# International Standard 36

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# Rubber, vulcanized — Determination of adhesion to textile fabric

*Caoutchouc vulcanisé — Détermination de l'adhérence aux textiles*

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## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 36 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

It cancels and replaces ISO Recommendation R 36-1969, of which it constitutes a technical revision.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.





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# Rubber, vulcanized — Determination of adhesion to textile fabric

## 0 Introduction

In this revision of ISO/R 36-1969, cross-reference is made to the methods of calculating the adhesion given in ISO 6133. These are based on the number of force peaks shown on the graphical trace obtained during the test.

## 1 Scope and field of application

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 are in a cylindrical orientation 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.

## 2 References

ISO 471, *Rubber — Standard temperature, humidities and times for the conditioning and testing of test pieces.*

ISO 4661/1, *Rubber — Preparation of test pieces — Part 1 : Physical tests.* [1)]

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

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

## 3 Definition

For the purposes of this International Standard, the following definition applies :

**adhesion strength :** The force per unit length required to cause a separation at the interface of 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. Such separation should be reported and should not be considered as indicating an adhesion strength. In such cases, the adhesion strength is greater than the strength of the weakest component involved.

## 4 Principle of method

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 fitted with an autographic recorder. An inertialess dynamometer (of electronic or optical type, for example) shall preferably be used.

The machine shall comply with the requirements of ISO 5893, capable of measuring force with an accuracy corresponding to grade B, as defined in ISO 5893, and with a rate of traverse of the moving grip of 50 ± 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 Recorded chart scale,** sufficiently large to permit easy interpretation of the trace.

## 6 Test piece

**6.1** The test piece shall have a width of 25 ± 0,5 mm and shall be of sufficient length to permit ply separation 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

1) At present at the stage of draft. (Partial revision of ISO 4661-1977.)

axis of the strips of the test piece held in the grips (see the figure). For tests intended to be comparable, the test pieces shall have the same dimensions.

**6.2** The standard test piece, whenever possible, shall be cut from the article even when the surface contains curves, angles or irregularities.

## 7 Number of test pieces

Unless otherwise specified, at least two 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 testing 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

Cut test pieces shall be conditioned, immediately before testing, for a minimum of 24 h at standard laboratory temperature and standard relative humidity (see ISO 471).

The test shall be carried out at the same temperature and relative humidity as used in the conditioning procedure. The same temperature and humidity shall be used throughout any one test or series of tests intended to be comparable.

## 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 testing 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 the 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 axes of the strips of the test piece held in the grips lie in the same plane.

Start the machine and continue the ply separation whilst recording the force over a length of separation of at least 100 mm. The rate of travel of the power-driven grip shall be 50 ± 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 using method A, B or C as appropriate to the trace, by the width of the test piece.

Report the result as the average of the individual values obtained for the duplicate 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) reference to this International Standard;

b) identification of the sample;

c) the type and dimensions of the test piece;

d) the rate of ply separation;

e) the temperature and relative humidity of the test;

f) the interfaces of the assembled components and the calculated strength;

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

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

j) the date of testing.