SLOVENSKI STANDARD
SIST EN 14869-1:2011

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Nadomešča:
SIST EN 14869-1:2004

Konstrukcijska lepila - Določanje strižnih lastnosti konstrukcijskih spojev - 1. del: Torzijski preskus z uporabo čelno lepljenih votlih cilindrov (ISO 11003-1:2001, spremenjen)

Structural adhesives - Determination of shear behaviour of structural bonds - Part 1: Torsion test method using butt-bonded hollow cylinders (ISO 11003-1:2001, modified)

Strukturklebstoffe - Bestimmung des Scherverhaltens struktureller Klebungen - Teil 1: Torsionsprüfverfahren unter Verwendung stumpf verklebter Hohlzylinder (ISO 11003-1:2001, modifiziert)

Adhésifs structuraux - Détermination du comportement en cisaillement de collages structuraux - Partie 1 : Méthode d'essai en torsion de cylindres creux collés bout à bout (ISO 11003-1:2001 Modifié)

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ICS:

83.180	Lepila	Adhesives

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EUROPEAN STANDARD

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English Version

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

Foreword

This document (EN 14869-1:2011) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by AENOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.

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This document supersedes EN 14869-1:2004.

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ENVIRONMENTAL STATEMENT — It is understood that some of the material permitted in this standard may have negative environmental impact. As technological advantages lead to acceptable alternatives for these materials, they will be eliminated from this standard to the extent possible.

At the end of the test, the user of the standard should take care to carry out an appropriate disposal of the wastes, according to local regulation.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies a shear test for the characterization of adhesives in a bond. The shear stress/strain properties of the adhesive (including the shear modulus) are useful for advanced design work, e.g. in finite element analysis methods.

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.

EN 923:2005+A1:2008, *Adhesives — Terms and definitions*

EN 13887, *Structural Adhesives — Guidelines for surface preparation of metals and plastics prior to adhesive bonding*

EN ISO 291, *Plastics — Standard atmospheres for conditioning and testing (ISO 291:2008)*

EN ISO 10365, *Adhesives — Designation of main failure patterns (ISO 10365:1992)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 923:2005+A1:2008 apply.

4 Principle

The shear deformation of the adhesive in an annular bond between two hollow cylinders, and the corresponding torque, are measured and recorded up to failure of the joint.

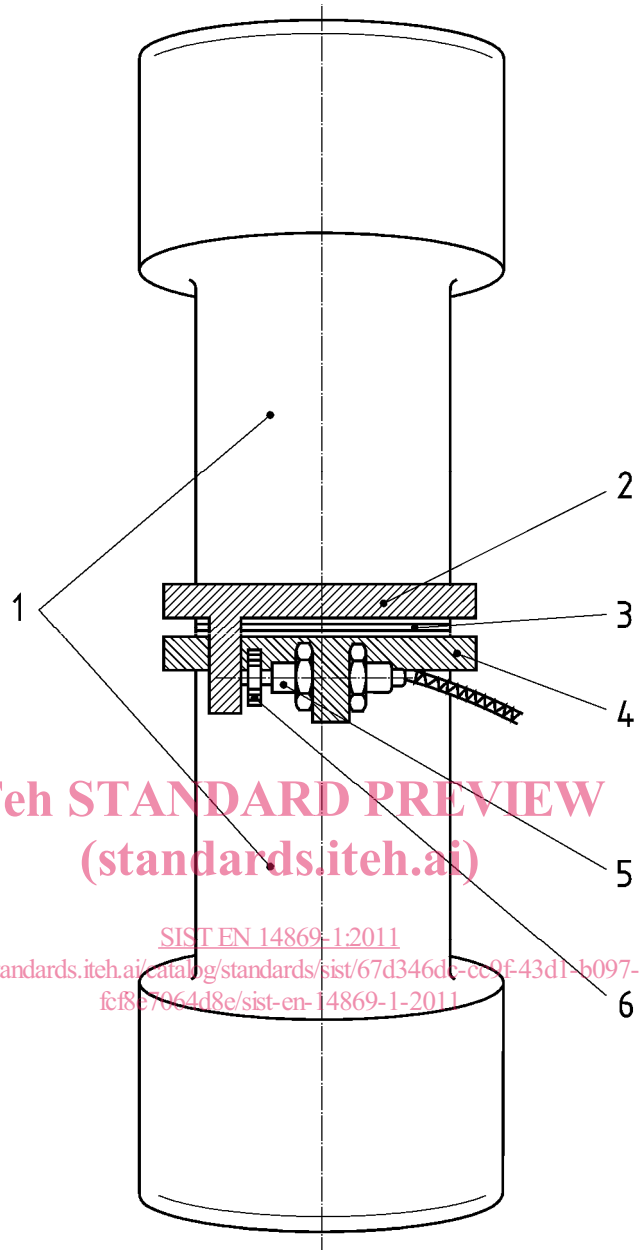
5 Apparatus

5.1 Torsion-testing machine, with a capacity of at least 300 N·m and preferably of 1 000 N·m.

Alternatively, a suitably adapted tensile-testing machine may be used. The machine shall include equipment for recording the torque instantaneously with an error of less than 1 %. The gripping heads shall be accurately aligned and, if no hydraulic gripping mechanism is available, all bolts and holes shall be precisely machined so that the specimens are mounted in the apparatus and tested free of uncontrolled loads. The machine shall be equipped with an adequately thermostatted chamber if tests are to be carried out at temperatures different from the ambient temperature.

