

Collective Quality Certification System for Functional Building Materials

(FUNCTIONAL BUILDING MATERIALS)



1. Overview

■ Background



Functional construction materials have been widely developed and use to reduce indoor air pollutants. However, consumers face more confusion in selecting products without objective test methods and standards. To this end, the association establishes precise evaluation methods of functional construction materials which may reduce indoor air pollutants and implements the collective certification system to gain confidence from customers.

By implementing the collective certification system for “functional construction materials”, the association expects to provide certified performance data and lead sound competition among products for product and technical development for upgrade.

■ Purpose

The purpose of the system is to evaluate adsorption, moisture absorption and prevention on local and foreign functional construction materials, recommend autonomous quality management by certifying products based on grades and contribute to product quality upgrade.

■ Applied sector

The system applies to general materials (plate, panel and board, floor materials and roll-type products like wallpapers) used as indoor finishing out of interior materials. However, catalysts for decomposition under UV or infrared light and liquid materials are exempted.

- ① Products produced by local construction material companies and imported construction materials
- ② Products under ① and distributed in the market or delivered to the sites (except prototypes and products under development)
- ③ Certification test may be performed in case that the head of the association admits on items other than defined in ① and ②.
- ④ However, raw and subsidiary materials for producing indoor finishing materials are exempted from the certification.

■ What is a functional building material (adsorption, moisture absorption and prevention)?

A construction material with positive functions including improving indoor air quality, as well as its unique functions

- Adsorption : Purify indoor air by adhere pollutants to surface blowholes and decomposing them
- Moisture Absorption and Prevention : Keep indoor humidity constant by absorbing and emitting moisture for low and high humidity, respectively

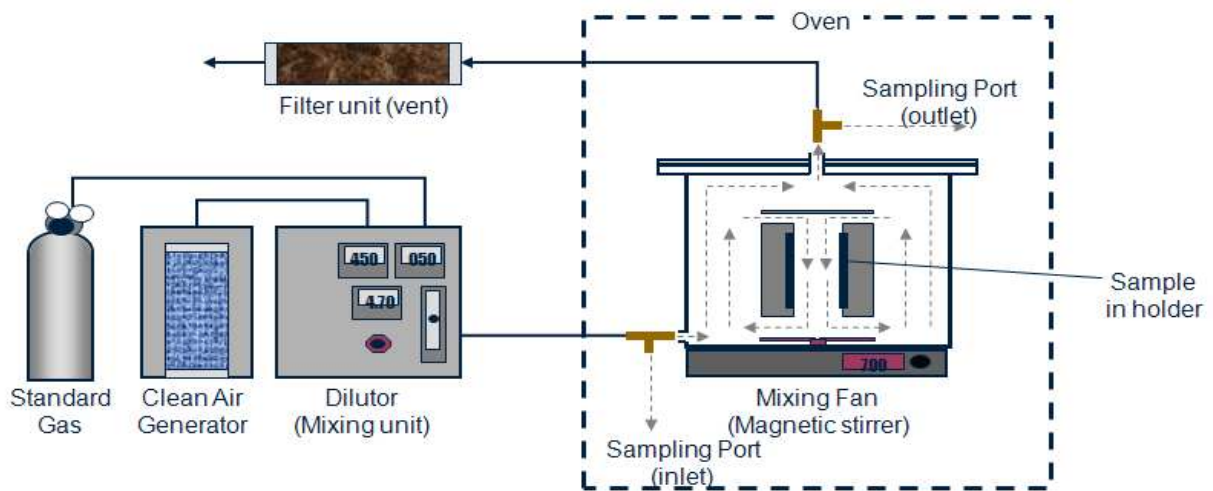
■ Certification Procedure

Certification Procedure	Contents
Application reception	→ Complete application after review based on regulations
Taking factory samples	→ Certificate inspector in the KS certification agency visits the factory, randomly takes samples after factory inspection and seal the samples
Test request to consigned certification test agency	→ Request sealed sample test to KOLAS and submit test report to the association after the test completed
Hold review committee	→ The review committee with independent experts (10) reviews and evaluates the test report
Send Test Report	→ The committee sends test reports for approved products with the attachment that the test is done by KOLAS
Agreement on Certification Use	→ The association and the approved company sign an agreement on certification use to guide the company to use the mark well.
Issue Certificate	→ Issue the certificate and mark for the grade and list the company name on the association's website
Post-management of certified products	→ Perform regular post-management on distributed products after certification

