Formaldehyde emission of building boards
Test method-desiccator method

JIS A 1460 : 2021

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According to the provisions of the Industrial Standardization Law, the Japanese Industrial Standards shall be examined by the Japanese Industrial Standards Committee by the day when at least five years have passed. It will be submitted to the agenda and will be promptly confirmed, revised or abolished.

table of contents

page

Preface

This standard was revised by the Minister of Economy, Trade and Industry in Japan after deliberation by the Japanese Industrial Standards Committee based on the Industrial Standardization La It is an industrial standard. As a result, **JIS A 1460** : 2015 was amended and replaced by this standard.

Note that some of this standard may conflict with patent rights, post-publication patent applications or utility model rights.
To arouse. The Minister of Economy, Trade and Industry and the Japanese Industrial Standards Committee have decided on such patent rights, patent applications after publication, and actual case We are not responsible for confirmation of utility model rights.

Japanese Industrial Standards JIS
A 1460 : 2021

Formaldehyde emission of building boards
Test method-desiccator method

Determination of the emission of formaldehyde from building boards-
Desiccator method

1 Scope of application

This standard defines the amount of formaldehyde emitted from building boards (hereinafter referred to as boards). The test method using a tar is specified.

Annex **B** shows the old and new comparison table for technically important revisions .

2 Citation standard

The following cited standards are partly or wholly required by this standard by being cited in this standard.
Consists of. The latest versions (including supplements) of these cited standards apply.

JIS A 1902-1 Volatile organic compounds (VOC), formaldehyde and other carbonyl compounds released from building materials
Sampling, test piece preparation and test conditions for divergence measurement-Part 1: Boards, wallpaper and flooring

JIS K 0050 General rules for chemical analysis methods

Water used for **JIS K 0557** water / drainage test

JIS K 0970 Piston pipette

JIS K 8001 Reagent test method general rules

JIS K 8005 Standard material for volumetric analysis

JIS K 8027 Acetylacetone (reagent)

JIS K 8051 3-Methyl-1-butanol (reagent)

JIS K 8180 Hydrochloric acid (reagent)

JIS K 8355 acetic acid (reagent)

JIS K 8359 Ammonium acetate (reagent)

JIS K 8576 Sodium hydroxide (reagent)

JIS K 8625 Sodium carbonate (reagent)

JIS K 8637 Sodium thiosulfate pentahydrate (reagent)

JIS K 8659 Starch (Soluble) (Reagent)

JIS K 8872 Formaldehyde solution (reagent)

JIS K 8913 Potassium **iodide** (reagent)

JIS K 8920 iodine (reagent)

JIS K 8951 Sulfuric acid (reagent)

JIS R 3503 Glassware for chemical analysis

JIS R 3505 glass volume meter

JIS Z 8401 How to round numbers

Standard condition of **JIS Z 8703** test site

ISO 13130 , Laboratory glassware-Desiccators

3 Terms and definitions

The main terms and definitions used in this standard are as follows.

3.1 3.1
Formaldehyde emission
Average of two sets of formaldehyde concentrations

3.2 3.2
Formaldehyde concentration
Concentration of formaldehyde absorbed in water by emission test

3.3 3.3
Boards
Rigid plate-shaped single material or composite product used as interior material

Note **1 For** building material boards, **JIS A 5404** , **JIS A 5440** , **JIS A 5905** , **JIS A** are the material standards.
There are 5908 and **JIS A 6901** .

(Source: **JIS A 1902-1** : 2015 **3.1**)

Four Test principle

The test of the amount of formaldehyde emission from boards by the desiccator method is performed on the glass desiccator specified in Fig. **1** .
Perform using a sicator. Formaldehyde emission is the amount of water in the desiccator at a controlled temperature.
Formaldehyde, which was absorbed in water after 24 hours, was placed and a test piece of boards cut out to a predetermined surface area was installed.

Obtained from the concentration.

The principle of measuring the concentration of formaldehyde absorbed in water is that formaldehyde is ammonium ion and ace.
It reacts with tylacetone to produce diacetyldihydromorphine (DDL), which turns yellow (orange).
It is based on the Hantzsch reaction.

a) When using the desiccator specified in **JIS R 3503**

b) When using the desiccator specified in **ISO 13130**

Symbol description

1: Desiccator
2: Specimen (see Fig. **2**)
3: Stainless steel wire mesh
4: Glass crystal dish
5: Water
6: Glass plate

Figure **1** -Desiccator method device (configuration diagram)

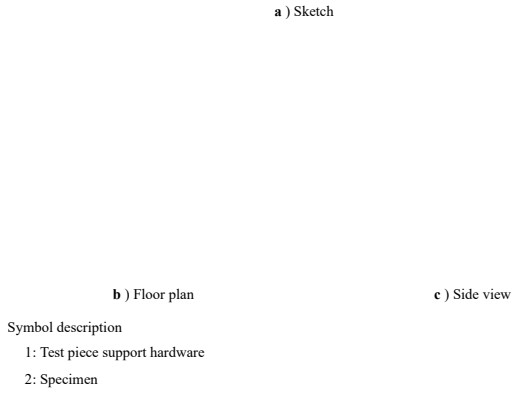

Figure **2-** Mounting of test pieces (example)

Five General conditions

5.1 Test environment

The test location shall be at a temperature of 20 ° C ± 5 ° C specified in **JIS Z 8703** .

5.2. Common conditions

The common conditions are as follows.

a) General chemical analysis General items common to chemical analysis are in accordance with **JIS K 0050** .

b) Water The water used in this standard shall be of A2 to A4 water specified in **JIS K 0557** , or of the same or higher quality.
Ion-exchanged water or distilled water.

6 Equipment and utensils

The equipment and appliances shall be as follows.

a) Temperature / humidity measuring device The thermometer shall be able to measure the air temperature with an accuracy of 0.1 ° C. In addition, the hygrometer is a phase
It shall be possible to measure with an accuracy of 5% against humidity.

b) Spectrophotometer The spectrophotometer shall be capable of measuring the absorption wavelength in the range of 410 nm to 415 nm.

It is desirable to use an absorption cell with an optical path length of 50 mm or more.

c) Constant temperature water tank The constant temperature water tank used for analysis shall be able to maintain the temperature at 65 ° C ± 2 ° C.

d) Chemical balances Chemical balances can measure masses from 100 g to 200 g and can read a difference of 0.1 mg.

And

e) Desiccator The desiccator has a ball lid and is airtight, with a nominal size of 240 mm specified in **JIS R 3503.**

(**Name** in **JIS R 3503** : Desiccator 240 mm) or Type 2 specified in **ISO 13130** (Non-

vacuum), those of series A, nominal diameter Mm 250 (**ISO 13130** nickname in: Desiccator **ISO 13130** -250-

2A).

f) Glass crystal dish The glass crystal dish that holds water has an outer diameter of 120 mm ± 5 mm, an inner diameter of 115 mm ± 1 mm, and a depth of 60 mm.

It shall be ± 2 mm.

It is desirable to have a spillage.

g) Glass plate The glass plate installed under the glass crystal dish shall be a circular one with a diameter of 120 mm ± 5 mm.

h) Full volume flask The full volume flask shall be specified in **JIS R 3505** .

i) **Full-** volume pipette **Full-** volume pipette specified in **JIS R 3505** (adjusted at 20 ° C), piston specified in **JIS K 0970**

A type pipette [1] or an automatic pipette with an accuracy equal to or higher than these.

Note [1] Also called a micropipette on the market.

j) Burette A burette specified in **JIS R 3505** or an automatic weighing device with an accuracy equal to or higher than this [2] .

NS.

Note [2] It is supplied to the market as an automatic titrator.

k) Flask with stopper The flask with stopper shall be a common ground-glass Erlenmeyer flask specified in **JIS R 3503** .

l) Specimen support hardware The test piece support hardware for fixing the test piece in the desiccator shall be made of stainless steel.

m) Stainless steel wire mesh The wire mesh on which the test piece support hardware with the test piece attached is placed in the desiccator is stainless steel.

The mesh spacing of the wire parts shall be 230 mm to 240 mm with a diameter larger than 15 mm.

n) Graduated cylinder The graduated cylinder shall be a graduated cylinder specified in **JIS R 3505** .

