

# INTERNATIONAL STANDARD

# ISO 6945

Second edition  
1991-12-01

**AMENDMENT 1**  
1998-12-15

---

---

## Rubber hoses — Determination of abrasion resistance of the outer cover

### AMENDMENT 1

*Tuyaux en caoutchouc — Détermination de la résistance à l'abrasion du  
revêtement extérieur*

*AMENDEMENT 1*

This material is reproduced from ISO documents under International Organization for Standardization (ISO) Copyright License Number IHS/ICC/1996. Not for resale. No part of these ISO documents may be reproduced in any form, electronic retrieval system or otherwise, except as allowed in the copyright law of the country of use, or with the prior written consent of ISO (Case postale 56, 1211 Geneva 20, Switzerland, Fax + 41 22 734 10 79), IHS or the ISO Licensor's members.



Reference number  
ISO 6945:1991/Amd.1:1998(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.

Amendment 1 to ISO 6945:1991 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Hoses (rubber and plastics)*.

© ISO 1998

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization  
Case postale 56 • CH-1211 Genève 20 • Switzerland  
Internet iso@iso.ch

Printed in Switzerland

## Rubber hoses — Determination of abrasion resistance of the outer cover

### AMENDMENT 1

Page 3

#### Clause 6

Replace the second paragraph by the following text:

“Place the abrading tool (3.3) in contact with the test piece, apply the vertical static force  $F$  as specified in the relevant product standard, and start the machine (3.1). If the product standard does not specify the force  $F$ , apply a vertical static force of  $50 \text{ N} \pm 0,5 \text{ N}$  and start the machine. Continue until the specified number of cycles has been completed, then remove the test assembly from the apparatus and re-weigh the test piece either on or off the mandrel, as for the initial weighing. It is important to remove any loose particles of cover compound prior to weighing. Record the mass ( $m_2$ ) and the number of cycles completed.

NOTE 2 For guidance in preparing requirements in product standards, the static force should be 50 N or 100 N, the latter being selected where higher abrasion resistance of the cover is expected.”

---

---

**ICS 23.040.70**

Price based on 1 page

---

---

# INTERNATIONAL STANDARD

**ISO**  
**6945**

Second edition  
1991-12-01

---

---

## **Rubber hoses — Determination of abrasion resistance of the outer cover**

*Tuyaux en caoutchouc — Détermination de la résistance à l'abrasion du  
revêtement extérieur*



Reference number  
ISO 6945:1991(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 6945 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Sub-Committee SC 1, *Hoses (rubber and plastics)*.

This second edition cancels and replaces the first edition (ISO 6945:1983), of which it constitutes a technical revision.

© ISO 1991

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

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

Printed in Switzerland

# Rubber hoses — Determination of abrasion resistance of the outer cover

## 1 Scope

This International Standard specifies a method for the determination of the abrasion resistance of the outer cover of rubber hoses.

This method is intended primarily for testing hydraulic hoses having textile or wire reinforcement and a nominally smooth and parallel cover, and other hoses of a similar type.

The method is not intended for predicting product abrasion life, but is suitable for the comparison of quality levels.

This International Standard does not specify the number of cycles which should be completed in each test; this number will be specified in the appropriate product specification.

## 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 471:1983, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

ISO 4957:1980, *Tool steels.*

## 3 Apparatus

**3.1 Wheel and crank arrangement**, capable of moving the abrading tool 100 mm back and forth along the test piece with sinusoidal motion at a rate of 1,25 Hz (one cycle equals 200 mm of travel). A typical arrangement is shown in figure 1.

The traversing arrangement shall be designed to ensure that:

- the mid-point of the traversed length is coincident with the mid-point of the assembled hose and mandrel;
- the axes of the abrading tool and hose are mutually perpendicular at the mid-point;
- the plane of travel is parallel to the longitudinal axis of the test piece.

**3.2 Recording device**, to record the number of cycles completed, and capable of being pre-set to terminate the test after completion of the specified number of cycles.

**3.3 Abrading tool**, manufactured from tool steel S 9 in accordance with ISO 4957, heat-treated to give a minimum hardness of HV 890.

The principal dimensions shall be as shown in figure 2. It is essential that the specified profile and surface finish are maintained, and that any extraneous material on the surface of the abrading tool is cleaned off before testing is started.

**3.4 Means of applying a vertical force  $F$** , as specified in the relevant product standard, to the abrading tool at the point of contact with the test piece.

