Standard of emission rate of volatile organic compounds from building products

Established by April 1st, 2008
Committee for standardization of emission rate of VOC from building products
（Secretariat: Japan Testing Center for Construction Materials）

Member of the committee

(July 6, 2007)

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Introduction

The document was defined on a basic matter for an evaluation or a judgment of emission rate of VOC from building products under common recognitions of the person concerned with manufactures and purchases, such as a manufacturer of building product, constructor, owner of a construction, designer, resident, and specifications maker, because JIS A1901 “small chamber method” was published.

It was established as a standard of “the Committee of standardization for emission rate of VOC from building products”.

1. Scope

1-1. Target of building products

Target of building products in this document is as follows. These are normally used in a living room.

1) Building boards, wallpaper, and floor materials as specified in JIS A1902-1
2) Adhesives as specified in JIS A1902-2
3) Paints and coating materials as specified in JIS A1902-3
4) Heat-insulating material boards as specified in JIS A1902-4
5) Others. That is a product using target VOC and it is able to estimate rationally within the document.

1-2. References and terms

The document is referred to the following standards in principle.

JIS A1901:2003	Small chamber method - Determination of the emission of volatile organic compounds and aldehydes for building products
JIS A1902-1:2006	Determination of the emission of volatile organic compounds and aldehydes for building products - Sampling, preparation of test specimens and testing condition - Part 1:Boards,wallpaper and floor materials
JIS A1902-2:2006	Determination of the emission of volatile organic compounds and aldehydes for building products - Sampling, preparation of test specimens and testing condition - Part 2:Adhesives
JIS A1902-3:2006	Determination of the emission of volatile organic compounds and aldehydes for building products - Sampling, preparation of test specimens and testing condition - Part 3: Paints and coating materials
JIS A1902-4:2006	Determination of the emission of volatile organic compounds and aldehydes for building products - Sampling, preparation of test specimens and testing condition – Part 4: Heat-Insulating material boards

2. Standard value for emission rate of VOC from building product

The emission rate of target VOC from building products is provided, which is shown in Table 1. The test result after 7days shall be lower than that value which measured by the measurement method mentioned in clause 3. It could be judged by a measured result before the 7th day if it

possible.

Table 1 Target VOC and the standard value

Target VOC	Symbol	Standard value of emission rate
Toluene	T	38μg/m^2h
Xylene	X	120μg/m^2h
Ethylbenzene	E	550μg/m^2h
Styrene	S	32μg/m^2h

Note: Loading factor 3.4m^2/m^3 was used in the calculation of the standard value of emission rate. It was assumed a real residential condition. The detail is in the description.

3. Measurement method

3-1. General

Measurement shall be carried out based on JIS A1901. The test specimen is prepared in order to fulfill the requirements of 3-2.

3-2. Selection and preparation of test specimen

The test specimen sampling from target product shall be selected based on JIS of each building product in principle. Follow the procedures for the test specimen preparation as specified in JIS A1902-1, JIS A1902-2, JIS A1902-3, and JIS A1902-4.

3-3. Test condition

The test condition shall be based on the standard as specified in 3-1. It shall be also carried out as follows.

1) The number of the test specimens: 2 per one condition

2) loading factor: 2.2 m^2/m^3 in normal
In case of adhesives, 0.4 m^2/m^3 could be used.

3) air sampling period: 1, 3, and 7 days after the start of the measurement

3-4. Test result

The test result has to be reported the contents as specified in JIS A1901, 3-2. and 3-3.

3-5. Test report

The test report has to be documented the contents as specified in 13 (Report) of JIS A1901.

Annex (Informative)

Conformity assessment and indication

When it is certificated or indicated the conformity based on this document, it should be applied to the following principle matter, in addition to being considered adjustment with the present system of each organization.

1. References

JIS Q1000:2005	Conformity Assessment - Guidelines for suppliers' declarations of conformity with product standards
JIS Q17030:2004	Conformity assessment - General requirements for third-party marks of conformity

2. Indication contents

The following contents have to be documented in principle when it indicates that it conforms to this standard.

1) organization name which warrants conforming to the standard, the grant day of the assessment, address, and phone number

2) the standard name (standard of emission rate of VOC from building products - Committee for standardization of emission rate of VOC from building products)

3) description or sign which conform to the standard

4) type of the product

5) brand name

6) manufacturer name, address, and phone number

3. Conformity assessment and classification

The conformity classification of the standard is as follows.

1) Suppliers' certification

It is certified conformity to the standard by a self-responsibility of manufacturer with test data etc.

2) Test report

It is certified conformity to the standard by a testing organization with measured sample of building products

3) Conformity assessment of owners' standard by specifications etc.

It is referred to this standard in construction specifications and design specifications, etc., and it is contributed to judgment of the acceptance and the permission of use for building products. That judgment is defined by the organization which is referred to this standard.

4) Certification or Mark

A third party warrants conformity to the standard by a specific way and a specific mark as a quality assurance of building products. That way or mark is indicated by a permission standard of certification or mark indication, which each organization have prepared, based on test data, and a quality control system, etc..

4. Requirements for assessment and indication

1) Suppliers' declaration of conformity

It is declared conformity to the standard by suppliers' self-verification based on JIS Q1000.

2) Test report

It is documented the contents as specified in 13 (Report) of JIS A1901, test report certification in each organization, and technical information such as test specimen, test condition, and test report that is required to judge by building products user.

