INTERNATIONAL STANDARD ISO 3910

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Unlined moulded rubber boots

Bottes en caoutchouc moulées non doublées

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

International Standard ISO 3910 was drawn up by Technical Committee ISO/TC 45, *Rubber and rubber products*, and was circulated to the Member Bodies in September 1975.

It has been approved by the Member Bodies of the following countries :

Belgium	Italy	Sweden
Brazil	Mexico	Turkey
Canada	Netherlands	U.S.A.
Czechoslovakia	New Zealand	U.S.S.R.
Egypt, Arab Rep. of	Romania	Yugoslavia
France	South Africa Rep. of	
India	Spain	

The Member Body of the following country expressed disapproval of the document on technical grounds :

Switzerland

Unlined moulded rubber boots

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the requirements for general purpose unlined rubber boots moulded in one piece.

2 REFERENCES

ISO/R 34, *Determination of tear strength of vulcanized natural and synthetic rubbers (crescent test piece).*

ISO 37, *Rubber, vulcanized — Determination of tensile stress-strain properties.*

ISO/R 188, *Vulcanized rubbers — Accelerated ageing or heat resistance tests.*

ISO 471, *Rubber — Standard temperatures and humidities for the conditioning and testing of test pieces.*[1]

ISO 1382/Add. 2, *Rubber vocabulary — Addendum 2.*[2]

3 MATERIALS

The rubber parts of the boot shall be homogeneous and free from porosity.

4 THICKNESS

The thickness of the rubber shall be not less than as shown in figure 1 at the points indicated for the upper part of the boot, and as shown in table 1 for the soling and heel.

TABLE 1 — **Minimum thicknesses**

Dimensions in millimetres

	Over cleats	Between cleats
Cleated soling, men's	13	8
Cleated soling, women's	11	7,5
Heel, men's	25	—
Heel, women's	20	—

The thickness of the heel shall be measured on the outside edge along the length of the heel.

1) At present at the stage of draft. (Revision of ISO/R 471.)

2) At present at the stage of draft.

5 PHYSICAL PROPERTIES OF SOLING AND HEELS

5.1 Tensile requirements before ageing

Three test pieces shall be cut from both the soling and heels and then reduced to the required thickness by careful buffing, or any other suitable method, taking care to avoid an increase in temperature. The tensile strength and elongation at break shall then be determined according to the method specified in ISO 37. The median of these results shall be at least the appropriate value given in table 2. A smaller dumb-bell test piece may be used for the heels if size makes this necessary. The size of the dumb-bell shall be stated when expressing results. All three test pieces shall be free from visible defects.

If the median of the results is below, and the highest value equal to or above, the appropriate value given in table 2, two further pieces shall be tested. The material shall not be deemed to comply with the requirements unless the median of all five results is at least the appropriate value given in table 2.

TABLE 2 — **Tensile strength and elongation at break requirements before ageing**

	Minimum tensile strength, MPa	Minimum elongation at break, %
Soling and heel	8,0	200

5.2 Tensile requirements after ageing

After ageing for 168 h at a temperature of 70 ± 1 °C, in accordance with clause 3 of ISO/R 188, the tensile strength and elongation at break of soling and heels determined as in 5.1 shall be in accordance with the values given in table 3.

TABLE 3 — **Tensile strength and elongation at break requirements after ageing**

	Tensile strength % of initial value	Elongation at break % of initial value
Soling and heel	± 20	+ 10 − 30

5.3 Tear resistance of upper

The tear resistance of the upper shall be not less than 80 N when tested in accordance with the method described in ISO/R 34.

The grain of the sample tested shall be at right angles to the length of the sample.

5.4 Resistance to dry heat ageing

All rubber component parts shall be capable of withstanding, without developing any signs of brittleness or tackiness, exposure to air at a temperature of 100 ± 1 °C and at atmospheric pressure for a period of 24 h in a suitable apparatus. For the purpose of this test, the test pieces may be entire articles or pieces cut from them.

