

INTERNATIONAL
STANDARD

ISO
13445

First edition
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**Adhesives — Determination of shear
strength of adhesive bonds between rigid
substrates by the block-shear method**

iTeh STANDARD PREVIEW

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*Adhésifs — Détermination de la résistance en cisaillement d'adhésifs de
joints collés par la méthode de cisaillement entre éléments massiques*

ISO 13445:1995

<https://standards.iteh.ai/catalog/standards/sist/1c5cbf74-a954-454a-a9dd-6128d7726633/iso-13445-1995>



Reference number
ISO 13445:1995(E)

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 13445 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

[ISO 13445:1995](#)

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Adhesives — Determination of shear strength of adhesive bonds between rigid substrates by the block-shear method

1 Scope

This International Standard specifies a method for the determination of the shear strength of adhesives used to bond materials with elastic moduli higher than the elastic modulus of the adhesive. The method provides an estimate of the shear strength of an adhesive on various machinable and non-machinable substrate materials.

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 291:1977, *Plastics — Standard atmospheres for conditioning and testing*.

ISO 7500-1:1986, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tensile testing machines*.

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

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 shear stress: The force applied parallel to a flat adhesive joint, divided by the bond area of the joint.

3.2 shear strength: The maximum shear stress sustained by an adhesive joint during a shear test.

4 Principle

Blocks, plates or discs are bonded together, and the maximum force required to shear them apart is determined. The method is particularly applicable to the testing of bonds between ceramic parts, glass parts, magnet mouldings and plastic parts having one flat face where machining would be difficult or impractical.

5 Apparatus

5.1 Test machine, with a capacity of not less than 45 kN in tension. The machine shall conform to the requirements of ISO 7500-1.

5.2 Shearing fixture, consisting of a specimen-holding block and a shearing tool (see figures 1 and 2). Adherends measuring up to 80 mm × 80 mm × 13 mm can be held in the block, while the shearing tool can be used with adherends measuring up to 30 mm × 30 mm × 13 mm. A test specimen with adherends approximately of these dimensions is shown in figure 3a). For test specimens having two smaller adherends as shown in figure 3b), an adapter plate can be inserted into the specimen-holding block (see figure 4) to keep the shearing tool in its guides and to ensure the specimen is located under the clamp.

