INTERNATIONAL STANDARD

ISO 36

Third edition
1999-12-01

Rubber, vulcanized or thermoplastic — Determination of adhesion to textile fabric

Caoutchouc vulcanisé ou thermoplastique — Détermination de l'adhérence aux tissus

Reference number
ISO 36:1999(E)

Contents

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 36 was prepared by ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Physical and degradation tests*.

This third edition cancels and replaces the second edition (ISO 36:1993), which has been technically revised.

Rubber, vulcanized or thermoplastic — Determination of adhesion to textile fabric

1 Scope

This International Standard specifies a method of test for measuring the force required to separate, by stripping, two plies of fabric bonded with rubber, or a rubber layer and a fabric ply bonded together.

The method is applicable when the ply surfaces are approximately plane or when they are in the form of a cylinder having an internal diameter greater than approximately 50 mm. The method is not applicable when the ply surfaces contain sharp bends, angles or other gross irregularities which cannot be excluded when cutting out test pieces.

This International Standard does not apply to coated fabrics, which are tested in accordance with ISO 2411, *Rubber- or plastics-coated fabrics — Determination of coating adhesion — Method of test,* or textile conveyor belts, which are tested in accordance with ISO 252-1, *Textile conveyor belts — Adhesive strength between constitutive elements — Part 1: Methods of test*.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 471:1995, *Rubber — Temperatures, humidities and times for conditioning and testing.*

ISO 3383:1985*, Rubber — General directions for achieving elevated or subnormal temperatures for test purposes*.

ISO 4661-1:1993, *Rubber, vulcanized or thermoplastic — Preparation of samples and test pieces — Part 1: Physical tests.*

ISO 5893:1993, *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Description.*

ISO 6133:1998, *Rubber and plastics — Analysis of multi-peak traces obtained in determinations of tear strength and adhesion strength*.

3 Term and definition

For the purposes of this International Standard, the following term and definition apply:

3.1
adhesion strength
the force per unit width required to cause a separation at the interface between the assembled components

NOTE Any separation occurring at any other point, for example inside either component under test, is a failure of the component material, and does not indicate an adhesion strength. In such cases, the adhesion strength is greater than the strength of the weakest component involved.

4 Principle

The stripping force required to separate two plies of fabric bonded with rubber, or a rubber layer and a fabric ply bonded together, is measured under specified conditions using test pieces of standard dimensions in the form of a flat strip.

5 Apparatus

5.1 Test machine, power-driven and equipped with a suitable dynamometer; it shall be capable of maintaining a substantially constant rate of traverse of the moving head during the test and shall be linked to an autographic recorder or a computer with graphic capabilities for data acquisition and processing. An inertialess dynamometer (of electronic or optical type, for example) should preferably be used.

The machine shall comply with the requirements of ISO 5893, be capable of measuring force with an accuracy corresponding to grade B, as defined in ISO 5893:1993, and have a rate of traverse of the moving grip of 50 mm/min ± 5 mm/min.

The machine shall be fitted with grips capable of holding the test piece and the ply to be separated without slipping during the test.

5.2 Autographic recorder, with a scale sufficiently large to permit easy interpretation of the trace, or **computer** with graphic capabilities and software enabling it to comply with the procedure for data processing described in ISO 6133.

6 Test piece

6.1 The test piece shall have a width of 25 mm ± 0,5 mm and shall be of sufficient length to permit ply separation during measurement over a length of at least 100 mm. The minimum thickness of the constituent components, or of one of them, shall be such that the weakest component can transmit the force necessary for separation without breaking.

The thickness shall be suitably reduced (see ISO 4661-1), if necessary, in order to ensure that the line of separation of the plies during the test lies as close as possible to the plane of the strips of test piece held in the grips (see Figure 1). For tests intended to be comparable, the test pieces shall have the same dimensions.

6.2 Whenever possible, the standard test piece shall be cut from the article and prepared in accordance with the relevant product standard, if one exists.

7 Number of test pieces

Unless otherwise specified, three test pieces shall be tested.