7 Preparation of reagents

Preparation of reagents is as follows.

The reagents specified in **a**) to **f**) and **h**) may be prepared by changing the total amount of reagents without changing the concentration of the reagents.

a) **0.05 mol / L** iodine solution Prepare the 0.05 mol / L iodine solution by any of the following. However, this solution is

Place in a light-shielded airtight container and store in a dark place.

1) Dissolve 40 g of potassium **iodide** in 25 mL of water as specified in **JIS K 8913,** and specify it in **JIS K 8920** .

After dissolving 13 g of **urine** , transfer it to a total volume flask of 1 000 mL, and use hydrochloric acid specified in **JIS K 8180** (special).

Class) After adding 3 drops, add water up to the marked line and mix.

2) **JIS K 8001** of **JA.6.4 w**) (0.05 mol / L so volumetrically for 0.05 mol / L so was prepared by iodine solution) Moto溶

Liquid [3] .

Note [3] It is supplied to the market as an iodine solution of 0.05 mol / L for volumetric analysis.

b) **0.1 mol / L** sodium thiosulfate solution Preparation of 0.1 mol / L sodium thiosulfate solution should be done by any of the following.

NS.

1) 26 g of sodium thiosulfate pentahydrate specified in **JIS K 8637** and charcoal specified in **JIS K 8625** as a preservative

Dissolve 0.2 g of sodium acid in 1 000 mL of dissolved oxygen-free water, leave it for 2 days, and then add it to **JIS K 8005** .

JIS K 8001 JA.6.4 t) **2**) (0.1 mol / L sodium thiosulfate solution) using potassium **phosphate** as **specified.**

The solution calibrated by.

As the preservative, use an appropriate amount of 3-methyl-1-butanol specified in **JIS K 8051** , or use it.
May be used in combination with sodium carbonate.

2) **JIS K 8001** of **JA.6.4 t**) **2** the capacity for analysis 0.1 was prepared by) mol / L sodium thiosulfate solution or 0.1
A volumetric sodium thiosulfate solution with a concentration higher than mol / L was prepared using a volumetric pipette and volumetric flask.
In solution accurately diluted Te, **JIS K 8005** by using a potassium iodate as specified in, **JIS K 8001** of **JA.6.4**
t) The standardization according to **2**).

3) A 0.1 mol / L sodium thiosulfate solution for volumetric analysis as a certified reference material [4]) whose concentration has been calibrated.
of.

Note [4]) As a supplier of certified reference materials, National Institute of Advanced Industrial Science and Technology, Metrology Standards General Center
National metrology institutes such as the Inter (NMIJ) and the National Institute of Standards and Technology (NIST) and certified reference materials.
There is a producer.

c) **1 mol / L** sodium hydroxide solution The preparation of 1 mol / L sodium hydroxide solution shall be as follows.

1) Dissolve 40 g of sodium hydroxide specified in **JIS K 8576** in 200 mL of water, and add this to a total volume flask of 1 000 mL.
A solution in which water was added up to the marked line and mixed.

2) **JIS K 8001** of **JA.6.4 r**) **1**) (1 mol / L aqueous capacitance analysis was prepared by 1 mol / L sodium hydroxide solution)
Sodium oxide solution.

d) Sulfuric acid (**1 mol / L**) Dissolve 56 mL of sulfuric acid specified in **JIS K 8951** in 200 mL of water, and add this to a total volume flask 1 000.
Transfer to mL, add water up to the marked line and mix.

e) Starch solution Mix 1 g of starch (soluble) specified in **JIS K 8659** with 10 mL of water and in 200 mL of hot water.
Add while stirring. A solution that has been boiled and cooled for about 1 minute.

f) Formaldehyde standard stock solution 1 mL of formaldehyde solution specified in **JIS K 8872 is** put in a full volume flask 1 000
A solution that was placed in mL, water was added up to the marked line, and the mixture was mixed.

The formaldehyde concentration of this standard stock solution is as follows.

Add 20 mL of the prepared standard formaldehyde stock solution to 100 mL of a flask with a stopper using a pipette.
Take exactly 25 mL of 0.05 mol / L iodine solution, add 10 mL of 1 mol / L sodium hydroxide solution, and shield from light.
Leave it at room temperature for 15 minutes. In addition, add 15 mL of sulfuric acid (1 mol / L) to immediately remove the liberated iodine.
Titrate with a burette in 0.1 mol / L sodium thiosulfate solution. After the solution turns pale yellow,
Add 1 mL of Pun solution as an indicator. Add starch solution to make a bluish or reddish bluish-black solution.
Titration is completed when the solution becomes colorless and transparent, and the titration of 0.1 mol / L sodium thiosulfate solution is determined. another
A blank test was performed using 20 mL of water, and the formaldehyde concentration in the formaldehyde standard stock solution was determined by the formula (1).
Calculate the degree.

$$C = 1.5 \times (V_0 - V) \times f \times (1\,000/20) \quad \cdots\cdots (1)$$

here,
C : Formaldehyde concentration in formaldehyde standard stock solution (Mg / L)
1.5: Holm equivalent to 1 mL of 0.1 mol / L sodium thiosulfate solution Aldehyde amount (mg / mL)
V_0 : Titration of 0.1 mol / L sodium thiosulfate solution in blank test (ML)
V : 0.1 mol / L sodium thiosulfate in formaldehyde standard stock solution Titration of solution (mL)

f : Factor of 0.1 mol / L sodium thiosulfate solution
20: Volume of the titrated formaldehyde standard stock solution (mL)

g) Formaldehyde standard solution The formaldehyde standard solution shall be prepared by one of the following.

1) Put the standard formaldehyde stock solution in a volumetric flask so that 1 000 mL of water contains 3 mg of formaldehyde.
A solution in which an appropriate amount was taken in 1 000 mL, water was added up to the marked line, and the mixture was mixed.

2) Holmarde, traceable to national metrology standards, provided by the Metrology Standards Supply System (JCSS)
Take 1.5 mL of Hido standard solution (HCHO for water quality test: 1 000 mg / L) as a stock solution in a 500 mL volumetric flask.
A solution in which water is added up to the marked line and mixed.

h) Acetylacetone-ammonium acetate solution 150 g of ammonium acetate specified in **JIS K 8359** in water 800
Dissolve in mL, and add 3 mL of glacial acetic acid specified in **JIS K 8355** and acetylacetone specified in **JIS K 8027.**
Add 2 mL, mix well, and add water to make 1 L. If you cannot measure immediately,
It may be stored in a cool and dark place at 0 ° C to 10 ° C for no more than 3 days after preparation. However, if stored, the test location

Return to temperature and use.

8 Test pieces

8.1 8.1 Cutting out test pieces

When cutting out the test piece, avoid the edges of the boards selected by a rational sampling inspection method.
Consider the requirements necessary for inspecting the characteristics of boards.

Regarding the cutting out of test pieces, **JIS A 1902-1** Clause **4** (sample collection, packaging and storage) and Clause **5**
(Preparation of test piece).

8.2 8.2 Dimension and number of test pieces

The dimensions and number of test pieces shall be as follows.

a) The dimensions of the test piece shall be 150 mm ± 1 mm in length and 50 mm ± 1 mm in width.

b) The number of test pieces shall be such that the total area of the front and back surfaces is closest to 1 800 cm^2 . Two sets of this
To make.

8.3 Curing

Curing is as follows.

a) The test piece becomes constant in the standard state of temperature 20 ° C ± 2 ° C and relative humidity (65 ± 5)% specified in **JIS Z 8703.**
Cure up to. This constant amount is the difference in mass between the test pieces before and after the mass measurement performed every 24 hours.
When it reaches 0.1% or less.

One week after the start of curing may be regarded as a constant dose.

b) Each test piece shall be at least 25 mm from each other so that air can freely contact the entire surface under the standard conditions specified in **a**).
Must be separated. In addition, the test piece with a small amount of formaldehyde emission is the formaldehyde of the surrounding environment.
Since it may absorb dehydration, it is necessary to pay attention to the environment during curing.