After heat exposure, test pieces shall receive a minimum of 2 days rest prior to further testing (see 5.5).

5.5 Flexing resistance of upper

When tested in accordance with the method described in the annex, after having been submitted to the dry heat ageing test given in 5.4, the upper shall withstand not less then the number of continuous flexes given in table 4 without the rubber face showing pinholes or any sign of cracking when viewed with the unaided eye. For this purpose only those parts of the test piece shall be observed which are under tension during the test, i.e. the folds which form a diamond shape. Pinholes or cracking associated with machine damage shall be ignored.

The test pieces shall receive a minimum of 2 days rest after having been subjected to the dry heat ageing test given in 5.4.

The testing equipment shall be kept away from any source of ozone.

TABLE 4 — **Flexing test limits**

Thickness mm	**Minimum number of flexes**
up to and including 2,00	75 000
over 2,00 up to and including 2,25	50 000
over 2,25	40 000

6 MARKING

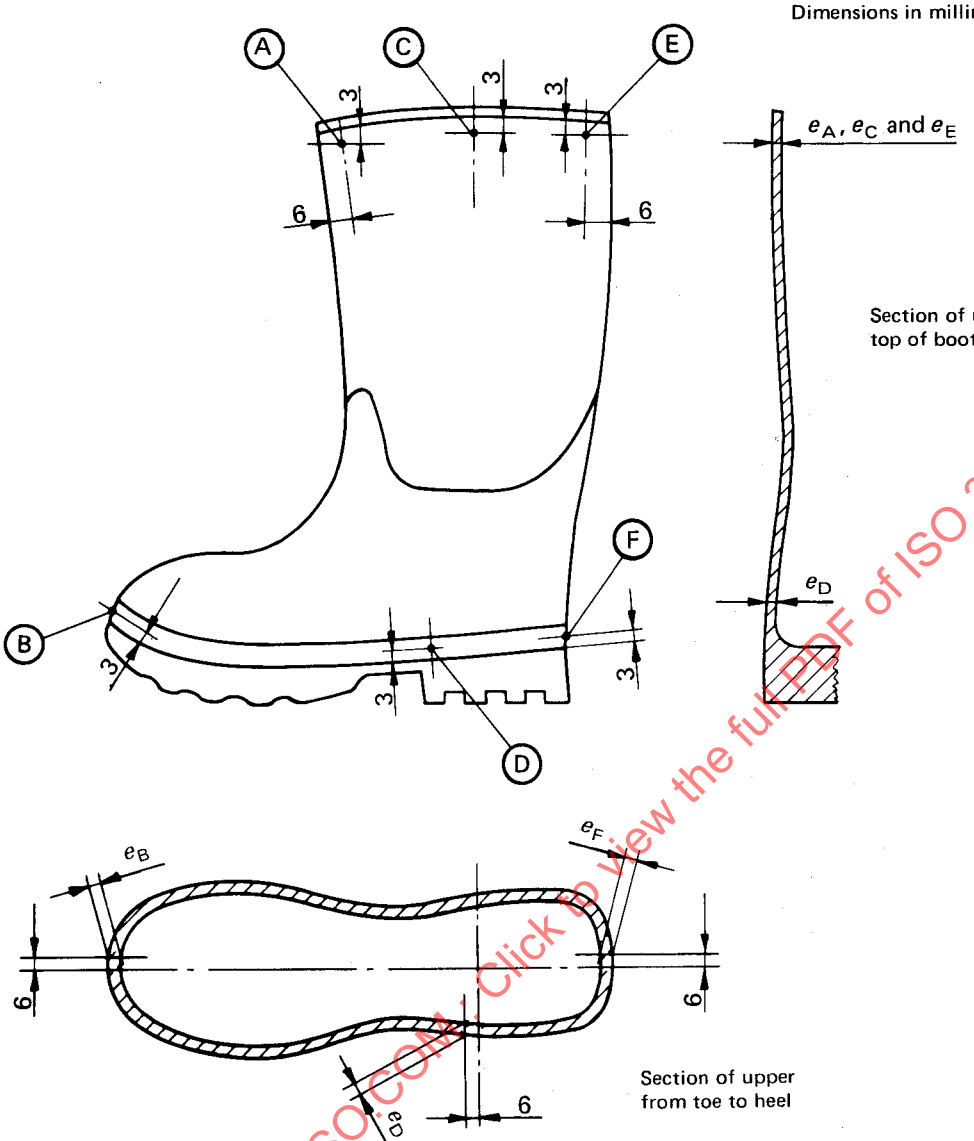
Each article of footwear shall be indelibly and legibly marked with the following particulars :

