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Particle boards - Determination of formaldehyde emission under specified conditions -
Method called: formaldehyde emission method

Spanplatten - Bestimmung der Formaldehydabgabe unter festgelegten Bedingungen -
Methode genannt: Formaldehydabgabe Methode

Panneaux de particules - Détermination de l'émission d'aldéhyde formique dans des
conditions déterminées - Méthode dite: méthode d'émission d'aldéhyde formique

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Ta slovenski standard je istoveten z: CR 213:1984

ICS:

79.060.20 X [] ^ [] ^ [] ^ [] ^ [] ^ [] ^ [] [] z ^ Fibre and particle boards

SIST-TP CR 213:2004

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CEN

REPORT
RAPPORT
BERICHT

CR213

May 1984

UDC 674.815-41:620.1:543.42.062:547.281.1

Key words : Particle boards, tests, measurement, emission of formaldehyde, sampling, specimen preparation, apparatus, testing, conditions, humidity, procedure.

English version

PARTICLE BOARDS
DETERMINATION OF FORMALDEHYDE EMISSION
UNDER SPECIFIED CONDITIONS
METHOD CALLED: FORMALDEHYDE EMISSION METHOD

Panneaux de particules - Détermination de l'émission d'aldéhyde formique dans des conditions déterminées. Méthode dite: Méthode d'émission d'aldéhyde formique.

Spanplatten - Bestimmung der Formaldehydabgabe unter festgelegten Bedingungen. Methode genannt: Formaldehydabgabe Methode.

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This CEN REPORT has been established by Technical Committee CEN/TC 91 and has been approved on 1983-06-15 by the Administrative Board of the European Committee for Standardization in accordance with CEN Internal Regulations.

CEN members are the national standards organizations of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat : Rue Bréderode 2, B-1000 Brussels

Foreword

A standard for the determination of the formaldehyde emission of particle boards is necessary for controlling the boards in all European countries in the same way. Up till now, every country has its own methods and regulations, with which the producers of particle boards have to comply. All these methods have their own problems on translating the test results into practice. For that reason, CEN/TC 91 has developed a new method as close to practice as possible.

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National standards on the same item do not exist.

This method for the determination of formaldehyde emission has not yet been accepted by CEN/TC 91 as a European Standard EN because there are some items that still have to be investigated. The members of CEN/TC 91 have reached a temporary agreement about these items, on the condition that investigations will be made.

The emission of formaldehyde from a particleboard is a complex process. For a given board, the test result depends upon its age, ageing conditions, moisture content etc., at the time of testing.

The "characteristic of the formaldehyde emission", as determined by the method laid down in this CEN report, is the formaldehyde emission of the test board which is assumed to be in a steady state under specified conditions of temperature, relative humidity, ventilation and loading of the testroom (chamber). The test results must be considered in relation to the specific board-conditions at the time of testing as outlined above. Although the test conditions are close to practice, their exact relation to practice is not known.

Further emission methods will not be developed. The existing methods (e.g. FESYP, TNO) will be harmonized as far as possible with the technical principles of this CEN report.

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1 Scope

This CEN report describes a method for characterising the formaldehyde emission from particleboards under specified conditions that have a relation to practice.

2 Field of application

The present CEN report describes a method for the determination of the emission of formaldehyde of particleboards under specified conditions, known as Formaldehyde Emission Method. The method can be used for all kinds of particleboards, coated or uncoated.

3 Principle

The test specimen is conditioned in a climatic chamber at a specified temperature and relative humidity. Under these same conditions of temperature and relative humidity, the formaldehyde concentration in the air of a testroom is measured in a steady state of temperature, relative humidity, ventilation rates and loading rates of the testroom.

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Sampling and preparation of test pieces

4.1 Sampling

- 4.1.1 Test pieces with an exposed surface (the sum of the two faces) of at least 15 000 m² are to be taken at least two weeks after production of the board at a distance not less than 100 mm from the edges. After sawing, the edges are to be sealed immediately with self-adhesive aluminium tape having a high diffusion resistance coefficient (1).
- 4.1.2 Test pieces of any shape and dimensions with a minimum surface of 2 500 mm² are to be taken from the same section of the board as the test pieces according to 4.1.1 for the determination of the moisture content.

4.2 Conditioning

Immediately after sealing the edges, the test pieces according to 4.1.1 shall be placed vertically in a climatic chamber at a distance of at least 30 mm from each other. (standards.iteh.ai)

The conditions in the climatic chamber shall be:

- Temperature: $(23 \pm 1)^\circ\text{C}$
- Relative humidity: $(50 \pm 5)\%$
- Formaldehyde concentration in the air: as low as possible but 300 $\mu\text{g}/\text{m}^3$ (2).