9 Test method

9.1 Preparing for the exam

Preparation for the test is as follows.

a) Prepare multiple desiccators and glass crystal dishes (usually 3 each) and glass plates as needed.
Then, wash each of them thoroughly with water and dry them before the test.

b) The desiccator was adjusted so that its internal temperature was 20 ° C ± 0.5 ° C specified in **JIS Z 8703** .
Stand still in place (see **9.3.1**).

c) Put 300 mL ± 1.5 mL of water in 3 glass crystal dishes with a measuring cylinder, and **b**) of the desiccator.
Install in the center of the bottom.

ISO 13130 when using desiccator specified in the FIG. **1 b** as), the position of the glass crystallizing dish
Place a glass plate in the center of the bottom of the desiccator so that it is raised 25 mm ± 2 mm from the bottom of the desiccator.
Install.

It should be noted that a plurality of glass plates may be stacked and raised.

d) Place the stainless steel wire mesh on the glass crystal dish in the desiccator as shown in Fig. **1** .

e) Attach the prescribed number of cured test pieces to the test piece support hardware as shown in Fig. **2** . Prepare two sets of this.

9.2 Start of emission test

The start of the emission test is as follows.

a) Place the mounted test piece on a stainless steel wire mesh in a desiccator. Prepare two sets of this.

The other desiccator is used for background formaldehyde concentration measurement, and is a test piece.
Do not wear.

b) Cover the desiccator and start the emission test.

9.3 Condition monitoring of test conditions

9.3.1 temperature

Using a desiccator without a test piece, the temperature inside the desiccator should not exceed continuous or 15 minutes.
Measure at intervals and record the temperature during the test. For the temperature, use a thermocouple in the test environment near the desiccator.
It may be attached and measured.

9.3.2 Background formaldehyde concentration measurement (blank test)

The background formaldehyde concentration is measured using a desiccator without a test piece.
The background formaldehyde concentration should not exceed 0.05 mg / L.

9.4 test time

The time required for one emission test shall be 24 hours ± 10 minutes.

9.5 Collection of test solution

The water in the glass crystal dish after the emission test is used as the test solution. After the emission test, a glass crystal dish containing the test solution
Remove from the desiccator and mix well with the test solution. 100 mL of flask with a stopper is the solution for this test.

After cleaning with, fill with this test solution and plug with glass. Directly check the formaldehyde concentration in the test solution
If it cannot be measured later, it may be stored at 0 ° C to 5 ° C for up to 30 hours. If stored, return to test site temperature
And use.

9.6 Measurement of formaldehyde concentration in test solution

The formaldehyde concentration in the test solution is measured by the acetylacetone absorptiometry.

Accurately place 5 to 25 mL of the test solution in a flask with a stopper, then the same amount of acetylacetone-vinegar.
Add ammonium acid solution, lightly plug and mix so that the solution does not leak when mixing. This frass with a stopper
After heating for 10 minutes in a constant temperature water bath at 65 ° C ± 2 ° C, the solution was shielded from light until it reached the temperature of the test site.
Let it stand still. Take this solution in an absorption cell and measure the absorbance at a wavelength of 412 nm with a spectrophotometer using water as a control.
NS. If maximum absorption occurs at wavelengths other than 412 nm, maximum absorption occurs for all measurements, including the creation of calibration curves.
It may be measured at the wavelength to be measured.

If the formaldehyde concentration in the test solution exceeds the range of the calibration curve, the test solution is appropriately diluted.
The formaldehyde concentration in the diluted solution may be determined by measuring the solution according to **9.6** .

Similarly, in the test solution in the desiccator crystal dish prepared for background formaldehyde measurement.
Also measure.

9.7 Creating a calibration curve

Take 0 mL, 5 mL, 10 mL, 20 mL, 50 mL and 100 mL of formaldehyde standard solution with a pipette.
After putting them in separate 100 mL volumetric flasks, add water up to the marked line to make a formaldehyde solution for preparing a calibration curve.
For the calibration curve, accurately separate 5 mL to 25 mL from each formaldehyde solution for preparing the calibration curve, and operate in **9.6** .
And prepare from the relationship line between formaldehyde concentration (0 mg / L to 3 mg / L) and absorbance. Relationship line at that time
The slope (*F*) of is obtained by graph or calculation.

Even if the concentration range of the formaldehyde solution for preparing a calibration curve is narrowed according to the expected concentration of the test solution.
good. However, in the range including the formaldehyde concentration in the test solution, the formaldehyde concentration is other than 0 mg / L.
Set the concentration level of the formaldehyde solution for preparing a calibration curve in 5 stages.

Create a calibration curve at least once a month.

9.8 Calculation

The formaldehyde concentration in the test solution in the desiccator containing the test piece is calculated by Eq. (2).

$$G = F \times (A_d - A_b) \times 1\,800 / A \quad \cdots\cdots (2)$$

here, G : Holmua in the test solution in the desiccator containing the test piece
Rudehide concentration (mg / L)
F : Slope of relational line for formaldehyde standard solution
(Mg / L)
A_d : absorbance of test solution in a desiccator over specimen
A_b : Absorbance of the test solution in the background desiccator
1 800: Total area of the edge surface and front and back surfaces of the test piece specified in **8.2**
(Cm^2)
A : Surface area of test piece (cm^2)

Formaldehyde concentration is calculated for each of the two sets of test pieces, and is after the decimal point according to Rule B of **JIS Z 8401.**

Round to one digit. However, the difference in formaldehyde concentration between the two sets is 0.2 mg / L or more, and the test results of the two sets are the same.
If there is a difference of 20% or more from the average value of, prepare two sets of new test pieces and test according to Clause **8** and Clause **9** .
Repeat the test.

9.9 Display of test results

The formaldehyde emission amount, which is the test result, is shown by calculating the average of the two sets of measured formaldehyde concentrations.
Show.

10 reports

The test report shall include the following (see Annex **A**).

a) Specimen type and its dimensions (mm)

b) Number of test pieces

c) Type of desiccator (for example, desiccator specified in **JIS R 3503**)

d) Formaldehyde emission amount (average value of formaldehyde concentration obtained in **9.9**), formaldehyde in each measurement
Concentration (including background values)

e) Test date

f) Temperature inside the desiccator during the emission test (see **9.3.1**)

g) Testing institution name

h) Name of person in charge of testing

The following items shall be stated in the test report as necessary.

i) Specimen density (kg / m^3)

j) Cutout position of the test piece (for example, the cutout position from the board is shown)

k) Producer's name, place of manufacture, date of manufacture or lot number

l) Preservation conditions of materials from manufacturing to sampling inspection, especially matters related to formaldehyde emission in the air, do not
Wow, temperature, humidity, material sealing status, storage status, etc.

m) Sampling inspection method and sampling date

n) Location where the test piece was removed from the factory or building [5] and condition [6] (For example, shown in an image such as a photograph)

o) Location where test pieces from buildings, furniture, etc. were collected [5] and condition [6] (For example, shown in images such as photographs)

p) Temperature, humidity and time of the cured state of the test piece

q) In addition, if this test method is not used, all items related to the test (preparation, temperature, etc.)

Note [5] For example, in the case of factories, or in the case of constructed boards, ceilings, floors, walls, etc.

Note [6] For example, moisture content, surface coating, finishing, etc.

