According to the test method, "Appraisal method of indoor air pollutant emission is unreasonable" in the auditing report of the Board of Audit and Inspection (Quality Control of Construction Material). There are four methods for evaluating indoor air pollutant emission, such as KS M 1998, KS I ISO 16000-9, and Healthy building materials test method standard. If the test method is different, the test result may be different. Therefore, according to the 「Environmental Sector Testing and Inspection Law」, the Ministry of the Environment has unified the test method for the indoor air quality process test to ensure the uniformity and accuracy of the test results. The standard test method is to comply with the Ministry of Environment's "Indoor

Air Quality Process Test Standard (ES 02131.1) Building Material emission Volatile Organic Compounds and Formaldehyde Test Methods".

This test method is a test method for evaluating unit emissions of volatile organic compounds and formaldehyde emitted from building materials using a small emission test chamber under constant temperature, relative humidity, and number of times of ventilation among building materials. The application range is used as the primary test method for measuring the concentration of pollutants emitted from solid and liquid building materials used indoors. This standard also distinguishes between solid building materials and liquid building materials to suit the test method

### **1.3.7 Report results**

The results report is in accordance with the ES 02131.1 8.0 results report and includes additional records.