The conditioning shall be continued until the steady state is reached. In practice a conditioning time of about two weeks is sufficient (3).

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- (1) Sealing has to be further investigated. Ensure that the sealing material does not contribute to the formaldehyde concentration.
 - (2) It is to be further investigated whether the value should be lowered for boards with low emission.
 - (3) Further investigations are necessary to clarify this point.

5 Apparatus

Approved laboratory equipment e.g.:

- 5.1 Balance, allowing a reading to an accuracy of 0,01 g.
- 5.2 Air convection drying oven, the temperature of which can be maintained at $(103 \pm 2)^\circ\text{C}$.
- 5.3 A testroom having the following conditions:
 - Temperature: $(23 \pm 0,5)^\circ\text{C}$
 - Relative humidity: $(50 \pm 2)\%$
 - Good air circulation
 - The measured air velocity in the chamber shall be less than 100 mm/s (accuracy $\pm 5\%$) (4)
 - The dimensions of the testroom may be chosen at will but the loading is at least 0,2 m² of exposed particleboards surface per m³ room volume.
 - Air pressure: atmospheric pressure ± 10 mbar (4)
 - Formaldehyde-concentration shall be near to zero.
- 5.4 An air flow regulator
- 5.5 A volume meter, e.g. a flowmeter
- 5.6 Gas absorption bottles

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6 Test procedure

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6.1 Number of determinations/sist-tp-cr-213-2004

A test piece is measured at not less than two levels. The determination is made in duplicate. The difference between the two results shall be less than 20% of the greater value but shall not exceed 10 μg (5). Otherwise a third determination shall be performed. The values shall then be reported.

6.2 Determination of the moisture content (ISO 823)

Weigh each test piece in the same state as at the time of sampling (see Note) to an accuracy of 0.01 g.

(4) To be investigated further.

(5) Further study is necessary to justify this figure.

Dry each test piece at a temperature of $(103 \pm 2)^\circ\text{C}$ to constant mass (6).

After cooling in dry atmosphere, weigh it with the same accuracy as before, rapidly enough to avoid an increase of moisture content greater than 0,1%.

Note - The first weighing shall be carried out immediately after sampling. If this is impossible, all precautions are to be taken to avoid variations of moisture content between sampling and weighing.

The test piece is weighed to an accuracy of 0,1% immediately after sealing and again immediately after testing, in order to calculate the moisture content of the test pieces after conditioning. (For very accurate measurements the weight of the sealing material shall be subtracted).

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6.3 Determination of the formaldehyde emission

The test piece is put into the testroom with standard conditions and a fixed ventilation rate (n). The ventilation rate (n) divided by the specific loading ($a \text{ m}^2/\text{m}^3$) gives a certain level of n/a in m/h. The test shall be made at least at two levels of n/a, between 0 and 5 m/h. The lowest and highest level shall differ by at least 2 m/h (7). Usually, it is necessary to make a measurement at the level of $n/a = 0,5$. The rate of ventilation shall be between 0 and $10,0 \text{ h}^{-1}$.

After a period in which the formaldehyde emission has come to a steady state the air is lead through the gas absorption bottle for a specified period of time. Steady state is assumed to be reached, when the

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- (6) Constant mass is considered to be reached when the results of two successive weighing operations carried out at an interval of 6 h do not differ by more than 0,1% of the mass of the test piece.
 - (7) During the period of investigation, the test will be done at three levels of n/a.

difference between two measurements is $\leq 10\%$ of the greater value but not more than $10 \mu\text{g}$ (8).

At each level of n/a two measurements shall be made. The air volume is measured for each measurement. The formaldehyde in each absorption bottle is measured spectrophotometrically.

Note - With a low ventilation rate e.g. $0,5 \text{ h}^{-1}$ the steady state is reached in about half a day; with a high ventilation rate e.g. 5 h^{-1} the steady state is reached in about half an hour (9).

7 Results

7.1 Moisture content (ISO 823)

The moisture content H of each test piece shall be calculated to the nearest 0.1% using the following formula:

$$H = \frac{m_0 - m_1}{m_1} \times 100$$

where

m_0 is the mass, in grams, of the test piece at the time of sampling

m_1 is the mass, in grams, of the test piece after drying.

The moisture content of a board or of a batch of particle boards is equal to the mean arithmetical value of the moisture contents of all the relevant test pieces. It shall be stated to the nearest 0,1%.

(8) Further study is necessary to justify this figure.

(9) To be investigated further.