2. Test Method and Certificate Grade Standards

■ Test Method

- Adsorption test : Adsorption performance test method for functional construction materials (SPS-KACA 0020-1867)



<Adsorption Chamber System>

1) Introduction

The test on evaluating adsorption performance of a construction material is done by calculating air concentration in the adsorption test chamber, air flow and surface area of specimen from supplying the test material and evaluating accumulated adsorption amount and adsorption rate.

2) Test Method

Test Condition

- Temperature and relative humidity

Maintain the temperature and the relative humidity (25°C, 50%) inside the adsorption test chamber. The test chamber shall be controlled within the range below.

Temperature: (25±1°C), Relative humidity: (50 ± 3) %

- Supplied air and background concentration

The background concentration of the air supplied into the chamber before supplying the standard gas shall be as low as possible not to affect the whole test process. However, it is a rule to set up the background concentration of TVOCs less than $20\mu\text{g}/\text{m}^3$, $2\mu\text{g}/\text{m}^3$ for a single VOC and $5\mu\text{g}/\text{m}^3$ for formaldehyde. In addition, the water for humidification shall not contain VOCs and aldehydes which may affect the concentration.

- Mass transfer rate and air flow speed

The air flow speed on the sample shall be between 0.1 and 0.3m/s. The speed shall be controlled by the agitator at $0.25\pm 0.05\text{m/s}$ to secure proper mass transfer rate for the test.

- Area specific ventilation rate and air exchange rate

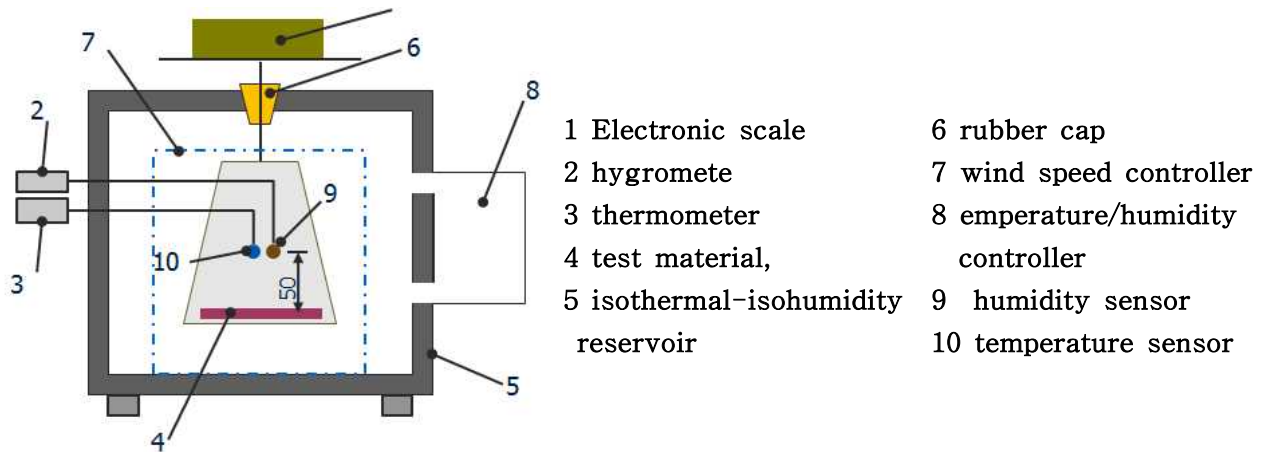
The adsorption test chamber concentration is a parameter which configure adsorption test conditions and depends on selected area specific ventilation rate in the steady state.

