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Rubber and plastics hoses — Determination of abrasion resistance of the outer cover

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

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Rubber and plastics hoses — Determination of abrasion resistance of the outer cover

WARNING — People using this document should be familiar with normal laboratory practice. This document 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.

1 Scope

This document specifies a method for the determination of the abrasion resistance of the outer cover of rubber and plastics hoses.

This test method is suitable for hoses with inside diameters from 10 mm to 38 mm.

This method is not intended for predicting product abrasion life but is suitable for the comparison of like-cover material products.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

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 terms and definitions given in ISO 8330 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Principle

Test pieces are abraded by the abrading tool and evaluated in accordance with the number of cycles completed or the number of cycles to the reinforcement exposure.

5 Apparatus

5.1 The abrasion test machine shall be capable of moving the abrading tool (75 ± 5) mm back and forth along the test piece with rotation at (1,3 ± 0,033) Hz [(78 ± 2) rpm)] with the machine synchronized for the lateral movement (back and forth) to be completed at the same cycle rate [one cycle equals one back and

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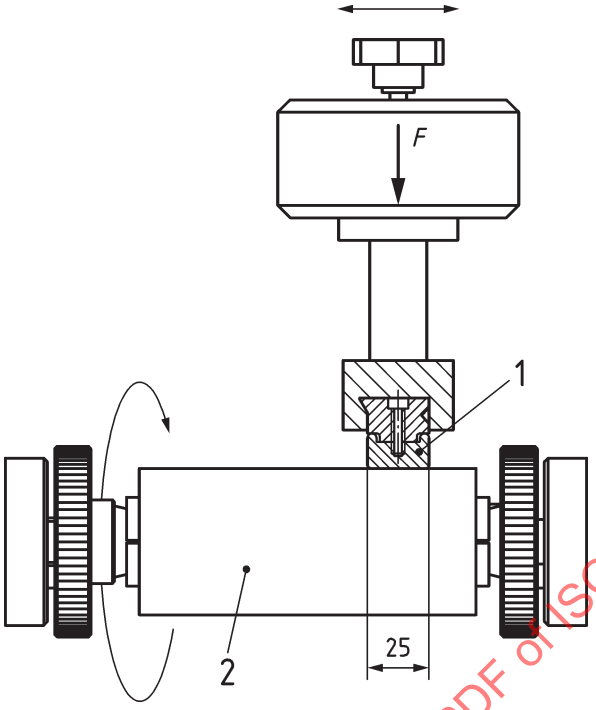
forth movement for a total of (150 ± 10) mm of travel and 360° of rotation]. A typical arrangement is shown in Figure 1.



Key

1 abrasion tool of (25 × 75) mm (see Figure 2)

2 hose sample of (140 ± 15) mm in length

Figure 1 — Typical test apparatus

The traversing arrangement shall be designed to ensure that:

a) the mid-point of the traversed length is coincident with the mid-point of the assembled hose and mandrel;

b) the axes of the abrading tool and hose are mutually perpendicular at the mid-point;

c) the plane of travel is parallel to the longitudinal axis of the test piece.

5.2 A recording device, capable of recording the number of cycles completed and of being pre-set to terminate the test after completion of the specified number of cycles.

5.3 A means of applying a vertical force, *F*, to the abrading tool at the point of contact with the test piece.

5.4 A mandrel, of appropriate length for the test apparatus, on to which the test piece fits 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 abrading tool.

For accurate determinations, the mandrel should be made of lightweight materials and should have a hollow section, so that it can support the abrading load but its mass is kept to an absolute minimum.

5.5 Abrading material, of (25 ± 2) mm × (75 ± 2) mm, P80 grit, coarse, Al_2O_3, fastened to a smooth hard surface as shown in Figure 2.

NOTE Information about P80 grit can be found in ISO 6344-2.