5.2 Displacement sensor (see Figure 1), capable of measuring, as near as possible to the bond line, the displacement of the two adherends relative to each other and hence the deformation of the adhesive.

The sensor and its associated target shall be rigidly mounted on the two adherends as shown in Figure 1. The range of the displacement-measuring equipment shall be adjustable to permit the full-scale reading to be varied between 2 µm and 1 000 µm. The equipment shall be capable of measuring displacements to an accuracy of ± 1 µm. The sensor shall be of lightweight and robust construction since it is subjected to high accelerations on failure of the specimen.



Key

1 Adherends
2 Target support (on upper adherend)
3 Butt joint
4 Sensor support (on lower adherend)
5 Displacement sensor
6 Target

Figure 1 — Adhesive-layer specimen with displacement sensor mounted in the test apparatus

6 Test specimen

6.1 Preparation

6.1.1 Substrate material

Aluminium alloy or steel are suitable materials for the adherends. Other materials are acceptable provided the material (including pre-treated surface layers) has a shear modulus at least ten times higher than that of the adhesive.

6.1.2 Preparation of the surface

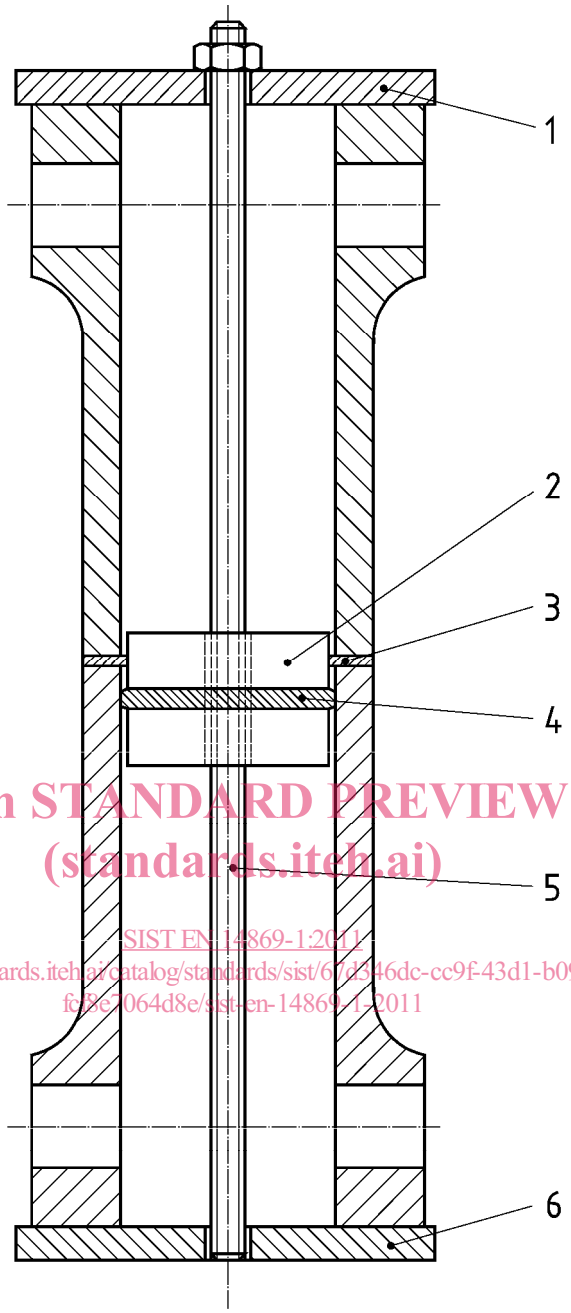
The surfaces to be bonded shall be prepared in accordance with EN 13887 or by any method leading to a cohesive failure within the adhesive layer.

6.1.3 Bonding

Prepare the specimens in accordance with the instructions of the manufacturer of the adhesive. Information about conditioning of the specimen shall be included in the test report.

A joint completely filled with adhesive is essential for the reliability of the test. The two adherends shall be bonded coaxially, with a maximum lateral displacement between their two axes of 0,002 r_o (= outer radius), and a maximum angular deviation so that the bond line thickness varies by no more than 5 % of the recommended thickness. The joining device shall prevent the adhesive from running out of the joint and any displacement of the two adherends during curing.

NOTE To achieve this, the two hollow cylinders may be aligned with the help of a plug made of polytetrafluoroethylene (PTFE) or any other suitable device. A temperature-resistant O-ring, inserted into the PTFE plug and placed just below the bond, stops the adhesive from running out of the joint. At the other ends of the adherends, two plates fastened to a threaded rod passing through the PTFE plug prevent any displacement during curing (see Figure 2).



Key

1 Top plate
2 Polytetrafluoroethylene plug
3 Adhesive layer
4 O-ring
5 Rod with screw thread
6 Bottom plate

Figure 2 — Coaxially aligned hollow cylinders in a suitable joining device