The air exchange rate may be controlled to $(0.5\pm 0.015)\text{ h}^{-1}$.

- Test chamber and air sampling

Check the accumulated air flow and leakage in the test chamber and take samples after 1, 3, 5 and 7 days. Here, take the air on the outlet of the chamber and then take the air supplied to the chamber. Stop supplying the standard gas when the adsorption test is completed, supply clean air, take samples one day later and release it.

- Moisture Absorption and Protection Test : Moisture absorption and protection test method for construction materials - Humidity response (KS F 2611)



<Moisture Absorption and Prevention Chamber System>

1) Introduction

- Block moisture on surfaces except the sample surface to measure moisture absorption and protection features of a construction material and evaluate absorption and protection amounts by changing humidity conditions in the thermostat
- Use wind speed regulator to reach a defined level while measuring surface moisture transfer resistances for each sample, cure the sample inside the thermostat to have its constant weight and calculate results through moisture absorption and protection processes

2) Test Method

Test Condition

The ambient temperature for curing and testing the samples is $23 \pm 0.5^\circ\text{C}$. The ambient relative humidity shall be within $\pm 1\%$ of the relative humidity for the test.

Moisture Absorption and Protection Tests for 1 Cycle

- Curing sample

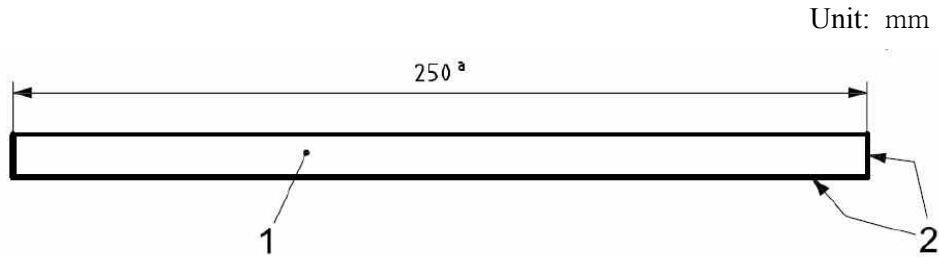
The sample shall be cured until the weight reaches the constant weight (m_0) against the relative humidity.

The constant weight of the sample is when the mass change for 24 hours is less than

0.01g.

- Moisture block on the sample

All the surfaces of the sample except moisture absorption and protection surface shall be treated to block the moisture. The blocked surfaces are treated with aluminum tape and others.



1. Sample

2. Block moisture (aluminum tape and others)

a Lengths of moisture absorption and protection surfaces

<Moisture block on the sample>

□ Test Procedure

The test consists of moisture absorption (1st stage) and desorption (2nd stage) and the desorption follows the absorption. The relative humidity of the protection stage shall be lower than that of the absorption.

Relative humidity for each stage consists of low, mid and high areas.

Quickly install the cured sample into the tester and keep it under the relative humidity in the 1st stage for 12 hours. Then, change the humidity to the value of the 2nd stage and keep it for 12 hours.

Mass changes in the sample shall be continuously measured for 24 hours from 0g in the beginning of the 1st stage.

Set the interval for 10 minutes and measure the mass with 0.01g scale.

