INTERNATIONAL STANDARD

ISO 10123

First edition
1990-12-01

Adhesives — Determination of shear strength of anaerobic adhesives using pin-and-collar specimens

Adhésifs — Détermination de la résistance au cisaillement des adhésifs anaérobies sur assemblage type axe-bague

Reference number
ISO 10123:1990(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 10123 was prepared by Technical Committee ISO/TC 61, *Plastics*.

Annex A of this International Standard is for information only.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Adhesives — Determination of shear strength of anaerobic adhesives using pin-and-collar specimens

1 Scope

This International Standard specifies a method for the determination of the shear strength of anaerobic-curing liquid adhesives used for retaining cylindrical assemblies, pin-and-collar type, or for locking and sealing threaded fasteners.

This test method may also be used for other adhesives.

The test is for ranking and quality control of adhesives. The result does not necessarily reflect the performance of the materials in service and the test is not suitable for providing numerical data for design purposes.

NOTE 1 Numerical design data may be obtained from tests using the materials and configurations used in the actual structure.

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 683-9:1988, *Heat-treatable steels, alloy steels and free-cutting steels — Part 9: Wrought free-cutting steels.*

ISO 4588:1989, *Adhesives — Preparation of metal surfaces for adhesive bonding.*

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

3 Principle

The force required to shear the adhesive joint formed between a metal pin and a metal collar is determined. The static shear is calculated from this force.

4 Apparatus

4.1 Universal testing machine, complying with ISO 7500-1, which will produce failure in the test specimen at between 10 % and 80 % of the scale range. The response time of the machine shall be short enough for it not to affect the accuracy of measurement of the force being applied at the time of failure.

The registered force shall differ by no more than 1 % from that actually applied.

The machine shall have a system for applying a compressive force directly or indirectly. An example of a compression cage for use on a tensile testing machine is shown in annex A.

4.2 Test specimen support, made of hardened steel, as shown in figure 1, for positioning the test specimen on the universal testing machine.

4.3 Test specimen curing rack, as shown in figure 2, or equivalent.

5 Preparation of test specimens

Assemble not less than five specimens for each test as described below.

5.1 Each specimen shall be comprised of a pin of diameter ($12{,}675\ ^{0}_{-0{,}025}$) mm and a slip collar ($12{,}700\ ^{+0{,}025}_{0}$) mm in inside diameter and 11,10 mm $\pm$ 0,05 mm in width, both components being finished to 0,8 µm to 1,6 µm (see figure 3). The material used for the collar and pin shall be stated in the test report.

NOTE 2 Unless there is a specific requirement to test the adhesive with a specific material, low-grade carbon-steel (complying with grade 2 of ISO 683-9) is generally used and has been found to be satisfactory.

All components of the cutting oil used in the manufacture of specimens shall be completely soluble in the solvents used for degreasing and shall contain no lanolin.

5.2 Vapour-degrease all pins and collars (see ISO 4588), store them in a desiccator at 23 °C ± 2 °C, and keep them clean. Use degreased specimens within four days or discard (oxidation affects the test results after this period of time). It is permissible to soak or wash hard-greased or waxed parts in solvent prior to vapour-degreasing. Do not prime or activate unless specified for the material to be tested (if the specimen is primed or activated, state this in the test report).

5.3 Pre-assemble pins and collars before application of the adhesive, to ensure a smooth and sliding fit.

Disassemble the parts. Apply sufficient adhesive to the surface of each pin, beginning at one end, to completely cover a length corresponding to the width of the collar in its final position. Also apply sufficient adhesive to completely cover the interior of the collar.

Slip the collar over the pin completely, with a helicoidal back-and-forth movement (this operation shall not take longer than 6 s).

5.4 Rack the assembly with the fillet upwards so that the collar does not slip out of the bond area. Take care that the rack is at the required temperature, and do not place on a hot or cold surface. There shall be excess material on the leading edge of the collar; if not, apply sufficient adhesive to create a fillet.

5.5 Before application of the adhesive, an activator may be applied as recommended by the manufacturer. If an activator is used, rack the assembly with the fillet up and, using a clean cloth, carefully wipe off excess material on the leading edge of the collar.