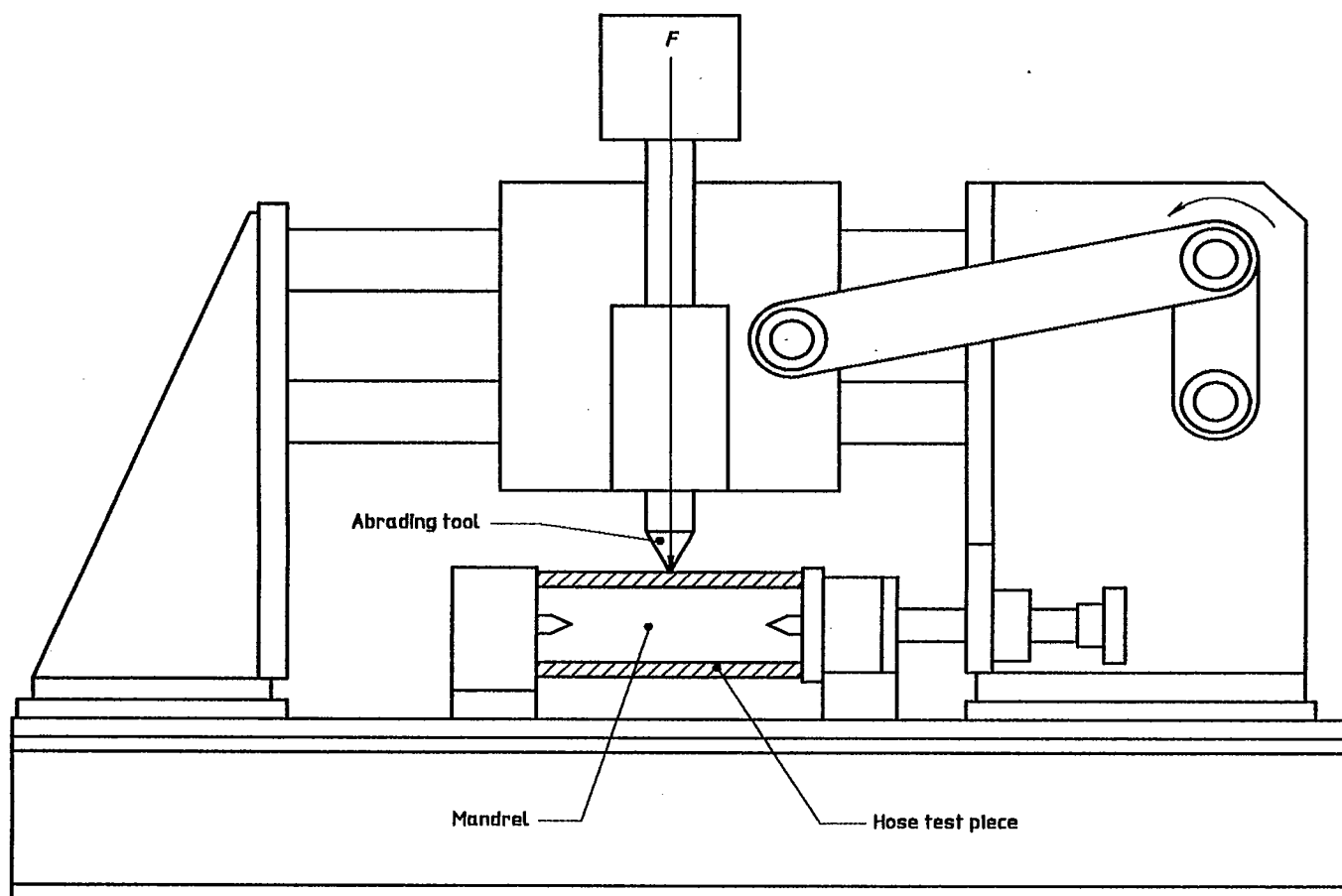
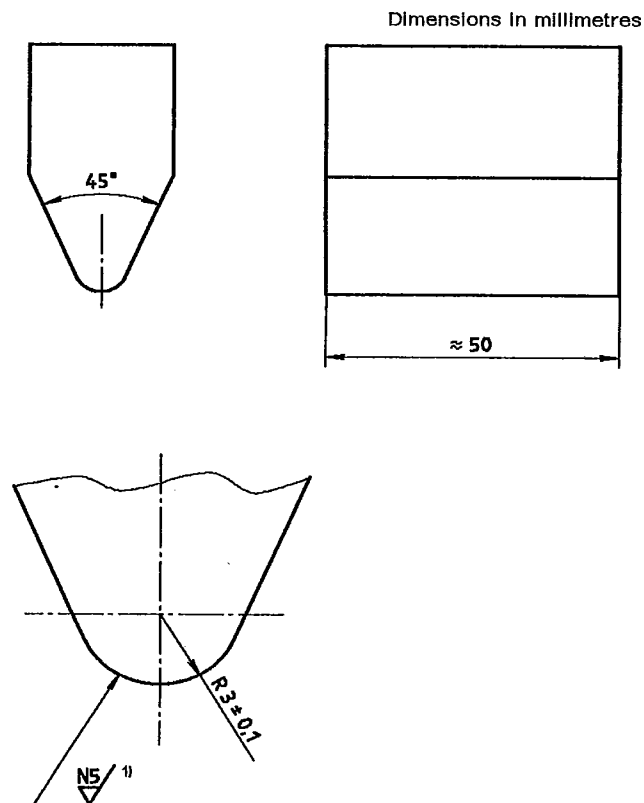


