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## Adhesives — Test methods for the selection of adhesives for indoor wood products

*Adhésifs — Méthodes d'essai pour la sélection des adhésifs destinés  
aux produits en bois pour l'usage intérieur*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 26842 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

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# Adhesives — Test methods for the selection of adhesives for indoor wood products

**SAFETY STATEMENT** — Persons using this document should be familiar with normal laboratory practice, if applicable. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory conditions.

## 1 Scope

This International Standard gives guidelines for the selection, by means of durability tests, of adhesives for use in wood products placed in indoor environments.

A series of exposure cycles at various temperatures and humidities is provided to verify that the adhesive selected, or a product bonded with the adhesive, meets the necessary durability requirements.

This International Standard is intended to help the user not only to select a suitable adhesive but also to evaluate adhesives and adhesively bonded wood products.

**NOTE** When actual wood products are tested using this method, the test results may not be comparable due to the fact that the test laboratory will not normally have had adequate control over the way the product was assembled.

This International Standard is not intended for use in the qualification of structural components.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 6238, *Adhesives — Wood-to-wood adhesive bonds — Determination of shear strength by compressive loading*

ISO 9424, *Wood-based panels — Determination of dimensions of test pieces*

ISO 16999, *Wood-based panels — Sampling and cutting of test pieces*

## 3 Principle

Test specimens or actual products that have been bonded with the adhesive under test are placed in chambers at a specified temperature and humidity for a length of time and/or number of cycles depending on the durability grade under consideration. On completion of this exposure, the length of any delamination at the bond line is determined as a percentage of the overall length. If the length of delamination does not exceed 10 %, the adhesive can be certificated as complying, under the test conditions used, with the requirements of the durability grade under consideration.

## 4 Apparatus

NOTE Apparatus may be available which includes the features of all the chambers specified in 4.1 to 4.4, in which case it will not be necessary to have one of each.

**4.1 Conditioning chamber**, capable of being maintained either at a temperature of  $(23 \pm 2) ^\circ\text{C}$  and a relative humidity of  $(50 \pm 10) \%$  or at a temperature of  $(27 \pm 2) ^\circ\text{C}$  and a relative humidity of  $(65 \pm 10) \%$ .

**4.2 Dry-heat chamber**, capable of being maintained at temperatures of  $(40 \pm 2) ^\circ\text{C}$ ,  $(50 \pm 2) ^\circ\text{C}$  and  $(80 \pm 2) ^\circ\text{C}$ , with no provision for humidity control.

NOTE These temperatures may be experienced in the bottom of ships sailing in tropical seas or on heated floors.

**4.3 Cold chamber**, capable of being maintained at temperatures of  $(-5 \pm 3) ^\circ\text{C}$ ,  $(-20 \pm 3) ^\circ\text{C}$  and  $(-40 \pm 3) ^\circ\text{C}$ , with no provision for humidity control.

NOTE These temperatures may be experienced inside warehouses in cold latitudes.

**4.4 Humidity chambers**, capable of being maintained at relative humidities of 20 %, 30 %, 85 % and 90 %, and fitted with the following:

- a) equipment capable of maintaining the temperature at  $(30 \pm 2) ^\circ\text{C}$  and  $(50 \pm 2) ^\circ\text{C}$  and measuring it to within  $\pm 2 ^\circ\text{C}$ ;
- b) equipment capable of measuring the relative humidity to within  $\pm 3 \%$ .

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## 5 Specimens

### 5.1 Preparation and number

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Test specimens shall be parallel two-ply laminates of dimensions 300 mm (width)  $\times$  300 mm (length)  $\times$  7,5 mm (thickness), prepared in accordance with ISO 6238, ISO 9424 and ISO 16999.

For each durability grade and specific set of test conditions within the grade, a minimum of ten specimens is required.

If appropriate, actual adhesively bonded products can be tested.

### 5.2 Conditioning

Prior to testing, condition all specimens in the conditioning chamber (4.1) at the standard atmospheric conditions of  $(23 \pm 2) ^\circ\text{C}$  and  $(50 \pm 10) \%$  RH or  $(27 \pm 2) ^\circ\text{C}$  and  $(65 \pm 10) \%$  RH for a minimum of 88 h.

Conditioning shall be carried out after the adhesive has been cured in accordance with the material specification or as specified by the manufacturer of the adhesive.

## 6 Durability grades

Four durability grades are specified, each representing a different type of use, i.e. the different conditions of temperature and humidity which different adhesively bonded wood products will experience in service:

- **durability grade 1** applies to semi-outdoor use (e.g. window frames and flooring exposed to the sunlight near windows);
- **durability grade 2** applies to high-durability indoor use (e.g. chair legs, fixtures, musical instruments);



- **durability grade 3** applies to medium-durability indoor use (e.g. panels, cabinets, doors);
- **durability grade 4** applies to low-durability indoor use (e.g. pencil boxes, coasters).

Annex A gives a typical example of groups of adhesives classified by durability grade, the resistance of the adhesives to temperature and humidity having been determined, not by measuring delamination at the bond line as in this International Standard, but by measuring the shear strength of the bond after exposure to the temperature and humidity conditions specified for the grade concerned.

## 7 Durability tests

The following four tests, which take into consideration the meteorological conditions of service and transport, shall be used when testing to confirm a particular durability grade:

- **Test A — Cyclic hot/cold test**, intended for testing using temperature variation only;
- **Test B — Cyclic humid/dry test**, intended for testing at a fixed temperature using humidity variation only;
- **Test C — Hot and humid test**, intended to represent the conditions of service or transport in tropical regions;
- **Test D — Hot and dry test**, intended to represent the conditions of service or transport in desert regions.

Details of these tests are given in Tables 1 and 2.

Usually, test A and test B are required, while test C and test D can be added in order to confirm the performance of the adhesive under specific conditions of service or transport.

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## 8 Procedure

Select a durability grade based on the conditions in which the wood product is expected to be used (see Clause 6) and then select suitable durability tests based on the expected meteorological conditions of service and transport (see Clause 7).

Conduct the durability tests in accordance with Table 1 and Table 2, placing the test specimens in the chamber appropriate to the particular test:

- For test A, place the specimens in a cold chamber (4.3) for the specified length of time, then immediately transfer them to a dry-heat chamber (4.2) for the specified length of time. Carry out the number of cycles specified in Table 1.
- For test B, place the specimens in a humidity chamber (4.4) at the higher of the two humidities for the specified length of time, then immediately transfer them to a humidity chamber (4.4) at the lower of the two humidities for the specified length of time. Carry out the number of cycles specified in Table 1.
- For tests C and D, place the specimens in a humidity chamber (4.4) for the specified length of time.

Except when transferring the specimens from one chamber to another, do not remove them from the chamber until the test has been completed.

At the end of the final test period, measure and record the total length of delamination of each specimen at the bond line.