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**Adhesives — Determination of the time to  
rupture of bonded joints under static load**

*Adhésifs — Détermination du temps jusqu'à la rupture de joints collés  
soumis à une charge statique*

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International Organization for Standardization  
Case postale 56 • CH-1211 Genève 20 • Switzerland  
Internet iso@iso.ch

Printed in Switzerland

## 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.

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.

International Standard ISO 15109 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

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# Adhesives — Determination of the time to rupture of bonded joints under static load

## 1 Scope

This International Standard describes a procedure for the determination of the time to failure of a bonded joint, using a specimen which is statically loaded under specified conditions. This method can only be used for comparing adhesives, and the results cannot be used for design purposes.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 291:1997, *Plastics — Standard atmospheres for conditioning and testing*.

ISO 4587:1995, *Adhesives — Determination of tensile lap-shear strength of rigid-to-rigid bonded assemblies*.

ISO 4588:1995, *Adhesives — Guidelines for the surface preparation of metals*.

ISO 10365:1992, *Adhesives — Designation of main failure patterns*.

ISO 13895:1996, *Adhesives — Guidelines for the surface preparation of plastics*.

## 3 Principle

The time to rupture of a bonded lap-shear specimen is measured under a specific load.

## 4 Apparatus

**4.1 Test rig**, capable of holding specimens securely at one end, in the vertical position, the other end of each specimen being linked to a fixture capable of receiving different weights in order to vary the load. The direction of the load shall coincide with the longitudinal axis of the specimen. The rig shall be capable of loading several specimens simultaneously. It shall be designed such that any vibration associated with breakage of one specimen will not influence the remaining specimens. The rig shall be placed in an environmentally controlled cabinet or be designed such that the specimens are tested under controlled conditions.

**4.2 Timer**, capable of measuring the time to failure of a specimen to an accuracy of  $\pm 1\%$ .

## 5 Specimens

### 5.1 Adherend material

The adherends shall be made of metal, rigid plastic, rigid fibre-reinforced plastic, wood or wood-based material.

### 5.2 Shape and dimensions

Specimens shall be as shown in figure 1 for all materials except wood and as shown in figure 2 for wood. The thickness of the adherends shall be sufficient to avoid significant plastic deformation.