3) Document of conformity to this document of owners' standard

It is indicated that it is satisfied with institutional requirements of a specific owner, such as a name and requirements etc. of owners' standard.

4) Certification or Mark

It is certified and indicated based on JIS Q17030 when the third party warrants conformity to this standard by mark etc.

In this case, the mark shall be contained the matter shown in 2. 1) and 2) in principle.

However, it has to be prepared to explain the conformity to this standard under the responsibility of each organization so that meanings of the mark dose not produce misunderstanding with F four star for formaldehyde.

Standard of emission rate of VOC from building products

Description

Background for establishment

After the regulation against sick house syndrome have been started under the Building Standard Law, it is required that an indoor air concentration of VOC except for formaldehyde shall be measured in many new houses such a public residence before delivered it to a resident. A field measurement for VOC concentration is also provided in the Housing Performance Indication Standards on the Housing Quality Assurance Act.

On the other hand, there was a measurement method for emission rates of VOC from building products as specified in JIS, but there was not a judgment criterion for results of product emissions. Therefore many calls on standardization about VOC emissions from building products were brought from manufacturers, constructors, designers, and residents etc.

The "Committee for standardization of emission rate of VOC from building products" was launched which consists of academic experts and industry participants. A secretariat was JTCCM. Because they have performed JIS draft creation for formaldehyde and VOC, and surveillance study such as a measurement method of VOC. When the standard was discussed in the Committee, the administration person in charge was invited as an observer and gave opinions. It was considered a consensus on various own criteria of the domestic industrial organizations, moreover the harmonization with product labelling systems of overseas.

Social character of the emission standard

This document is defined independently, opened, and released by the Committee as a common "Scale". A manufacturer, seller, user, and buyer can select and judge building products on common recognition by using the "scale". It was defined the standard value of VOC emission, and also indication method, test method, and judgment method which are a foundation to use. Related organizations can refer to this document in independence criteria.

The aim which decided this standard value is to become lower than guideline value by MHLW for indoor air concentration of target VOC under assumed condition in normal environment.

The ground of target products

Target products was the products with decided sampling, preparation of the test specimens, and test conditions as specified in JIS A1902-1, JIS A1902-2, JIS A1902-3, and JIS A1902-4 in principle. However, when those test method is applied correspondingly and it can be measured appropriately, this standard might be adopted.

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The ground of standard value

The target VOC was selected from chemical substances which can be measured based on JIS A1901, which is the target for concentration determined on public residences and the Housing Performance Indication Standards, and which is considered that may be used in building products.

The standard value was calculated by the following view. It was referred to the technical evidence of the Building Standard Law against sick house. It was considered an actual VOC emission and condition of using building products. For this reason, this standard value is one criterion under assumed conditions (28°C), and is not a guideline value which is fulfilled with the condition under high temperature.

> Assumed conditions on this document were the same as the technical evidence of the Building Standard Law against sick house.

> It was supposed that target products were used all surfaces in the room, and the surface area of the furniture was three times of the floor area. Therefore loading factor is calculated 3.4 (3.4=2.2+0.4*3) m^2/m^3.

> It was supposed that air change rate was 0.5/h, and temperature was 28°C.

Name	Guideline value*	loading factor, L	air change rate	Standard value of emission rate
	$\mu g/m^3$	m^2/m^3	1/h	$\mu g/m^2h$
Toluene	260	2.2+0.4*3=3.4	0.5	38
Xylene	870			120
Ethylbenzene	3800			550
Styrene	220			32

The value of the emission rate cut off lower than three columns of significant figure. The measurement carries out at loading factor 2.2 m^2/m^3 in order to become in safety side. When an adhesive is measured, the condition of loading factor could choose 0.4 m^2/m^3.

Guideline value*: The guideline values of indoor air concentration of chemical substances were given by Ministry of Health, Labour and Welfare.

Measurement method and preparation of test specimens

The measurement method that determined the conformity to this standard was applied to JIS A1901 that is small chamber method. The preparation of test specimens followed JIS A1902-1, JIS A1902-2, JIS A1902-3, and JIS A1902-4. However, a difference condition of the test specimen could be selected when it has a correlation with the methods on this document.

Indication method

In order to check whether it conforms to the standard, it is important to unify an indication based on a common rule. However it was difficult at present to reach an agreement of the persons concerned to indicate. Because there was similar indications, such as F four star indication for formaldehyde, and there was many information to indicate except for chemical substances. It was kept an annex with described a basic concept to the indication in this document. It is not disturbed that a related organization applies a labelling system based on the annex.

Reference of related JIS

The follow JIS was established. It will be taken in this standard immediately.

JIS A1912: 2008 Large chamber method - Determination of the emission of volatile organic compounds and carbonyl compounds except for formaldehyde for building products

Applied to furniture and fixture

Furniture and fixture cannot be measured by using a small chamber method with a product. The composition part of furniture or fixture should be measured for a judgment on the standard. If a large

chamber method will be provided in JIS, and if it will be also applied to this document, the emission performance of furniture or fixture could be judged by this document.

Utilization and reference of this document

When it will be certificated or announced VOC emission performance for building products based on this document, this standard name and the Committee name shall be indicated clearly. Also when some documents like a specification will refer to this document, they shall be shown clearly. The Committee grasps how this document is used and referred in order to correspond quickly in case of a revision of this document.