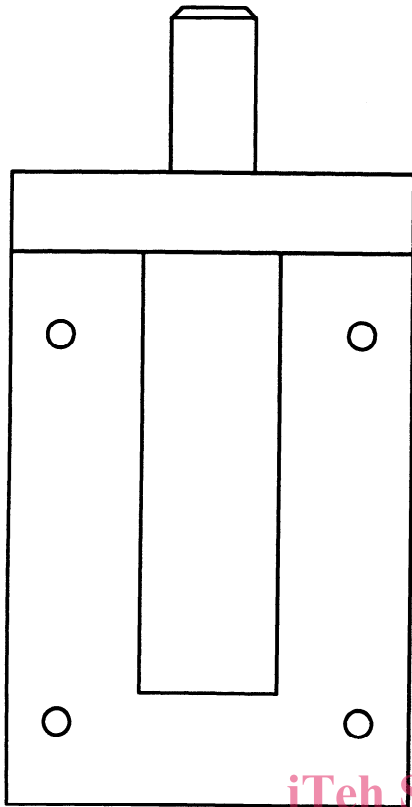


Figure 1 — Specimen-holding block

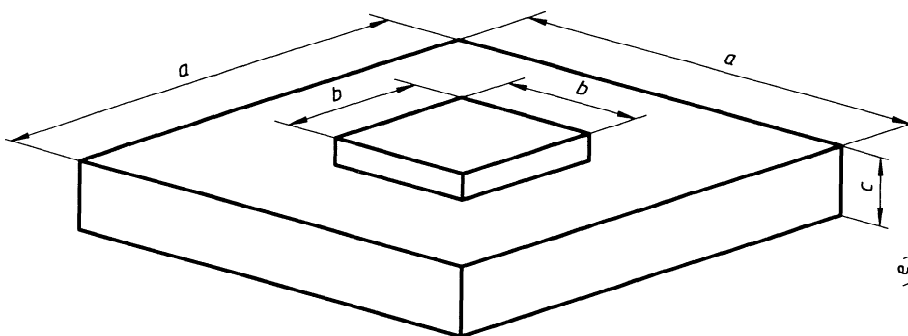


Figure 2 — Shearing tool

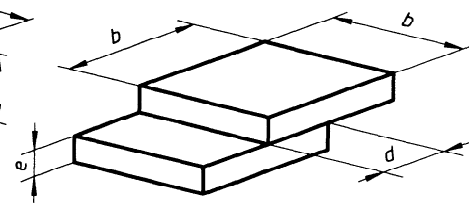
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a) Plastic, metal, ceramic or wood to glass



b) Plastic, metal, ceramic or wood to the same material or to one of the other materials

- a: 75 mm ± 1 mm
- b: 25 mm ± 0,2 mm
- c: 13 mm ± 1 mm
- d: 12 mm < d ± 0,2 mm < 13 mm
- e: 6 mm for metal adherends, 13 mm for others

Figure 3 — Typical specimens after assembly

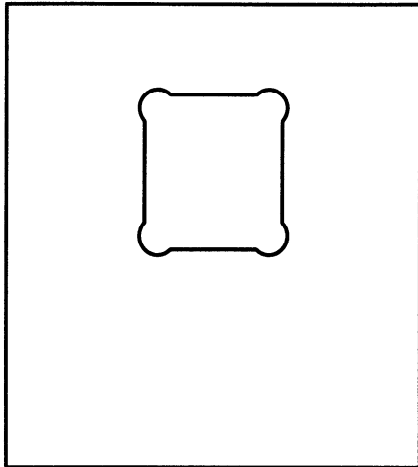


Figure 4 — Adapter for small specimens of the size shown in figure 3 b)

6 Test specimens

6.1 Adherend sizes shall be as follows:

- a) metal blocks: 25 mm × 25 mm × 6 mm;
- b) glass plates: 75 mm × 75 mm × 13 mm;
- c) other materials: 25 mm × 25 mm × 13 mm.

NOTES

1 Other adherend dimensions, within the limits of the shearing-fixture capacity, may be used depending on the application, provided the specimens are thick enough to avoid deformation occurring.

2 This method is not applicable to thin adherends with which deformation of the specimen would occur.

6.2 Prepare the adhesive and apply it in accordance with the adhesive manufacturer's recommendations. Bond the adhesive-coated adherends in accordance with the procedure under investigation. Assemble straight-sided adherends such that the thrust surfaces of the specimen are parallel to within $\pm 5 \mu\text{m/mm}$. Determine the thickness of the adhesion layer to within 0,02 mm using suitable equipment.

6.3 Remove immediately any excess adhesive squeezed out during assembly. Figure 3 shows typical specimens after bonding.

6.4 Test a minimum of five specimens.

7 Conditioning

The specimens shall be conditioned and tested in one of the standard atmospheres specified in ISO 291.

8 Procedure

8.1 Mount the shearing fixture in the test machine with the specimen-holding block on top.

8.2 Place an assembled specimen in the shearing fixture in such a way that one of the adherends is held by the block and the other engaged by the shearing tool (see figure 5). Centre the specimen in the shearing tool so that no turning moment is applied to the specimen during shearing. Close the toggle clamp on the rear of the specimen-holding block to keep the specimen (or adapter) located against the shearing tool.

8.3 Test the specimen using a crosshead speed of 1,5 mm/min. Record the maximum force sustained by the specimen.

8.4 Examine the adherends after the test and determine the failure pattern in accordance with ISO 10365.

8.5 Repeat the procedure for the remaining specimens.

9 Expression of results

Calculate the maximum shear stress for each specimen by dividing the maximum force by the bond area. Average the maximum shear stresses for all replicates to determine the average shear strength. Express the shear stress and shear strength in megapascals.