Annex A
(reference)
Example of test report

Test name	Performance test of cosmetic MDF					
Requester	○○○○ Co., Ltd.					
Test items	Formaldehyde emission					
Test pieces	Name: Makeup MDF Material: Decorative sheet, MDF Dimensions: 50 mm x 150 mm x 12 mm Quantity: 18 pieces (9 pieces x 2 sets)					
Test method	**According to JIS A 1460** (Test method for formaldehyde emission of building boards-desiccator method) I went. Desiccator type: Nominal size 240 mm specified in **JIS R 3503** Desiccator temperature: 20.1 ° C					
Test results	Test pieces	Analysis result mg / L				
	number	De with a test piece Trial in the sicator Hol in test solution Maldehyde concentration	Formaldehyde De-emission amount	For background Trial in desiccator Holm in test solution Aldehyde concentration	Lower limit of quantification	
	1	0.2 0.2	0.3	<0.02	0.02	
	2	0.3				
Test date	○○○○ year ○○ month ○○ day ~ ○○ month ○○ day					
Test performer	○○○○					
Testing institution	○○○○ Co., Ltd. (○○ prefecture ○○ city ○○ town ○○-○○-○)					

References

JIS A 5404 Wood-based cement board

JIS A 5440 Volcanic vitreous multi-layer board (VS board)

JIS A 5905 fiber board

JIS A 5908 particle board

JIS A 6901 gypsum board product

ISO 12460-4 : 2016, Wood-based panels-Determination of formaldehyde release-Part 4: Desiccator method

Annex B

(reference)

Old and new comparison table for technically important revisions

Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
Clause number And title	Contents	Clause number And title	Contents	
3 terms and Definition	Formaldehyde emission amount, formaldehyde concentration and Define boards	-	-	Formaldehyde emission and formaldehyde Clarify the relationship with aldehyde concent Added definition of terms for. Also, **JIS A** as a source for the definition of boards **1902-1** is described.
4 Test source Li	**JIS R 3503** desiccator and specified in **ISO 13130** to Configuration diagram of the desiccator method to be specified	3 Test source Li	**Of** the desiccator method specified in **JIS R 3503** Diagram	In the block diagram of the desiccator method Added desiccator specified in **13130** bottom.
	Formaldehyde is ammonium ion and acetyl Diacetyldihydromorphine by reacting with acetone A haunch that generates (DDL) and finally turns (orange) yellow (Hantzsch) Based on reaction.		Formaldehyde is ammonium ion And react with acetylacetone, Diacetyldihydromorphine (DDL) is raw Based on the Hantzsch reaction that occurs There is.	Contains formaldehyde by absorptiometry Since it measures a large amount, it is close to Added the coloration of.
5.1 Test ring Border	The test location is the temperature specified in **JIS Z 8703** , 20 ° C ± 5 ° C. It is in the state of.	4.1 Test ring Border	The test location is 20 ° C specified in **JIS Z 8703.** The temperature shall be in the 0.5 class (20 ± 0.5 ° C).	Temperature during curing and emission test o Applicable to Clause **8** and Clause **9** It is specified in the place. Here, the other procedure (absorbance) About the test location where the measuremen ± 0.5 ° C is excessive It was a request. Analytical equipment etc. ear Sufficient temperature range to work Changed to ± 5 ° C.
5.2 Common conditions b) Water	The water used in this standard is A2 ~ specified in **JIS K 0557.** A4 water or ion exchange with quality equal to or better than them Use water exchange or distilled water.	4.2 Common conditions b) Water	The water used in this standard is **specified** in **JIS K 0557** . Constant to A1 ~ A4 water, or **JIS K 0557** of Ion exchange with the same quality as A1 to A4 Water or distilled water.	A1 water specified in **JIS K 0557** is a contain Since it is used for cleaning ingredients, it suit The quality was A2 or higher.

Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
Clause number And title	Contents	Clause number And title	Contents	
6 equipment and Equipment e) Desike -Ter	The desiccator has a ball lid and is airtight **JIS R** **Nominal** dimension 240 mm specified in **3503** (**JIS R 3503)** **Name in** : Desiccator 240 mm), or **ISO 13130** Type 2 (Non-vacuum), Series A, Nominal With a diameter of 250 mm (name in **ISO 13130** : Desiccator) **ISO 13130-250-2A**).	5 equipment and Equipment e) Desike -Ter	The desiccator is **JIS R 3503** with airtightness. Nominal dimension of 240 mm specified in NS.	As defined in the old standard " **JIS R 3503** sp Desiccator with a nominal size of 240 mm -Since the production of "-" has ended, it will And **ISO 13130** desiccator as defined in Added a tar.
6 equipment and Equipment g) glass Board	The glass plate installed under the glass crystal dish has a diameter of 120 mm. It shall be a circle of ± 5 mm.	-	-	Used to raise the glass crystal dish Added the regulation of the glass plate to be u The glass plate is specified in **ISO 13130** . If you select a desiccator to do It is to be used.
6 equipment and Equipment h) Total amount Rasco	Full volume flasks shall be specified in **JIS R 3505** .	5 equipment and Equipment g) Total amount Rasco	Total volume flasks are referred to as specified in **JIS R 3505** And the capacity is 100 mL and 1 000 mL. NS.	The capacity of the volumetric flask is the liqu It should be selected according to the capacity Therefore, the capacity regulation has been de
6 equipment and Equipment i) Total amount Pets	**Full-** volume pipette specified in **JIS R 3505** (adjusted at 20 ° C), Piston type pipette specified in **JIS K 0970** 1) or this An automatic pipette with an accuracy equal to or higher than these. Note 1) Also called a micropipette on the market.	5 equipment and Equipment h) Total amount Pets	The total pipette is the **nominal value** specified in **JIS R 3505** And capacity 5 mL, 10 mL, 15 mL, 20 mL, 25 mL, 50 mL, 100 mL total volume pipette (20 ° C) Adjusted by) or self with equivalent quality Use a dynamic pipette.	The volume of the total pipette is the liquid us It should be selected according to the capacity Therefore, the capacity regulation has been de A formula pipette was added as an option.
6 equipment and	Flasks with stoppers are common grinds specified in **JIS R 3503.**	5 equipment and	Flasks with stoppers are specified in **JIS R 3503** .	The capacity of the flask with a stopper is use

Equipment k) With stopper Flask	Make a combined Erlenmeyer flask.	Equipment j) With stopper Flask	Common ground joint triangle with a nominal capacity of 100 mL Make a flask.	Select according to the volume of liquid Therefore, the capacity regulation was deleted
6 equipment and Equipment m) Stainless Less wire mesh	Test piece support hardware with test piece attached in a desiccator The wire mesh on which the wire mesh is placed is the distance between the m Made larger than 15 mm in diameter from 230 mm to 240 mm It shall be.	5 equipment and Equipment l) Stainless Less wire mesh	A test with a test piece attached in a desiccator The stainless steel wire part on which the specimen support hardware is pl The mesh spacing of the wire part is from 15 mm Larger diameter 240 mm NS.	Tolerance for stainless steel wire mesh diamet Wire mesh Diameter less than 240 mm If so, you can put it in the desiccator Therefore, the allowable range is set on the sic I decided.

Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
Clause number And title	Contents	Clause number And title	Contents	
6 equipment and Equipment n) Messi Linder	The graduated cylinder is a graduated cylinder specified in **JIS R 3505.** Let's call it Dar.	-	-	Graduated cylinder to measure the volume of Added a dar.
7 Reagent adjustment Made	Preparation of reagents is as follows. The reagents specified in **a**) to **f**) and **h**) use the reagent concentration. The total amount of the reagent may be changed without changing the preparation.	-	Preparation of reagents is as follows.	**As** specified in **a**) to **f**) and **h**) When preparing reagents in, most of the reage It will be necessary to treat it as waste liquid. Reagents considering the environmental impa Added so that the total amount of can be chan
7 Reagent adjustment Made a) 0.05 mol / L Elementary solution	The preparation of the 0.05 mol / L iodine solution shall be as follows. However, put this solution in a light-shielded airtight container in a dark place Save to. **1**) Add 40 g of potassium **iodide** to water 25 as specified in **JIS K 8913.** Dissolve in mL and specify in **JIS K 8920.** After melting 13 g of the element, put it in a full volume flask 1 000 **Transfer** to mL and specify hydrochloric acid specified in **JIS K 8180** (special Class) After adding 3 drops, water was added up to the marked line and mixed. solution. **2**) **JIS K 8001** of **JA.6.4 w**) (0.05 mol / L iodine solution) 0.05 mol / L iodine solution for volumetric analysis prepared by Liquid 3) . Note 3) City as 0.05 mol / L iodine solution for volumetric analysis It is being supplied to the field.	6 Reagent adjustment Made a) Iodine Solution (0.05 mol / L)	Potassium **iodide** 40 as specified in **JIS K 8913** Dissolve g in 25 mL of water and add **JIS K 8920 to** this. After melting 13 g of iodine as specified in Transfer this to a 1 000 mL flask, and put it in a bottle. Added 3 drops of hydrochloric acid specified in **JIS K 8180** After that, a solution prepared by adding water up to the marked line.	According to the old standard, 0.05 mol / L io It only specified to prepare, In the current standard, it is a solution for volu Reagents commercially available as liquids ar Added so that it can be done.

Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
Clause number And title	Contents	Clause number And title	Contents	
7 Reagent adjustment Made b) 0.1 mol / L Thiosulfate Thorium melting	Preparation of 0.1 mol / L sodium thiosulfate solution is as follows. It depends on that. **1**) Sodium thiosulfate pentahydrate specified in **JIS K 8637** 26 g of charcoal and charcoal specified in **JIS K 8625** as a preservative 0.2 g of sodium acid and dissolved oxygen-free water	6 Reagent adjustment Made b) Thio-sulfur Acid Natriu Solution (0.1	**Natriu** thiosulfate specified in **JIS K 8637** Specified in 26 g of pentahydrate and **JIS K 8625** Contains 0.2 g of dissolved oxygen Dissolve in 1 000 mL of no water and leave for 2 days After that, as specified in **JIS K 8005**	In the old standard, sodium thiosulfate solutio Sodium thiosulfate pentahydrate and charcoal Prepare by mixing with sodium acid It was only specified that, but the current stanc Then, if you add the choice of preservatives

	liquid	Dissolve in 1 000 mL, leave for 2 days, then **JIS K 8005**	mol / L)	Using a **lithium** , **JIS K 8001 JA.6.4 t**) **2**)	Both are thiosulfate natri for volumetric analys
		Using potassium iodine as specified in **JIS K 8001**		The solution calibrated by.	Umm solution (commercially available) or its
Copyright law		Of **JA.6.4 t**) **2**) (0.1 mol / L sodium thiosulfate solution)			Solutions and certified reference materials can
		The solution calibrated by.			Added as.
By		Preservatives are specified in an appropriate amount of **JIS K 8051** .			
Nothing Duplex by decisive		Use 3-methyl-1-butanol or use it			
		May be used in combination with sodium carbonate.			
		2) **JIS K 8001** of **JA.6.4 t**) **2** volume fraction was prepared by)			
Made, rolled		0.1 mol / L sodium thiosulfate solution for analysis or 0.1			
		Natriu thiosulfate for volumetric analysis at higher concentrations than mol / L			
Listed Etc. are prohibited		Using a total volume pipette and a total volume flask			
		Accurately diluted solution, specified in **JIS K 8005**			
Being done		Yo with potassium iodate, **JIS K 8001** of **JA.6.4**			
		t) The standardization according to **2**).			
Oh I will.		**3**) 0.1 mol / L thio for volumetric analysis as certified reference material [4])			
		The concentration was calibrated with sodium sulfate solution.			
		of.			
		Note [4]) National as a supplier of certified reference materials			
		National Institute of Advanced Industrial Science and Technology, Research and Development Agency			
		Semi-Comprehensive Center (NMIJ), US National Standard Technology			
		National Institute of Standards and Measures (NIST) and			
		There are certified reference material producers.			

	Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
	Clause number And title	Contents	Clause number And title	Contents	
	7 Reagent adjustment Made	Preparation of 1 mol / L sodium hydroxide solution is one of the following: according to.	6 Reagent adjustment Made	Sodium hydroxide specified in **JIS K 8576** Dissolve 40 g in 200 mL of water and add the whole amount.	The old standard uses sodium hydroxide Was only specified to be prepared
	c) 1 mol / L Nato hydroxide Rium solution	**1**) Add 40 g of sodium hydroxide specified in **JIS K 8576** to water. Dissolve in 200 mL and add to a 1 000 mL volumetric flask. Transfer, add water up to the marked line and mix.	c) Hydroxide sodium Solution (1 mol / L)	Transfer to 1 000 mL of Lasco and mark with water. The solution prepared by adding in.	However, in the current standard, hydroxide fo Commercially available as a sodium chemical Add the existing reagents so that they can be u
		2) **JIS K 8001** of **JA.6.4 r**) **1**) (1 mol / L hydroxide sodium 1 mol / L water for volumetric analysis prepared by Sodium oxide solution.			rice field.
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	7 Reagent adjustment Made	After the solution turns pale yellow, finger 1 mL of starch solution. Add as an indication. Add starch solution, blue or red	6 Reagent adjustment Made	After the solution turns pale yellow, starch is dissolved. Add 1 mL of liquid as an indicator and further titrate.	In the old standard, after adding starch solutio Because the titration procedure was omitted
By	f) Holm aldehyde Standard stock solution	When the bluish-black solution becomes colorless and transparent Titration is completed with 0.1 mol / L sodium thiosulfate solution.	f) Holm aldehyde Standard stock solution	NS.	Clarified.
Nothing Duplex by decisive					
Made, rolled	7 Reagent adjustment Made	Preparation of formaldehyde standard solution should be one of the following: evening.	6 Reagent adjustment Made	Formaldehyde standard stock solution 1 000 mL of water To contain 3 mg of formaldehyde in	In the old standard, formaldehyde standard sou Only regulates and titrates the liquid
Listed Etc. are prohibited	g) Holm aldehyde Standard solution	**1**) Formaldehyde standard stock solution in 1 000 mL of water Total volume flask to contain 3 mg of mualdehyde Take an appropriate amount in 1 000 mL, add water up to the marked line and mix. Solution.	g) Holm aldehyde Standard solution	In addition, take an appropriate amount in a total volume flask of 1 000 mL. A solution prepared by adding water up to the marked line.	However, in the current standard, JCSS certifi Formaldehyde standard solution with a statem The diluted solution is also formaldehyde Added so that it can be used as a standard solu
Being done					Added.
Oh I will.		**2**) Provided by the Metrology Standards Supply System (JCSS), Holmarde, traceable to national metrology standards Hido standard solution (HCHO for water quality test: 1 000 mg / L) 1.5 Using mL as the undiluted solution, take a total volume of 500 mL into a flask. A solution in which water is added up to the marked line and mixed.			

Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
Clause number And title	Contents	Clause number And title	Contents	
9.1 of the exam Preparation	Preparation for the test is as follows.	8.1 Test equipment Preparation for placement	Preparation of the test equipment shall be as follows.	To prepare (clean and dry) equipment
	a) Multiple desiccators and glass crystal dishes (usually 3 each) and glass plate as needed Therefore, wash each of them thoroughly with water and dry them before the test. NS.		a) Multiple desiccators and glass crystal dishes Prepare several (usually 3) and try each one. Thoroughly wash with water and dry before the test.	Added a board. Change the test procedure according to the act rice field.
	b) The internal temperature of the desiccator is **specified** in **JIS Z 8703** . Adjusted to a fixed temperature of 20 ° C ± 0.5 ° C **Let** it stand still (see **9.3.1**).		**d**) Multiple desiccators have their internal temperature Is adjusted to 20 ± 0.5 ° C Place it in the test site.	The desiccator is placed in a glass crystal dish It was the procedure before installation.
	c) 300 mL ± with a graduated cylinder in 3 glass crystal dishes Add 1.5 mL of water and **b**) desiccator. Install in the center of the bottom of the. Use the desiccator specified in **ISO 13130** In this case, the position of the glass crystal dish as shown in Fig. **1b**) . Raise 25 mm ± 2 mm from the bottom of the desiccator Glass in the center of the bottom of the desiccator Install the board. It should be noted that multiple glass plates are stacked and used on top of each other. You may get rid of it.		**b**) Add 300 ± 1 mL of water to each glass crystal dish. Put in, the center of the bottom of the desiccator Install in.	Measure the volume of water with a graduated In addition, the capacity tolerance is **JIS R** **According** to Class A specified in **3505** . Follow the procedure for installing the glass pl Added.
	d) As shown in Fig. **1** , the glass crystal dish in the desiccator Place a stainless steel wire mesh on top.		**c**) As shown in Fig. **1** , the glass in the desiccator Place a stainless steel wire mesh on the crystal dish. Place the test piece support hardware on it Fig. **2** Place as shown in.	
	e) As shown in Fig . **2** , a predetermined number of cured test pieces are shown Attach to the test piece support hardware. Prepare two sets of this.	8.2 Measurement test Installation of charges	a) A predetermined number of cured test pieces, test pieces Attach it to the support hardware.	Test piece specified in **8.2 a**) of the old standa The procedure for attaching the test piece to th Moved to **9.1** .
9.2 Dissipation test Start of trial	The start of the emission test is as follows. **a**) The attached test piece is made of stainless steel in the desiccator. Place it on the wire mesh. Prepare two sets of this. The other desiccator is the back glass. Tested for measuring the formaldehyde concentration of the und Do not attach a piece.		The measurement sample is attached as follows. **a**) A predetermined number of cured test pieces, test pieces Attach it to the support hardware. For one desiccator, try Do not attach the test piece.	In the old standard, the procedure for mountin Because it was done, it was changed according rice field. Along with that, the title of the claus Changed to "Start test".
	b) Cover the desiccator and start the emission test.		**b**) Cover the desiccator and perform a emission test. Start.	

Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
Clause number And title	Contents	Clause number And title	Contents	
9.4 During the test while	The time required for one emission test is 24 hours ± 10 minutes. NS.	8.4 At the time of test while	The time required for one emission test is 24 hours. ± 5 minutes.	Affects formaldehyde concentration measuren Tolerable range of test time without giving I widened the siege.
9.6 For testing E in solution Lumuarde Hidden concentration Samadhi	Accurately place 5 mL to 25 mL of test solution in a flask with a stopper Add, then the same amount of acetylacetone-acetate Add a mnemonium solution and prevent the liquid from leaking when mixing. Lightly plug and mix. This flask with a stopper After heating for 10 minutes in a constant temperature water bath at 65 ° C ± 2 ° C, this Let the solution stand in the dark until it reaches the temperature of the test site. do. Take this solution in an absorption cell and use water as a control. Measure the absorbance at a wavelength of 412 nm with a spectrophotometer. 412 nm If maximum absorption occurs at wavelengths other than the above, create a calibration curve. All measurements, including formation, are measured at the wavelength at which maximum absorption occurs. You may decide. In addition, the formaldehyde concentration in the test solution is the calibration curve. If the above range is exceeded, use a test solution diluted appropriately. Holm in diluent by measuring according to **9.6** The aldehyde concentration may be determined.	8.6 For testing E in solution Lumuarde Hidden concentration Samadhi	Formaldehyde in solution for quantitative operation test Acetylacetone absorptiometry Measured by. Quantitatively take 25 mL of the test solution shown in **8.5** Place in Erlenmeyer flask, then acetyl 25 mL of acetone-ammonium acetate solution Add, lightly plug and mix. This common Place the ground-glass Erlenmeyer flask at 65 ± 2 ° C. After warming in water for 10 minutes, put this solution in the room Leave it in a shaded state until it becomes warm. Take this solution in an absorption cell and use water as a control. Then, at a wavelength of 412 nm, the absorbance with a spectrophotometer To measure. Similarly, the background holm Also measure aldehydes. 412 nm	From the viewpoint of reducing waste liquid, t Measure the amount (25 mL) with a spectroph 5 so that it can be reduced to a certain extent It was changed to mL to 25 mL. "Room temperature" as "test site temperature" Specifically described. The contents of the notes have been organized

Oh
I will.

Similarly for background formaldehyde measurements
About the test solution in the prepared desiccator crystal dish

Even measure.

When maximum absorption occurs at wavelengths other than
Is this for all measurements, including calibration curve creation

It may be measured by wavelength.

NOTE Formaldehyde in test solution

De-concentration exceeded the range of the calibration curve

In some cases, the test solution diluted appropriately

To measure the liquid according to **8.6**

Therefore, Holmarde in the diluted solution

The hide concentration can be determined.

Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
Clause number And title	Contents	Clause number And title	Contents	
9.7 Calibration curve Creation	0 mL of total formaldehyde standard solution with a pipette, Take 5 mL, 10 mL, 20 mL, 50 mL and 100 mL separately After putting in a 100 mL volumetric flask, add water up to the marked line. Eh, use a formaldehyde solution for preparing a calibration curve. Calibration The line is a formaldehyde solution for preparing each calibration curve. Accurately dispense 5 mL to 25 mL from, and perform the operation of **9.6** . Formaldehyde concentration (0 mg / L-3 mg / L) and absorbance Create from the relation line of. Slope of the relation line at that time (*F*) Is calculated by graph or calculation. A calibration curve should be drawn according to the expected concentration of the test solution. You may narrow the concentration range of the formaldehyde solution for use. stomach. However, the formaldehyde concentration in the test solution In the range including, 5 steps other than formaldehyde concentration 0 mg / L Concentration level of formaldehyde solution for preparing calibration curve on the floor prepare.	8.7 Calibration curve Creation	For the calibration curve, use the formaldehyde standard solution Pipette 0 mL, 5 mL, 10 mL, 20 mL, Take 50 mL and 100 mL, separate 100 mL After putting in a full volume flask, water is marked. In addition, formaldehyde for preparing a calibration curve Make a solution. Melting for creating each calibration curve Take 25 mL from the solution , perform the operation of **8.6** , and perform the operation Formaldehyde amount (0-3 mg) and absorbance Create a relationship line with. Tilt at that time (*F*) is obtained by graph or calculation.	From the viewpoint of reducing waste liquid, a Transfer the volume of the liquid (25 mL) to tl Can be reduced to a sufficient extent for meas It was changed to 5 mL to 25 mL. Expected to improve the accuracy of the calib Weighing and the concentration of the te Concentration of formaldehyde solution for lir Allowed to narrow the degree range.
9.8 Calculation	Formaldehyde concentration is determined for each of the two sets of test piece Calculate and one digit after the decimal point according to **JIS Z 8401** Rule B Round to. However, the difference in formaldehyde concentration between the two sets Is 0.2 mg / L or more, and the two sets of test results are the average. If there is a difference of 20% or more to the value, a new test Prepare two sets and repeat the test according to Clause **8** and Clause **9.** implement.	8.8 Calculation	Formaldehyde concentration is applied to 2 sets of test pieces Each is calculated and displayed as (mg / L), and is a decima Round to one digit below the point according to **JIS Z 8401** . However, at this time, the test results of the two sets are the sa If there is a difference of 20% or more from the average valu It doesn't become.	The rounding method of the numerical value i Clarified that. Two sets of formaldehyde concentrations are (mg / L, 0.2 mg / L) or (0.2 mg / L, 0.3) When it becomes mg / L), the difference is the 20% or more. But However, this difference is rounded to one dec Is the smallest unit. “Difference is 0.2 mg / L By adding the provision "above" The difference in this case was recognized.
10 reports c)	Type of desiccator (for example, specified in **JIS R 3503**) Desiccator)	-	-	Deci used as a required item in the test report Added the type of kata.
10 reports	**a**) Specimen type and its dimensions (mm) **i**) Specimen density (kg / m 3)	9 Report	**a**) Board type, its thickness (mm) and And density (kg / m 3)	Test piece whose density cannot be reported (l Density is an essential item because there are Not an optional item.

Current standard (**JIS A 1460** : 2021)		Old standard (**JIS A 1460** : 2015)		Reason for revision
Clause number And title	Contents	Clause number And title	Contents	
10 reports	**j**) Cutting position of the test piece (for example, cutting from the board) Illustration of the position)	9 Report	**b**) Cutting position of the test piece (for example, board Illustration of the cutout position from)	The cutout position of the test piece is handled It is not a required item because it is not within

Annex A (Reference) Test Report example	The test report was illustrated.	-	-

It was an optional item.
Regarding the test report, the users of the stan
This standard so that it can be recognized by t
The test report of is illustrated in the annex.

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Listed
Etc. are prohibited

Being done

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I will.

JIS A 1460 : 2021

Test method for formaldehyde emission of building boards- Desiccator method Explanation

This commentary explains what is specified and described in the standard, and is not a part of the standard.

This commentary is edited and published by the Japanese Standards Association, and the contact for inquiries regarding this is the Japanese Standards Association.

1 Background to this revision

This standard was established in 2001, and after the revision in 2015 (hereinafter referred to as the old standard), this revision was reached.

The process leading up to this amendment is as follows.

a) It was established as **JIS A 1460 in** 2001 .

This standard has been tested in consideration of the international standardization of formaldehyde emission measurement method and the circumstances peculiar to Japan.
It was established as a test method standard. This test method is a method for measuring the amount of formaldehyde emitted into the air.
However, there are many years of measurement results and data accumulation in Japan, and building boards (hereinafter referred to as boards).
It's called kind.) It is a useful test method that can be executed relatively easily to ensure the quality of the product.

b) Revised in 2015 to unify related **ISO** standards and terms and definitions, symbols, units, formulas, etc. between **JIS.**
went.