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Dimensions in millimetres

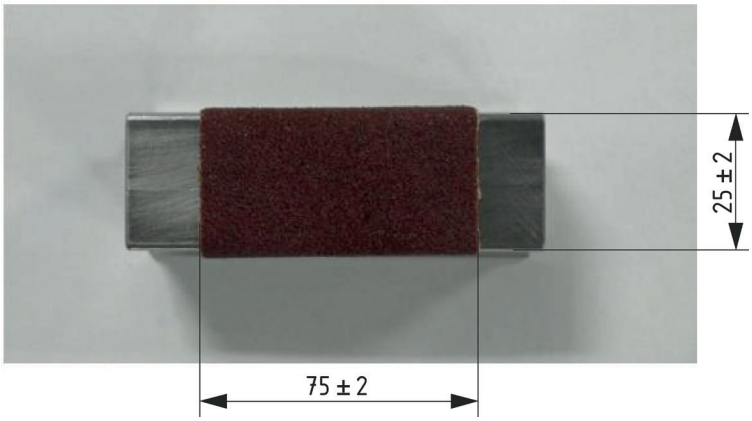

Figure 2 — Typical abrasion tool

6 Test pieces

Each test piece shall be a sample of hose of length (140 ± 15) mm. A minimum of three test pieces shall be tested.

Selection of test pieces is permitted to ensure that there are no surface irregularities greater than 0,5 mm and that they are free from surface contamination.

7 Conditioning of test pieces

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

For evaluation, which is intended to be comparable, the test shall be carried out within six months from the date of manufacture.

Before testing, test pieces shall be conditioned for at least 3 h at the standard temperature and humidity of (23 ± 2) °C and (50 ± 5) % relative humidity or (27 ± 2) °C and (65 ± 10) % of relative humidity, in accordance with ISO 23529. This 3 h period may be part of the 24 h interval after manufacture.

8 Procedure

The temperatures and humidities for testing shall be in accordance with ISO 23529.

For each hose specimen to be tested, start the test with a new test piece of abrading material. Replace the abrading material when the number of cycles reaches 1 000 cycles.

Mount the assembled test piece and mandrel in the apparatus, ensuring that the test piece is restrained from either axial movement or rotational movement, or both. The hose shall be clamped on both ends of the test sample to eliminate any stretching of movement of the hose on the mandrel during the test.

Prepare the abrasion machine for test by aligning the abrading tool to either end of its travel for stop/reverse.

Place the abrading tool in contact with the test piece using the 25 mm side facing as shown in Figures 1 and 2. Apply the vertical static force, *F*, as specified in the relevant product standard, or if not specified, use a force of (45,0 ± 0,5) N, and start the machine. Continue until the specified number of cycles in the relevant hose standard has been completed or until exposure of the reinforcement if this occurs before the specified number is reached. Then, remove the test assembly from the apparatus. See Figure 3 for reinforcement exposure.

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Key

a one reinforcement visible = no failure

b multiple reinforcements visible = failure

c reinforcement pattern visible = failure

Figure 3 — Reinforcement exposure

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9 Test report

The test report shall include the following information:

a) a reference to this document and year of publication (i.e. ISO/TS 20444:2024);

b) a full description of the hose tested, including the relevant hose standard;

c) the vertical static force, *F*, applied;

d) the abrasive material used and the manufacturer;

e) the temperature at which the test was carried out;

f) the number of cycles specified in the relevant hose standard;

g) the number of cycles completed, or the number of cycles to the reinforcement exposure, if it occurs before the specified number is reached;

h) any observations on the nature of wear, particularly any evidence of exposure of reinforcement;

i) any deviations from the procedure;

j) any unusual features observed;

k) the date of the test.

10 Identification statement (reference to this document)

Use the following statement in test reports, catalogues and sales literature when electing to conform to this document:

"Tested in accordance with ISO/TS 20444, *Rubber and plastics hoses — Determination of abrasion resistance of the outer cover*".

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