Figure 1 — Typical test apparatus





1) The roughness grade N5 corresponds to a roughness value  $R_a$  of  $0,4 \mu\text{m}$ .

**Figure 2.** — Dimensional details of a typical abrading tool

**3.5 Mandrel**, 150 mm long, on to which the test piece will fit tightly.

It is essential that the mandrel is a tight fit in the test piece to prevent distortion of the test piece under the action of the reciprocating abrading tool.

For accurate determinations, it is recommended that the mandrel is made of lightweight materials and is of hollow section, so that it is capable of supporting the abrading load but its mass is kept to an absolute minimum. If a solid mandrel is used, this shall be removed prior to weighing the test piece, taking care to avoid loss of material from the hose lining.

#### 4 Test pieces

Each test piece shall be a sample of hose of length  $150 \text{ mm} \pm 0,5 \text{ mm}$ . A minimum of three test pieces shall be tested.

**NOTE 1** Selection of test pieces is permitted to ensure that there are no surface irregularities greater than  $0,5 \text{ mm}$  and that they are free from surface contamination.

#### 5 Conditioning of test pieces

No test shall be carried out within 24 h of manufacture.

For evaluations which are intended to be comparable, the test shall, as far as possible, be carried out after the same time interval after manufacture.

Before testing, test pieces shall be conditioned for at least 3 h at the standard temperature and humidity of  $23 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$  and  $(50 \pm 5) \%$  relative humidity or  $27 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$  and  $(65 \pm 5) \%$  relative humidity, in accordance with ISO 471; this 3 h period may be part of the 24 h interval after manufacture.

#### 6 Procedure

Weigh each test piece on or off the mandrel (3.5) and record the mass ( $m_1$ ). Mount the assembled test piece and mandrel in the apparatus, ensuring that the test piece is restrained from axial and/or rotational movement.

Place the abrading tool (3.3) in contact with the test piece, apply the vertical static force  $F$  as specified in the relevant product standard, and start the machine (3.1). Continue until the specified number of cycles has been completed, then remove the test assembly from the apparatus and reweigh the test piece, either on or off the mandrel, as for the initial weighing. It is important to remove any loose particles of cover compound prior to weighing. Remove the mass ( $m_2$ ) and the number of cycles completed.

If it becomes evident during the test that wear has taken place to an extent that the reinforcement is exposed, stop the test, remove the test assembly from the apparatus and reweigh. Record the mass and the number of cycles completed.

All weighings shall be carried out to an accuracy of  $\pm 0,01 \text{ g}$ .

#### 7 Expression of results

The loss of mass  $\Delta m$ , in grams, is given by the equation

$$\Delta m = m_1 - m_2$$

where

$m_1$  is the mass, in grams, of the test piece before testing;

$m_2$  is the mass, in grams, of the test piece after testing.

## 8 Test report

The test report shall include the following information:

- a) a reference to this International Standard;
- b) a full description of the hose tested;
- c) the temperature at which the test was carried out;
- d) the number of cycles specified;
- e) the number of cycles completed on each test piece;
- f) the vertical static force  $F$  applied;
- g) the mass of each test piece before the test;
- h) the mass of each test piece after completion of the specified number of cycles or after discontinuation of the test;
- i) the loss of mass from each test piece;
- j) the mean loss in mass of the three (or more) test pieces;
- k) any observations on the nature of wear, particularly any evidence of exposure of reinforcement;
- l) the date of the test.

ISO 6945:1991(E)

---

---

**UDC 621.643.33:620.178.16**

**Descriptors:** rubber products, hoses, rubber hoses, external linings, tests, determination, abrasion resistance, test equipment.

Price based on 4 pages

---

---