

# SVENSK STANDARD

## SS-ISO 1827:2011



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### **Vulkat gummi och termoelast – Bestämning av skjuvmodell eller vidhäftning – Kvadrupelmetoden (ISO 1827:2011, IDT)**

**Rubber, vulcanized or thermoplastic – Determination of shear modulus and adhesion to rigid plates – Quadruple-shear methods (ISO 1827:2011, IDT)**

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Den internationella standarden ISO 1827:2011 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 1827:2011.

Denna standard ersätter SS-ISO 1827:2007, utgåva 2.

The International Standard ISO 1827:2011 has the status of a Swedish Standard. This document contains the official version of ISO 1827:2011.

This standard supersedes the Swedish Standard SS-ISO 1827:2007, edition 2.

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Denna standard är framtagen av kommittén för Gummi och gummiprodukter, SIS/TK 154.

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<b>Contents</b>	<b>Page</b>
<b>Foreword</b> .....	<b>iv</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>2</b>
<b>4.1 Method A — Determination of the shear modulus</b> .....	<b>2</b>
<b>4.2 Method B — Determination of the adhesion</b> .....	<b>2</b>
<b>5 Apparatus</b> .....	<b>2</b>
<b>6 Calibration</b> .....	<b>2</b>
<b>7 Test piece</b> .....	<b>2</b>
<b>7.1 Shape and dimensions</b> .....	<b>2</b>
<b>7.2 Preparation</b> .....	<b>3</b>
<b>7.3 Number of test pieces</b> .....	<b>4</b>
<b>8 Time interval between vulcanization and testing</b> .....	<b>4</b>
<b>9 Conditioning</b> .....	<b>4</b>
<b>10 Temperature of test</b> .....	<b>4</b>
<b>11 Procedure</b> .....	<b>4</b>
<b>11.1 Method A</b> .....	<b>4</b>
<b>11.2 Method B</b> .....	<b>5</b>
<b>12 Expression of results</b> .....	<b>5</b>
<b>12.1 Method A</b> .....	<b>5</b>
<b>12.2 Method B</b> .....	<b>6</b>
<b>13 Test report</b> .....	<b>6</b>
<b>13.1 For method A</b> .....	<b>6</b>
<b>13.2 For method B</b> .....	<b>7</b>
<b>Annex A (normative) Calibration schedule</b> .....	<b>8</b>

## 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 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1827 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This fourth edition cancels and replaces the third edition (ISO 1827:2007), of which it constitutes a minor revision to include a calibration schedule for the apparatus used (see Annex A).

# Rubber, vulcanized or thermoplastic — Determination of shear modulus and adhesion to rigid plates — Quadruple-shear methods

**WARNING** — Persons using this International Standard should be familiar with normal laboratory practice. This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

**IMPORTANT** — Certain procedures specified in this International Standard might involve the use or generation of substances, or the generation of waste, that could constitute a local environmental hazard. Reference should be made to appropriate documentation on safe handling and disposal after use.

## 1 Scope

This International Standard specifies methods for the determination of the modulus in shear and the strength of bonds of rubber to metal or other rigid plates, using rubber bonded between four parallel plates.

Method A describes the determination of the modulus in shear.

Method B describes the determination of the strength of the bonds.

The methods are applicable primarily to test pieces prepared in the laboratory under standard conditions, such as can be used to provide data for the development and control of rubber compounds and methods of manufacture of bonded shear units.

## 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.

ISO 5893:2002, *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification*

ISO 18899:2004, *Rubber — Guide to the calibration of test equipment*

ISO 23529, *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **shear modulus**

applied shear stress, calculated with respect to the bonded areas of the rubber in a test piece as specified in this International Standard, divided by the resultant shear strain in the direction of application of the stress

NOTE 1 The shear strain ( $\gamma$ ) is half the measured deformation divided by the thickness of one rubber block or element. The shear stress ( $\tau$ ) is the applied force divided by twice the area of a bonded face of one rubber block or element.

NOTE 2 The form of the test piece specified ensures that there is zero applied stress in the direction normal to the bonded surfaces, so that the deformation can be regarded as simple shear.

NOTE 3 This definition of shear modulus is sometimes referred to as the secant modulus.

## 4 Principle

### 4.1 Method A — Determination of the shear modulus

The force required to obtain a range of predetermined shear strains of a unit of standard dimensions comprising four parallelepipeds of rubber symmetrically disposed and bonded to four parallel rigid plates is measured, the forces being parallel to the bonding surfaces and, as a rule, non-destructive, i.e. of maximum values appreciably lower than the bond strength.

### 4.2 Method B — Determination of the adhesion

The force required to cause the rupture of a unit as described for method A is measured.

## 5 Apparatus

**5.1 Test machine**, complying with the requirements of ISO 5893, capable of measuring force with an accuracy corresponding to class 1, as defined in ISO 5893:2002, and with a rate of traverse of the moving grip of 5 mm/min (method A) or 50 mm/min (method B).

The test machine shall include apparatus to measure the deformation of the rubber of the test piece to an accuracy of 0,02 mm.

**5.2 Fixtures**, for holding the test pieces in the grips, provided with a universal joint to permit accurate centring of the line of action of the applied force.

**5.3 Environmental chamber**, suitable for carrying out tests at the temperature chosen or specified (see Clause 10), conforming to the requirements of ISO 23529.

## 6 Calibration

The test apparatus shall be calibrated in accordance with the schedule given in Annex A.

## 7 Test piece

### 7.1 Shape and dimensions

The test piece shall consist of four identical parallelepipedic rubber elements  $4 \text{ mm} \pm 1 \text{ mm}$  thick,  $20 \text{ mm} \pm 5 \text{ mm}$  wide and  $25 \text{ mm} \pm 5 \text{ mm}$  long, bonded on each of their two largest opposite faces to the mating faces of four rigid plates of the same width and of appropriate lengths to obtain a symmetrical double-sandwich arrangement, means being provided at the free external end of each central plate to enable it to be attached to a holding fixture. The rigid plates shall be of sufficient thickness to withstand bending. A typical arrangement is shown in Figure 1.