Humidity Condition	Relative humidity (%)		
	Cure	Moisture absorption	Moisture desorption
		Moisture absorption	Moisture desorption
Low humidity area	30	55	30
Mid humidity area	50	75	50
High humidity area	70	95	70

<Relative Humidity in the Moisture Absorption and Protection Test>

■ Standard for Certificate Grade

- Adsorption (28 days)

Spe	Adsorption Rate (%)		Accumulated adsorption ($\mu\text{g}/\text{m}^3$)	Re-emission ($\mu\text{g}/\text{m}^3 \cdot \text{h}$)
	7 days	28 days		
Most excellent	More than 85	More than 62	More than 22,000	HCHO : 15
Excellent		More than 52	More than 21,000	
Good		More than 42	More than 20,000	

- Adsorption test : Adsorption performance test method for functional construction materials (SPS-KACA 0020-1867)
- Material: HCHO
- Adsorption Rate (%): Ratio between the adsorption concentration for 7 , 8 days and supplied concentration
- Supplied air concentration: HCHO : 210 $\mu\text{g}/\text{m}^3$
However, the supplied air concentration vary depending on test purpose and note it in the test report.
- The deviation of the supplied air concentration shall be within $\pm 10\%$.
- Re-emission concentration ($\mu\text{g}/\text{m}^3 \cdot \text{h}$): Concentration of re-emitted pollutant on the 1st day after adsorption evaluation

- Moisture Absorption and Protection Standard:

Spec	Moisture Absorption and Prevention Amount (g/m^3)
Most excellent	More than 85
Excellent	More than 70
Good	More than 60

- Moisture Absorption and Protection Test : Moisture absorption and protection test method for construction materials - Humidity response (KS F 2611)
- Moisture Absorption and Prevention Amount (g/m^3): It means the average values of moisture absorption and protection.
However, the difference between the two shall be within 25% from the average.

3. List of Review Board Members

No	Organization	Name	Title	Department	TEL/FAX
1	Kyungwon University (chairperson)	Dongwon Yoon	Professor	Construction Facility Dept.	031-750-5460
					031-750-5314
2	Seoul Research Institute of Health and Environment	Joongsup Yoon	Environment Researcher	Air Measurement Team	570-3370
					570-3267
3	Korea Testing & Research Institute	Woonki Lee	HQ manager	Customer Service Dept.	2164-0020
					2164-1008
4	LH Corporation	Wanje Cho	Deputy Director	Urban Housing Researcher	031-738-3705
					031-738-3711
5	Chosun University	Janghoo Seo	Professor	Architecture Dept	062-230-7022
					062-230-7155
6	Soongsil University	Soomin Kim	Professor	Architecture Dept	820-0665
					816-3354
7	Dankuk University	Sunghwan Kim	Professor	Microbiology Dept	041-550-3454
					-
8	Hyundai Development Company	Moonyoung Jeong	Director	Technology Research Institute	031-766-8593
					031-766-8598
9	Seoil College	Yongkyu Baek	Professor	Architecture Dept.	490-7529
					490-7242

4. Certification Test Agency

■ Certification Test Agency

No.	Name	Region	Region
1	Korea Conformity Laboratories	Gunpo	Adsorption, absorption, protection
2	Korea Institute of Construction Technology	Ilisan	Adsorption, absorption, protection



It is designated and operated as a test agency certified by KOLAS in the Korean Agency for Technology and Standards

■ Management Program for Certificate Test Agencies

Proficiency tests on tasks are performed more than once a year to proof that a designated agency is capable of performing its tasks as a certificate test agency in accordance with the Article 6 (Securing proficiency of certificate test agency) of the management rule on the agency for functional building materials and agencies which pass the test extend the designation.

External management: (among certificate agencies)

- Perform the RRT once a year
- Site inspection once a year (on QA management)

Internal management: (each certificate agencies)

- Write the SOP
- Sampling QA (sampling, delivery, storage)
- Sample analysis QA
 - Standard material
 - Manage instrument performance (linearity, stability)
 - Manage measurement sensitivity (sensitivity, detection limit)
- Manage measurement blank
- Data management and evaluation
- QA management report

5. Certificate Mark



Adsorption construction material



Moisture absorption and damp-proof construction



adsorption · moisture and damp-proof construction material

< FUNCTIONAL BUILDING MATERIALS >