In this amendment, the **JIS** Development Committee and subcommittees have been conducting building material testing for three years from 2017.
Organized within the center. The committee and subcommittees will discuss and add types of desiccators.

Created a draft **JIS** revision.

2 Purpose of this amendment

Desiccator used when conducting tests according to the old standard [Call specified in " **JIS R 3503** (Glassware for chemical analysis)"
It is stipulated that the size shall be 240 mm.] The domestic production has been discontinued, according to the relevant industry associations.
If so, there is no prospect of future production. For this reason, an alternative desiccator (hereinafter referred to as an alternative product)
Needed to be selected and verified and added to the standard.

Against this background, we selected and verified alternatives through a three-year national consignment project from 2017.
Revised the standard.

In addition, we will discuss the contents that cause inconvenience in testing according to this standard, and if necessary, **JIS.**
Created by reflecting it in the draft.

Solution **1**

3 Matters that were particularly problematic during the deliberation

The main matters and the results of the deliberation that became a problem in the deliberation of this standard are as follows.

a) Addition of substitutes for desiccators Discontinued desiccators (nominal dimensions specified in **JIS R 3503)**
240 mm. Hereinafter referred to as the current product.) To add a replacement to the standard, to a similar desiccator
I conducted a market research. As a result of the investigation, the product conforms to **ISO 13130** , Laboratory glassware-Desiccators.
Was available in Japan and was found to be distributed in Europe and the United States. In response to this, it complies with **ISO** standards.
If it is a product, it is considered that the quality is guaranteed, and it is possible to make an international match by quoting it.
A non-vacuum deci with a ball lid with a nominal diameter of 250 mm that complies with **ISO 13130** after deliberation.
Kata) was used as a substitute (reference [1]).

This is to confirm that there is no difference in the test results of formaldehyde emission between the current product and the alternative product.
The standard does not provide for round-robin testing, but it was conducted by 6 testing institutions. As a result, each trial
There is no statistically significant difference between the test results of the current product and the test results of the alternative product at the testing institution, and they are almost the same
For reference, it was confirmed that the difference between the test institutions was about ± 20% of the total average value.
Dedication [2]). Efforts should be made to reduce the differences between testing institutions.

Use of substitutes for building boards other than the building boards tested in conjunction with the round-robin test
We verified whether it is possible to use it by numerical analysis for the purpose of theoretical support. resulting in,
If the measurement target is an internal diffusion-dominated building material, the effect of different desiccators is small, but transpiration-dominated.
In the case of mold-dissipating building materials, it was found to have an effect (reference [2]).

Most of the building materials measured by this standard are assumed to be internal diffusion controlled emission. However,
It cannot be said that there is no possibility of transpiration-dominated emission. Therefore, further numerical analysis is performed and an alternative product is used.
If this is the case, install a 25 mm thick glass plate under the glass crystal dish and raise it to support transpiration.
It was clarified that the influence of different desiccators can be reduced for the test target of distributed emission (reference).
Reference [3]).

In order to confirm the test results under the condition that the glass plate is installed in the substitute product, a comparative test between the substitute product and the current product is p
It was carried out and the results were discussed. As a result of deliberation, the test result of formaldehyde emission amount is the current product.
It was concluded that the test results based on the above and the test results using the substitute product are almost the same (reference [3]).

Based on the above-mentioned deliberation on desiccator alternatives, the desiccator and bulk specified in **ISO 13130.**
The specifications and usage procedure of the glass plate for raising were specified and reflected in the **JIS** draft.

b) Response to the actual situation of domestic testing institutions Judging about the contents that cause inconvenience in testing according to this standard
We had a meeting. As a result of deliberation, the temperature of the test environment (change in tolerance), equipment (additional options), reagents (additional options),
Test time (change of allowable range), procedure for preparing calibration curve (change of volume range of solution, change of regulation of concentration range), report
The section (review of required items) was reviewed and reflected in the **JIS** draft.

Four Major amendments

The main amendments are as follows.

a) Terms and definitions (Clause **3**) To clarify the relationship between formaldehyde emission and formaldehyde concentration
Added definition of terms to. In addition, **JIS A 1902-1** is described as a source in the definition of boards .

b) Principle of test (Clause **4**) The desiccator specified in **ISO 13130** was added to the block diagram of the desiccator method .

In addition, since the formaldehyde content is measured by the absorptiometry method, a color development similar to the measurement wavelength is added.

c) Test environment (**5.1**) Regarding the temperature of the test piece during the curing and emission test, the applicable parts of Clause **8** and Clause **9** are specified.
I have decided. Here, the test location where other procedures (measurement of absorbance, etc.) are performed is specified.

Solution **2**

Therefore, ± 0.5 ° C was an excessive requirement. Within a temperature range sufficient for the analyzer to operate normally
It was changed to a certain ± 5 ° C.

d) Common conditions (**5.2**) **b**) Water In the old standard, water of A1 to A4 specified in **JIS K 0557** was specified, but A1
Since the water used for cleaning appliances is used for cleaning equipment, the quality was set to A2 to A4 according to the actual situation.

e) Equipment and fixtures (Clause **6**) **e**) Desiccator Nominal dimension 240 mm specified in **JIS R 3503** specified in the old standard
Since the production of "desiccator" has been discontinued , the desiccator specified in **ISO 13130** is added as a substitute.
rice field. See Clause **3** of the commentary for the progress of deliberation on the addition of desiccators .

f) Equipment and utensils (Clause **6**) **g**) Glass plate Follow the regulations for the glass plate used for raising the glass crystal dish.
Added. The glass plate is used when the desiccator specified in **ISO 13130** is selected.
NS. See Clause **3** of the commentary for the reasons for using glass plates .

g) Equipment and instruments (clause **6**) **h**) Total volume flask The volume of the total volume flask is selected according to the volume of the liquid used.
Since it only needs to be determined, the capacity regulation has been deleted.

h) Equipment and instruments (clause **6**) **i**) Total pipette The volume of the total pipette should be selected according to the volume of the liquid used.
Since it only needs to be determined, the capacity regulation has been deleted. A piston pipette was added as an option.

i) Equipment and instruments (clause **6**) **k**) Flask with stopper The capacity of the flask with stopper matches the capacity of the liquid used.
Since it is only necessary to select them together, the capacity regulation has been deleted.

j) Equipment and appliances (clause **6**) **m**) Stainless steel wire mesh An allowable range was added to the diameter of the stainless steel wire mesh. diameter
If is smaller than 240 mm, it can be placed in a desiccator, so the allowable range was set to the smaller diameter side.

k) Equipment and instruments (clause **6**) **n**) Graduated cylinder A graduated cylinder was added to measure the volume of water.

l) Preparation of reagents (Clause **7**) When reagents are prepared according to the volume specified in the old standard, most of the reagents are waste liquid.
It had to be processed. Therefore, considering the environmental impact of waste liquid treatment, the total amount of reagents can be changed.
I added it so that I could do it. However, for the formaldehyde standard solution, the measurement accuracy will be improved by changing the total amount.
Since the effect of is not negligible, the change in the total amount is not allowed.

m) Preparation of reagents (Clause **7**) **a**) **0.05 mol / L** iodine solution According to the old standard, 0.05 mol / L iodine solution should be prepared.
However, in the current standard, the solution prepared according to **JIS K 8001** is added as an option.
rice field. This made it possible to use commercially available reagents as iodine solutions for volumetric analysis.

n) Preparation of reagents (Clause **7**) **b**) **0.1 mol / L** sodium thiosulfate solution According to the old standard, the sodium thiosulfate solution is
It was only specified to prepare by mixing sodium thiosulfate pentahydrate and sodium carbonate, but now
In the line standard, the choice of preservatives is added, and the solution prepared as specified in **JIS K 8001** is selected.
Added as a limb. This makes it a commercially available reagent as a sodium thiosulfate solution for volumetric analysis.
And certified reference materials are now available.

o) Preparation of reagents (Clause **7**) **c**) **1 mol / L** sodium hydroxide solution According to the old standard, the sodium hydroxide solution is a hydroxide solution.
Although it was specified only to prepare using sodium chemicals, the current standard specifies the adjustment specified in **JIS K 8001.**
The prepared solution was added as an option. This makes it a sodium hydroxide solution for volumetric analysis.
Commercially available reagents can now be used.

p) Preparation of reagents (clause **7**) **f**) Formaldehyde standard stock solution In the old standard, titration after adding starch solution
Since the procedure was omitted, the procedure is specified in the current standard.

q) Preparation of reagents (Clause **7**) **g**) Formaldehyde standard solution In the old standard, the formaldehyde standard stock solution is adjusted.
Only titration was specified, but the current standard uses a formaldehyde standard solution with a JCSS certificate.
A diluted solution was also added so that it could be used as a standard formaldehyde stock solution.