10 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.

11 Test report

The test report shall include the following information:

- a) a reference to this International Standard;

- b) all details necessary for complete identification of the adhesive tested, including type, source and manufacturer's code numbers;
- c) all details necessary for complete identification of the adherends used, including dimensions and orientation in the shearing fixture, conditioning of specimens, and the method of cleaning and preparing the surface prior to bonding;
- d) the quantity of adhesive applied and the bonding conditions used;
- e) the average thickness of the adhesive layer after formation of the bond, to within 0,02 mm, and the way in which the thickness was measured;
- f) the temperature at which the test was performed;
- g) the number of specimens tested;
- h) the maximum shear stress for each specimen;
- i) the average shear strength;
- j) the failure-pattern designation for each specimen, in accordance with ISO 10365.

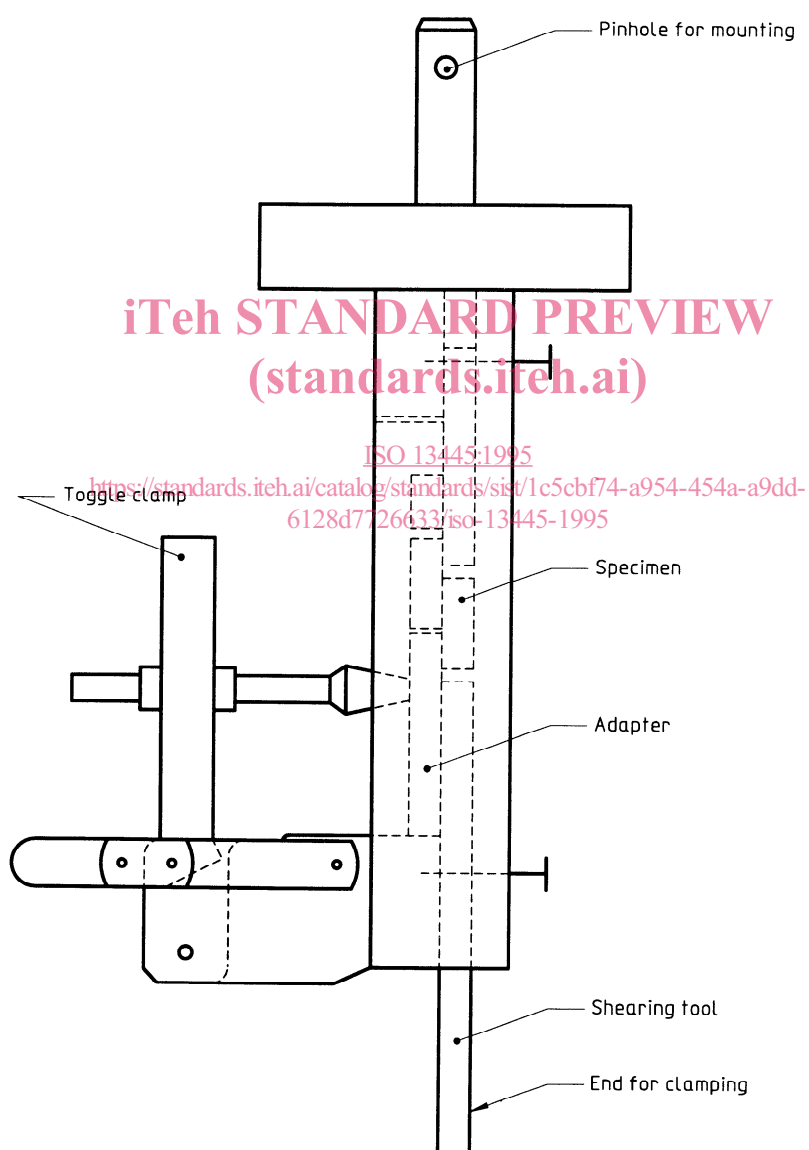


Figure 5 — Side view of shearing fixture with specimen

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