a) size;

b) manufacturer's identification;

c) reference number issued by the appropriate national standards organisation.

Dimensions in millimetres



Thickness at specified points	
e_A	2
e_B	5
e_C	2
e_D	4
e_E	2
e_F	5

FIGURE 1 – **Unlined moulded rubber boot**

Dimensions in millimetres

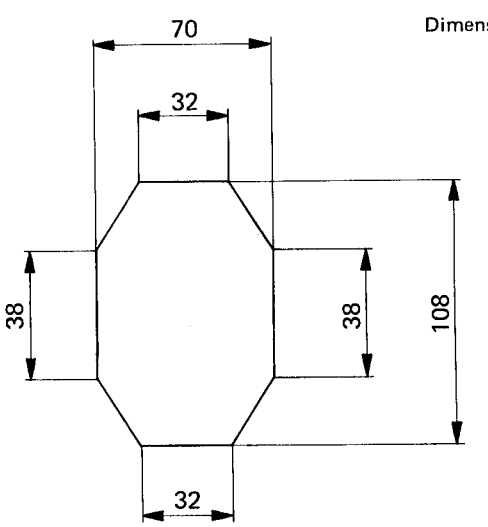


FIGURE 2 – **Test piece for flexing test**

ANNEX

METHOD OF TESTING RESISTANCE TO FLEXING

A.1 APPARATUS

The apparatus shall have the following essential features :

The machine shall have an adjustable stationary part provided with grips 25 mm across, for holding one end of each of the test pieces in a fixed position, and a similar reciprocating part for holding the other end of each of the test pieces.

The reciprocating part shall be arranged so that its motion is in the direction of, and in the same plane as, the centre line between the grips, and its travel shall be adjusted so that the two sets of grips approach each other to a distance of 13 mm and separate to a distance of 57 mm.

The eccentric which actuates the reciprocating part shall be driven by a constant speed motor to give 340 to 400 flexing cycles per minute, with sufficient power to flex at least six and preferably twelve test pieces at one time.

The test pieces shall be arranged in two equal groups, so that one group is being flexed while the other group is being straightened, thus reducing the vibration in the machine. The grips must hold the test pieces firmly, and shall enable individual adjustment to be made to the test pieces.

A.2 TEST PIECES

The test pieces shall have the dimensions shown in figure 2. Four test pieces shall be cut from the thinnest portion of the leg part of the upper. Care shall be taken to ensure that the test pieces are cut cleanly from the sample material.

A.3 FITTING

The test piece shall be folded symmetrically about its major axis. In the folded condition one tapered end shall be inserted into the fixed central grip and pushed in until the test piece touches the grip pins.

This fixed grip shall then be tightened. The corresponding movable grip shall then be taken out to its fullest extent, the test piece inserted and pulled flat, and the grip tightened. It is recommended that clips be used to keep the edges together during the insertion of the test piece in the grips, but their removal is essential before flexing commences.

NOTE – The test piece shall not be under tension.

A.4 PROCEDURE

A complete to-and-fro movement of the grip shall be counted as one flex cycle. The length of test shall be calculated in flex cycles and not in time units.

The flex cycles may be determined by using a trip-counter operated by one of the movable grips. The ambient temperature shall be one of the standard temperatures laid down in ISO 471.