5.6 Cure the adhesive in accordance with the manufacturer's instructions.

6 Procedure

After allowing for cure and any predetermined environmental conditioning, determine the static shear strength as follows:

Place the pin-and-collar assembly in the steel specimen support and place the support on the test device (see figure 4). Load the specimen smoothly using a constant crosshead speed between 1 mm/min and 2 mm/min.

Record the maximum load in newtons. Calculate the static shear strength τ, expressed in megapascals, using the equation

$$\tau = \frac{F}{S}$$

where

F is the maximum load, in newtons;

S is the bond area, in square millimetres.

Test not fewer than five specimens.

7 Precision

The precision of this test method is not known because inter-laboratory data are not available. Inter-laboratory data are being obtained and a precision statement will be added at the next revision.

8 Test report

The test report shall include the following information:

a) a reference to this International Standard;

b) a complete identification of the adhesive tested, including type, form, source, date manufactured and manufacturer's code number;

c) a complete identification of the material used and the method of cleaning and surface preparation prior to bonding;

d) the adhesive-application and bonding conditions used in preparing the specimens;

e) the conditioning procedure used for the specimens prior to testing;

f) the number of specimens tested;

g) the crosshead speed;

h) the average value of the maximum load and the standard deviation, as well as the average value of the shear strength.

Dimensions in millimetres

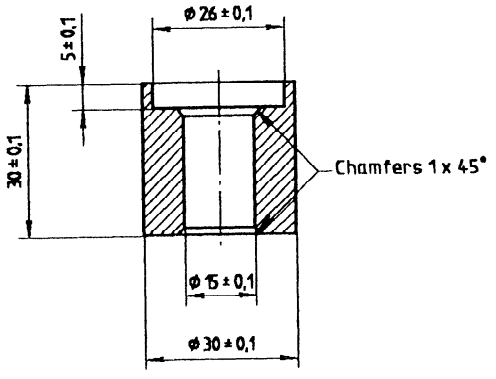


Figure 1 — Test specimen support

Dimensions in millimetres

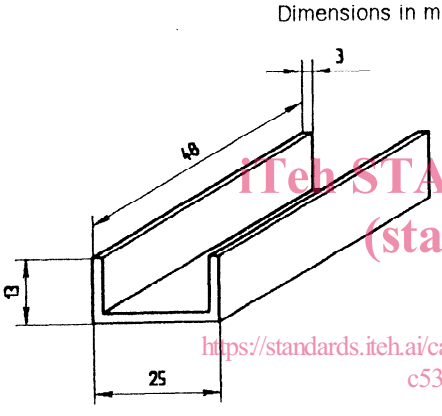
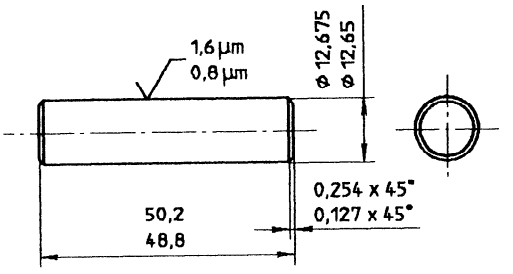
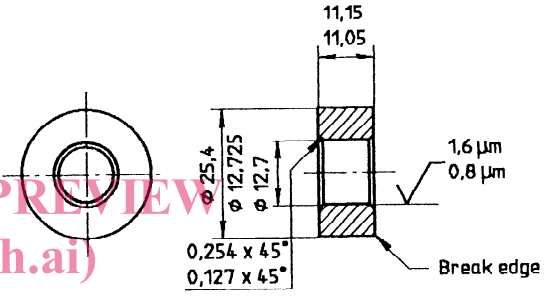