The commercially available formaldehyde standard solution with JCSS certificate is titrated according to the old standard.
The uncertainty of concentration is larger than that of the case. Due to this effect, formaldehyde emission calculated by this standard

Solution **3**

It has been suggested that there is a slight effect on the uncertainty of the dose. Formaldehyde with JCSS certificate
Since the uncertainty of the concentration of the standard solution includes factors related to storage stability, the standard solution is used early after purchase.
By using, the variation in formaldehyde concentration during use can be made smaller than the indicated value of uncertainty.
It is presumed that.

r) Preparation for test (**9.1**) Start of emission test (**9.2**) Procedure for preparation (cleaning and drying) and installation of glass plate
Was added. The height at which the glass crystal dish is raised by the glass plate is shown in **JIS R 3503** and **ISO 13130** .
It was set to 25 mm ± 2 mm based on the surface.

In addition, the capacity of water is measured with a measuring cylinder, and the capacity tolerance is specified in **JIS R 3505** .
Matched to Lath A.

In the old standard, the procedure and regulations for test preparation, mounting of the test piece on the test piece support hardware, and the start of the emission test
Since the order of the sentences was different, the procedure was rearranged according to the actual situation in the current standard.

s) Test time (**9.4**) The allowable range of the test time of the old standard was ± 5 minutes, which was an excessive requirement. Therefore, Hol
The allowable range of test time was expanded to the extent that it did not affect the measurement of mualdehyde concentration. In addition, in the reference
Even at ISO 12460-4 : 2016, the allowable range of test time is ± 10 minutes.

t) Measurement of formaldehyde concentration in test solution (**9.6**) According to the old standard, the volume of test solution was 25 mL.
However, most of them had to be treated as waste liquid. Therefore, from the viewpoint of reducing waste liquid, the capacity of the test solution should be adjusted.
The solution was changed from 5 mL to 25 mL so that the solution could be reduced within a range sufficient for measurement with a spectrophotometer.

u) Preparation of calibration curve (**9.7**) Similar to the test solution, the volume of the calibration curve preparation solution is 25 mL to 5 mL to 25.
It was changed to mL so that the solution could be reduced within a range sufficient for measurement with a spectrophotometer.

In addition, the amount of formaldehyde emitted from building materials has generally decreased in recent years compared to when the standard was first established.
ing. For test solutions with low formaldehyde emission (low formaldehyde concentration)
If a calibration curve is created with the concentration specified in the old standard, there is a concern that the measurement accuracy of the concentration will decrease. Therefore, inspection
Allows the concentration range of formaldehyde solution for making quantity lines to be narrowed so that the measurement accuracy can be improved.
rice field.

v) Calculation (**9.8**) The method of rounding the calculation result of formaldehyde concentration shall be Rule B of **JIS Z 8401** and rounded off.
Clarified that.

Also, when the two sets of formaldehyde concentrations are (0.1 mg / L, 0.2 mg / L) or (0.2 mg / L, 0.3 mg / L).
In addition, the difference is 20% or more of the average value. However, this difference is the smallest rounded to one decimal place.
The width. The difference in this case was recognized by adding the provision that "the difference is 0.2 mg / L or more".

w) Report (Clause **10**) The type of desiccator used was added to the required items of the test report. Also, density and trial
The cutting position of the test piece was changed from a required item to an optional item. Regarding the density, like the laminated lumber, the density
This is because there are many test pieces for which is not defined, and the cutting position of the test piece is within the range covered by this standard.
Because there is no such thing.

x) Example of test report (Annex **A**) This so that users of the standard can gain a common understanding of the test report.
The test report of the standard is illustrated in the annex.

Five Concern

In 2008, **ISO 12460-4** : 2008, Wood-based panels-Determination of formaldehyde release-Part 4: Desiccator
A method (hereinafter referred to as **ISO** standard) was established. This **ISO** standard is JANS16 based on the Japanese desiccator method.
Made from the desiccator method (JANS: regional standard created in collaboration with Japan, Australia and New Zealand)
However, there are differences in the scope of application. Reexamine whether the **ISO** standard should be the corresponding international standard for this standard

Solution **4**

Was done.

The ISO standard covers particle board, fiber board, plywood, and oriented strand board (OSB).
And wooden flooring. On the other hand, this standard includes Japanese Agricultural Standard (JAS) wood-based boards and **JIS A.**
It is also quoted in **5440** [Volcanic **Vitreous** Multilayer Board (VS Board)] and covers all building boards.
There is a difference.

In addition, the number of digits displayed in the test results differs between the **ISO** standard and this standard. **According to the ISO** standard, the test result is only 0.01 mg / L.
Although it is specified to be expressed in digits, this standard rounds it to one digit after the decimal point (0.1 mg / L unit).
As a result of deliberation on this point, we will make it consistent with the **ISO** standard based on the domestic situation (requirements in laws and regulations).
The unit was set to 0.1 mg / L as specified in the old standard.

Compliance with international standards is now related not only to the measurement accuracy of test piece collection and analysis, but also to domestic laws and regulations.
I decided to send it as a later task.

6 Other commentary

The following are new supplements to the items specified in the old standard.

a) Temperature / humidity measuring device [Clause **6 a**)] The accuracy of the thermometer and hygrometer specified in the main unit is the displayed value of each device.
Represents the minimum scale of (reading value).

b) Test preparation (**9.1**) "Multiple desiccators were adjusted to have an internal temperature of 20 ° C ± 0.5 ° C.
Place it in the test area. However, the tolerance of the internal temperature at this time is flat for 24 hours (radiation time).
It is a regulation for the average value, not for the time fluctuation.

c) Temperature (**9.3.1**) When measuring the temperature inside the desiccator, the heat generated by the thermometer causes the inside of the desiccator to generate heat.
There is concern that the temperature will be higher than the temperature in the test room. Be especially careful when using an electric thermometer
There is a need to.

d) Calculation (**9.8**) It is stipulated that the number of digits of formaldehyde concentration is rounded to one decimal place (0.1 mg / L unit).
However, in recent years, the number of products that emit less formaldehyde has increased compared to when the standard was first established. for that reason,
In the display of one digit after the decimal point, the significant digit is often one digit. Against this background, Holmardech
There was an opinion that the number of digits of the concentration should be changed to two digits after the decimal point (0.01 mg / L unit), but the following reasons
Therefore, the number of digits of formaldehyde concentration was left as one digit after the decimal point (0.1 mg / L unit).

-The measurement accuracy of the desiccator method is not so high.

-Formaldehyde concentration is a decimal point in product standards (**JIS A 5905** , **JIS A 5908,** etc.) that cite this standard.
It must be clearly stated as one digit below.

7 References

[1] Consignment of Ministry of Economy, Trade and Industry 2017 Industrial standardization promotion business consignment cost High-performance JIS maintenance business (safe and secure s
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JIS Development Results Report, February 2018, Building Materials Testing Center

[2] Consignment by Ministry of Economy, Trade and Industry FY2018 Industrial Standardization Promotion Project Consignment Cost Strategic International Standardization Acceleration Project
International standard development activities related to the test method of formaldehyde emission of building boards (desiccator method)
JIS Development Results Report, February 2019, Building Materials Testing Center

[3] Consignment by Ministry of Economy, Trade and Industry FY2019 Industrial Standardization Promotion Project Consignment Cost Strategic International Standardization Acceleration Project

Solution **5**

International standard development activities related to the test method of formaldehyde emission of building boards (desiccator method)
JIS Development Results Report, February 2nd year of Reiwa, Building Materials Testing Center

8 Composition table of the drafting committee

The composition table of the drafting committee is shown below.

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Solution **6**

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