
**Footwear — Test methods for uppers,
linings and insoles — Abrasion
resistance**

*Chaussures — Méthodes d'essai des tiges, des doublures et des
premières de propreté — Résistance à l'abrasion*

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Foreword

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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 17704 was prepared by the European Committee for Standardization as EN 13520:2001. This International Standard includes corrigendum EN 13520:2001/AC:2003 and was adopted under a special "fast-track procedure" by Technical Committee ISO/TC 216, *Footwear* in parallel with its approval by the ISO member bodies.

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

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1 Scope

This standard specifies a test method for determining the resistance of uppers, linings and insoles irrespective of the material, to wet and dry abrasion, in order to assess the suitability for the end use.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 12222, *Footwear - Standard atmospheres for conditioning and testing of footwear and components for footwear.*

3 Terms and definitions

For the purposes of this European Standard, the following term and definition apply.

3.1

abrasion resistance uppers, linings and insoles

surface resistance shown by an upper, lining or insole test piece when rubbed with an abradant fabric in a Martindale machine

4 Apparatus and material

The following apparatus and material shall be used:

4.1 Abrasion machine, with one or more test stations each including the following:

4.1.1 Circular specimen carrier with a clamping ring which grips the test specimen around its edge leaving an exposed raised flat circular portion of area $645 \text{ mm}^2 \pm 5 \text{ mm}^2$.

4.1.2 Horizontal abradant table of sufficient size to incorporate a square central test area of side 88 mm. Typically, the abradant tables are circular and of minimum diameter 125 mm.

4.1.3 Means of holding the exposed flat portion of the test specimen carrier (4.1.1) in contact with the abradant table (4.1.2) whilst allowing the test specimen carrier to rotate freely in the plane of the abradant table.

4.1.4 Means of producing relative movement between the specimen carrier (4.1.1) and the abradant table (4.1.2) which forms a Lissajous figure occupying an area of $60 \text{ mm} \pm 1 \text{ mm} \times 60 \text{ mm} \pm 1 \text{ mm}$ (see Figure 1). Each Lissajous figure requires 16 elliptical motions (revolutions) of the test specimen carrier and the speed of operation of the tester shall be $5 \text{ rad/s} \pm 0,4 \text{ rad/s}^1$.

NOTE – For a speed of operation of $5 \text{ rad/s} \pm 0,4 \text{ rad/s}$, the speed of rotation of outer hubs of tester is $48 \text{ rev/min} \pm 2 \text{ rev/min}$.

4.1.5 Means of maintaining a constant pressure of $12 \text{ kPa} \pm 0,2 \text{ kPa}$ between the specimen carrier (4.1.1) and the abradant table (4.1.2). The corresponding mass of the test specimen carrier and associated fitments is $795 \text{ g} \pm 5 \text{ g}$.

1) $1 \text{ rad} \approx 0,16 \text{ rev}$.

4.1.6 The parallelism of the abrasant table (4.1.2) and the test specimen holder (4.1.1) shall be maintained within $\pm 0,05$ mm throughout each Lissajous figure. A dial gauge fitted in place of the specimen carrier can be used to verify the parallelism of the abrasant table.

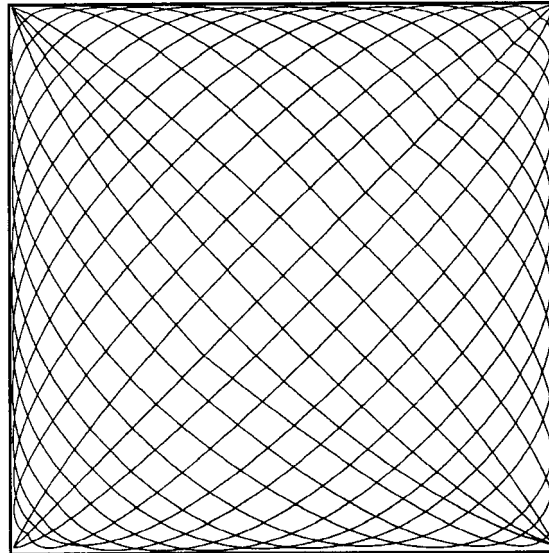


Figure 1 — Lissajous figure

4.1.7 The circumferential parallelism between the test specimen holder (4.1.1) and the abrasant table shall be better than 0,05 mm. This can be verified by attempting to insert slip gauges of thickness less than 0,05 mm under the edges of the flat face of the test specimen carrier.

4.1.8 Means of counting the number of abrasion cycles completed in terms of revolutions [16 revolutions ²⁾ (100 rad) per cycle].

4.2 Four pieces of crossbred worsted spun, plain woven fabric, to be used as the abrasant in the test, each of size sufficient to be clamped over the abrasant table (4.1.2). The fabric shall comply with the following specification:

Characteristic	Warp	Weft
Yarn linear density	(R63 \pm 2) tex/2	(R74 \pm 2) tex/2
Threads per unit length	(1,7 \pm 0,1)/mm	(1,3 \pm 0,1)/mm
Singles twist	(540 \pm 20) tpm'Z'	(500 \pm 20) tpm'Z'
Twofold twist	(450 \pm 20) tpm'S'	(350 \pm 20) tpm'S'
Fibre diameter	(27,5 \pm 2) μ m	(29 \pm 2) μ m
Minimum mass per unit area	190 gm ⁻²	

The two faces of the abrasant fabric do not necessarily have the same abrasive characteristics and when supplied it should be noted which face the supplier recommends for use, this is normally the slightly smoother face of the fabric. Stocks of the fabric shall be controlled to ensure that only this face is used in testing.

4.3 Abrasant paper. A technical standard of 36 grit is recommended.

2) 1 rad \approx 0,16 rev.