Figure 2 — Test specimen curing rack

Dimensions in millimetres
(except where otherwise stated)



a) Pin



b) Collar

Figure 3 — Pin-and-collar assembly

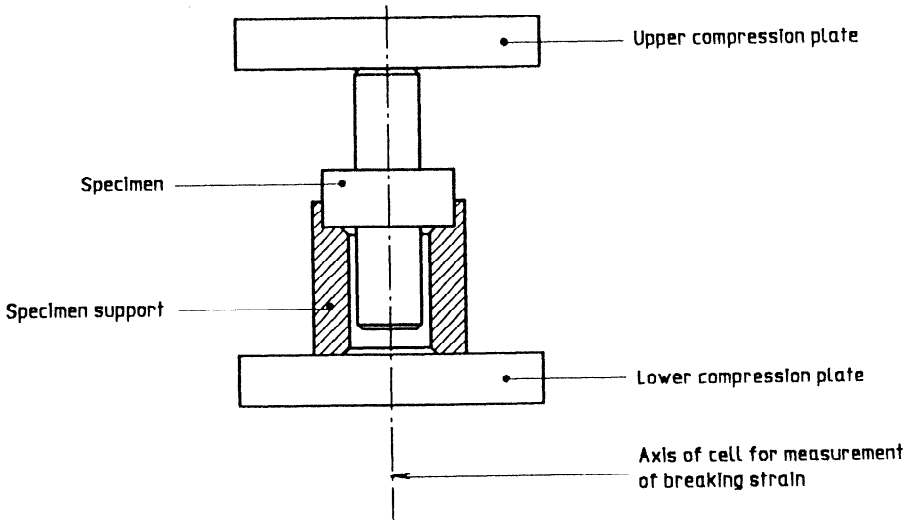


Figure 4 — Test device

Annex A
(informative)

Example of adaptor for tensile testing machine

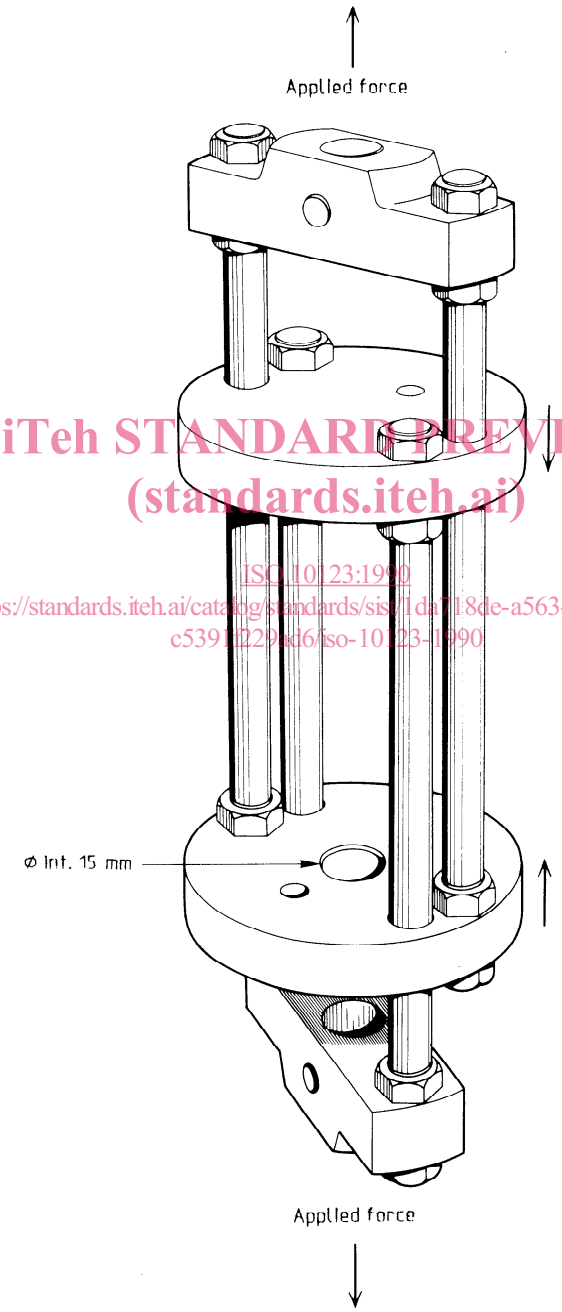


Figure A.1 — Jig for compression testing on tensile testing machines

This page intentionally left blank

UDC 678.061:621.792.3.052:620.176:620.179.4

Descriptors: plastics, adhesives, adhesive bonded joints, tests, adhesion tests, shear tests.

Price based on 4 pages