8 Time-interval between vulcanization and testing

Unless otherwise specified for technical reasons, the following requirements for time-intervals shall be observed:

a) For all test purposes, the minimum time between vulcanization and testing shall be 16 h.

b) For non-product tests, the maximum time between vulcanization and test shall be 4 weeks, and for evaluations intended to be comparable the tests shall be carried out, as far as possible, after the same time-interval.

c) For product tests, whenever possible, the time between vulcanization and testing shall not exceed 3 months. In other cases, tests shall be made within 2 months of the date of receipt of the product by the customer.

9 Conditioning of test pieces and temperature of test

Condition all test pieces in accordance with ISO 471. If the preparation of test pieces involves buffing, the interval between buffing and testing shall be not less than 16 h and not greater than 72 h.

For tests at standard temperature, test pieces that do not require further preparation may be tested immediately, if cut from conditioned test samples. Where additional preparation is involved, a minimum conditioning period of 3 h at standard temperature shall be allowed.

For tests at temperatures other than standard temperature, condition the test pieces at the temperature at which the test is to be conducted for a period sufficient to enable test pieces to attain substantial equilibrium in accordance with ISO 3383.

10 Procedure

Take the test piece as described in 6.1 and separate a ply of fabric or a rubber layer by hand for a distance of approximately 50 mm. The use of a scalpel or similar implement may be necessary to initiate the separation. Fix the separated ends of the test piece in the grips of the test machine (5.1), and adjust so that the tension is distributed uniformly and so that no twisting of the test piece will occur during the test. Place the body of test piece in the non-driven grip and the ply to be separated in the power-driven grip so that the angle of separation is approximately 180°. It is important to ensure that the strips of test piece held in the grips lie in the same plane.

Start the machine and continue the ply separation whilst recording on the chart recorder or in the memory of the computer (5.2) the force values over a length separation of at least 100 mm. The rate of travel of the power-driven grip shall be 50 mm/min ± 5 mm/min.

Examine the separated pieces for separation or failure.

11 Expression of results

11.1 Calculate the adhesion strength of the test piece by dividing the median peak force, determined in accordance with ISO 6133:1998 using method A, B, C, D or E as appropriate to the trace, by the width of the test piece.

Report the result as the median of the individual values obtained for the three test pieces, expressed in newtons per millimetre.

11.2 Describe the type of failure or separation using the following terminology:

a) R indicates that the failure is in the rubber layer;

b) RA indicates that the separation is between the rubber layer and the adhesive;

c) AT indicates that the separation is between the adhesive and the fabric;

d) RB indicates that the failure is in the rubber bond between two fabric plies;

e) T indicates that the failure is in the fabric;

f) RT indicates that the separation is between the rubber and the textile when no adhesive is present.

12 Test report

The test report shall include the following particulars:

a) a reference to this International Standard;

b) all details necessary for the identification of the sample;

c) the type of test piece used, and the test piece dimensions;

d) the rate of ply separation;

e) the temperature and relative humidity of the test;

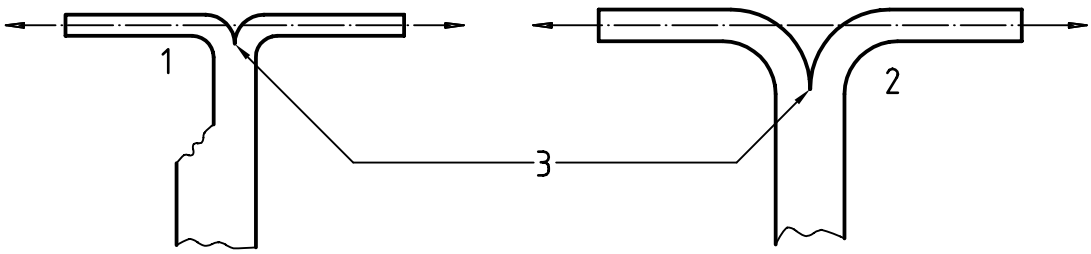
f) the nature of the interface between the assembled components, and the calculated adhesion strength;

g) the method of calculation, i.e. A, B, C, D or E;

h) the adhesion strength, calculated as described in 11.1;

i) the type of failure or separation, as described in 11.2;

j) the date of testing.



Key

1 Ideal
2 Undesirable
3 Line of separation

Figure 1 — Position of line of separation of plies