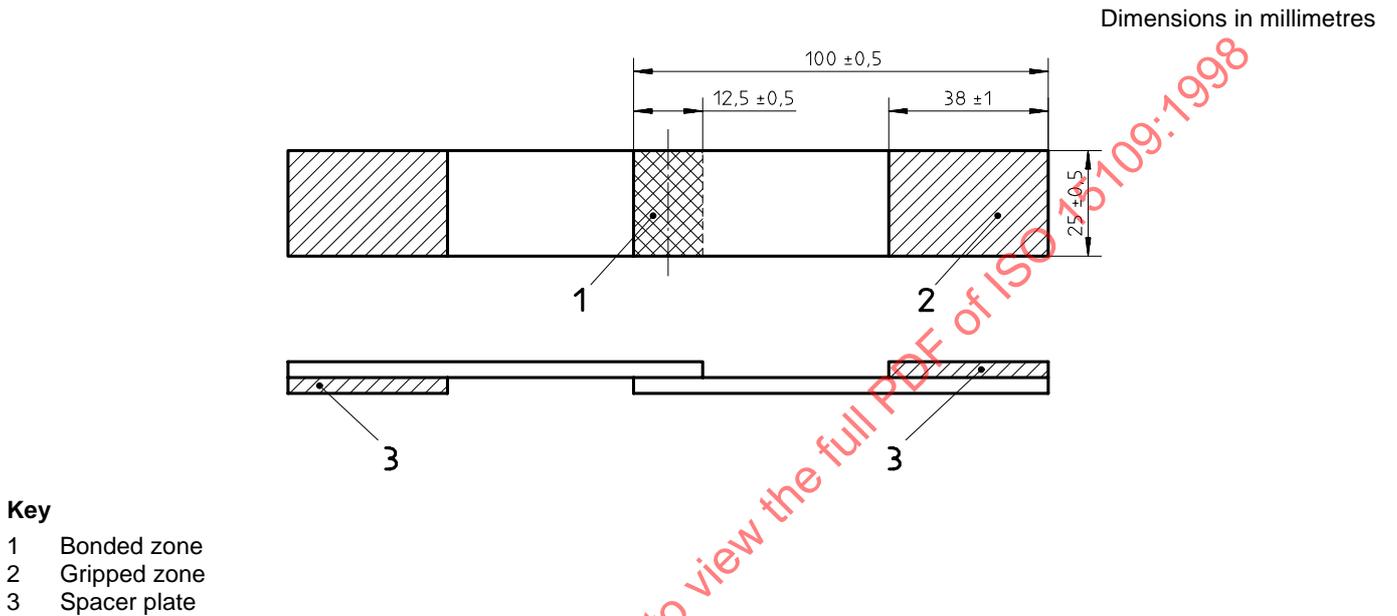


Figure 1 — Test specimen for all adherend materials except wood

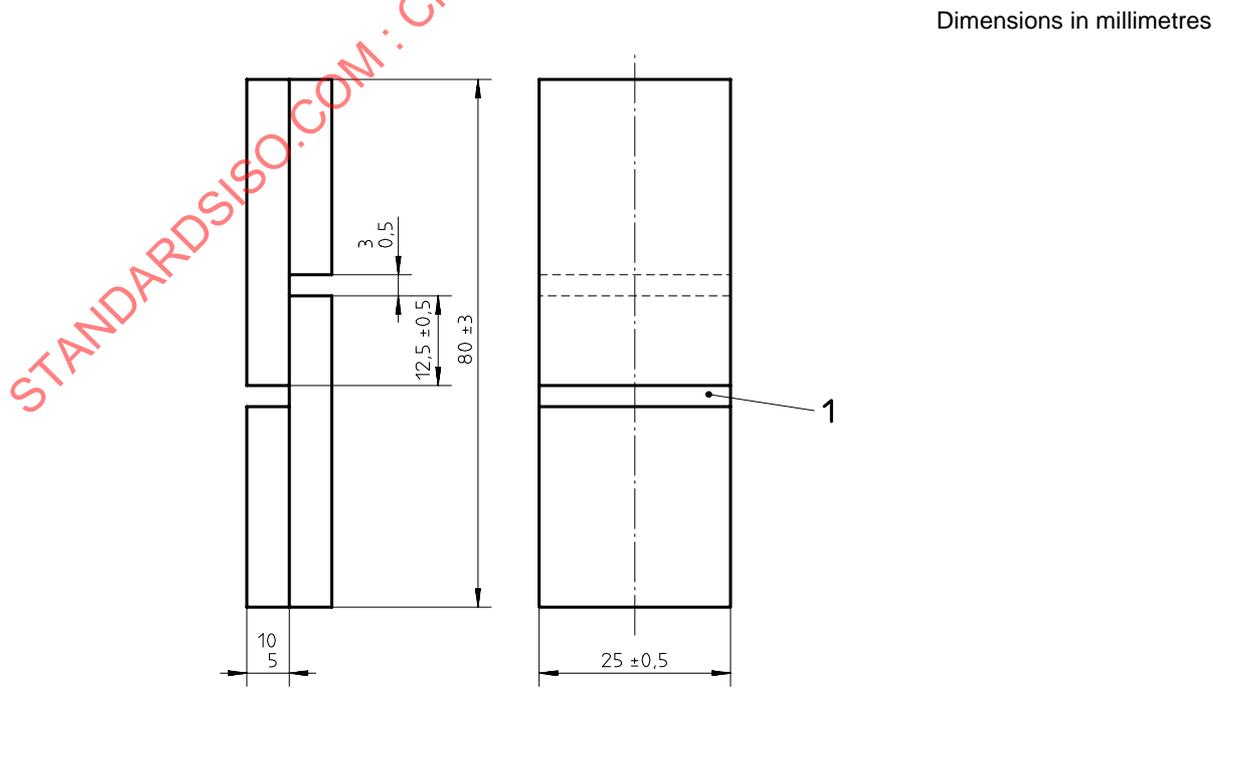


Figure 2 — Test specimen for wooden adherends

### 5.3 Cleaning and surface treatment of adherends

The cleaning and surface treatment of adherends other than wood shall be in accordance with the instructions of the adherend manufacturer and/or adhesive manufacturer, and/or shall be chosen from the methods described in ISO 4588 in the case of metals or ISO 13895 in the case of plastics. In the case of wood, the adherends shall be free of dust, dirt and any other surface contaminants.

### 5.4 Preparation of specimens

Prepare specimens other than wood in accordance with the procedure described in ISO 4587. In the case of wood, prepare specimens by bonding two adherends together and using a saw to make cuts in the specimen as shown in figure 2. Apply and cure the adhesive in accordance with the manufacturer's recommendations. Control the bond line thickness by appropriate means, such as glass spheres or wire spacers. When using glass spheres, the content shall not exceed 0,5 % of the mass of the adhesive. When using wire spacers, prepare the specimens in such a way that the final test piece does not include the area containing the wire.

The bond line thickness shall be reported in the test report.

### 5.5 Conditioning and testing atmosphere

Condition and test the specimens in one of the standard atmospheres specified in ISO 291.

### 5.6 Number of specimens

Prepare and test at least three specimens for each stress investigated.

## 6 Procedure

Attach the specimens to the test rig. Allow them to reach equilibrium in the controlled conditions selected for the test. Using weights, carefully apply the loads necessary to obtain the required stresses.

NOTE — It is usual to investigate stresses which are a percentage of the tensile lap-shear strength determined in accordance with ISO 4587.

Record the time to failure of each specimen.

Determine the failure pattern for each specimen, in accordance with ISO 10365.

## 7 Expression of results

Record graphically the stress investigated versus the average time to failure, plotting the stress as the ordinate and the time to failure as the abscissa on a logarithmic scale.

## 8 Precision

The precision of this test method is not known because inter-laboratory data are not available. When inter-laboratory data are obtained, a precision statement will be added at the following revision.

## 9 Test report

The test report shall include the following information:

- a) a reference to this International Standard;
- b) all details necessary for identification of the adhesive tested, including type, source and manufacturer's code number;
- c) all details necessary for complete identification of the adherends used, including their dimensions and the method of preparing the surfaces prior to bonding;
- d) the bond line thickness;
- e) the atmosphere used for conditioning and testing;
- f) the number of specimens tested;
- g) the graph of stress versus time to failure;
- h) the failure pattern for each specimen;
- i) the date of the test.

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