INTERNATIONAL STANDARD

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Second edition
2018-09

Protective clothing for users of hand-held chainsaws —

Part 3: Test methods for footwear

Vêtements de protection pour utilisateurs de scies à chaîne tenues à la main —

Partie 3: Méthodes d'essai pour chaussures

Reference number
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Contents

Page

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 documents 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 the European Committee for Standardization (CEN) Technical Committee CEN/TC 162, *Protective clothing including hand and arm protection and lifejackets*, in collaboration with ISO Technical Committee TC 94, *Personal safety — Personal protective equipment*, Subcommittee SC 13, *Protective clothing*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 11393-3:1999), which has been technically revised. The main changes compared to the previous edition are as follows:

— in the Introduction, the term "hand-held chainsaws primarily constructed for cutting wood" has been added;

— the normative references have been updated;

— the term and definition 3.1 has been added;

— in Clause 4, the definition has been adapted to 6.2;

— in Clause 5, the definition and normative reference has been specified;

— in 6.1.2.2, 6.2.1, 6.2.2, 6.2.3, 6.2.4 and Clause 7, definitions have been specified;

— in 6.1.3, a new comprising procedure has been defined;

— in 6.2.1, the total number of cuts has been enlarged, "protection class" has been renamed as "level" and "class 0" has been deleted;

— in 6.2.4, an alternative system for fastening the footwear to the test rig has been added;

— in 6.2.5, the definition "non-steel" has been used following ISO 17249.

A list of all parts in the ISO 11393 series can be found on the ISO website.

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.

Introduction

This document forms part of a series concerned with personal protective equipment (PPE) designed to protect against the risks arising from the use of hand-held chainsaws primarily constructed for cutting wood.

No PPE can ensure a 100 % protection against cutting from a hand-held chainsaw. Nevertheless, experience has shown that it is possible to design PPE that offers a certain degree of protection.

Different functional principles may be applied in order to give protection. These include:

a) chain slipping: on contact the chain does not cut the material;

b) clogging: fibres are drawn by the chain into the drive sprocket and block chain movement;

c) chain braking: fibres have a high resistance to cutting and absorb rotational energy, thereby reducing the chain speed.

Often more than one principle is applied.

Protective clothing for users of hand-held chainsaws —

Part 3:
Test methods for footwear

1 Scope

This document specifies test methods for assessing the resistance of footwear to cutting by hand-held chainsaws.

This document is applicable only to footwear with integral protection.

NOTE Methods for testing other forms of foot and leg protection (e.g. gaiters) against hand-held chainsaws are covered in other parts of the ISO 11393 series.

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 11393-1:2018, *Protective clothing for users of hand-held chainsaws — Part 1: Test rig for testing resistance to cutting by a chainsaw*

ISO 17249, *Safety footwear with resistance to chain saw cutting*

ISO 20344:2011, *Personal protective equipment — Test methods for footwear*

3 Terms and definitions

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

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

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

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

3.1
cut-through
any visible change on the underside of the innermost layer of the test sample caused by the saw chain

3.2
integral protection
footwear in which the chainsaw protective material either comprises the material of the footwear or is permanently attached to the footwear

4 Test specimens

For footwear with steel toecaps, four pairs of three different sizes, representing the smallest, largest and medium size, shall be tested.

For footwear with non-steel toecaps, five pairs of three different sizes, representing the smallest, largest and medium size, shall be tested.

Additional samples can be needed for additional test cuts according to 6.2.1.

5 Checking of protective area

5.1 Sizing body for laced footwear

The sizing body for laced footwear shall have a total height of minimum 500 mm, comprising:

— ankle cylinder: height (76 ± 1) mm; diameter (84 ± 1) mm;

— conical section: height (274 ± 1) mm;

— upper cylinder: height 150 mm min.; diameter (110 ± 1) mm.

See Figure 1.

Dimensions in millimetres

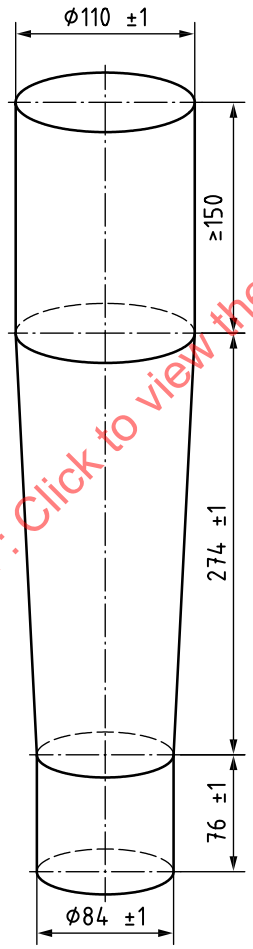


Figure 1 — Sizing body for laced footwear

5.2 Procedure

Insert the sizing body for laced footwear into the leg of the footwear and tighten any fastenings (e.g. laces or straps) about it. Measure the protective area given in ISO 17249.

Test one pair each of the smallest, largest and medium sizes. Samples that have been cut tested according to 6.2 may be used.

Check and report whether the protective material extends throughout the protective area as specified by ISO 17249.

Report any gaps or areas not covered by protective material.

Report whether the protective material is continuous throughout the protective area specified, and whether the protective material consists of more than one type of material.

6 Testing resistance to cutting

6.1 Apparatus

6.1.1 Test rig

The test rig shall be as described in ISO 11393-1, with additional elements to fulfil the requirements of 6.2.

6.1.2 Footwear mounting devices

6.1.2.1 Base

The base for mounting the footwear shall be capable of holding the footwear in the required positions.

Devices for fixing the footwear to the base, including holes and bolts, shall not interfere with the protective material under test.

6.1.2.2 Test mount

The test mount shall be made of hardwood or similar material, covered with a (14 ± 2) mm thick layer of flexible cellular material of copolymer foam as described in ISO 11393-1:2018, 5.4.

The diameter of the cylinder shall be (50 ± 1) mm plus the thickness of the cellular material.

See Figure 2.

Dimensions in millimetres

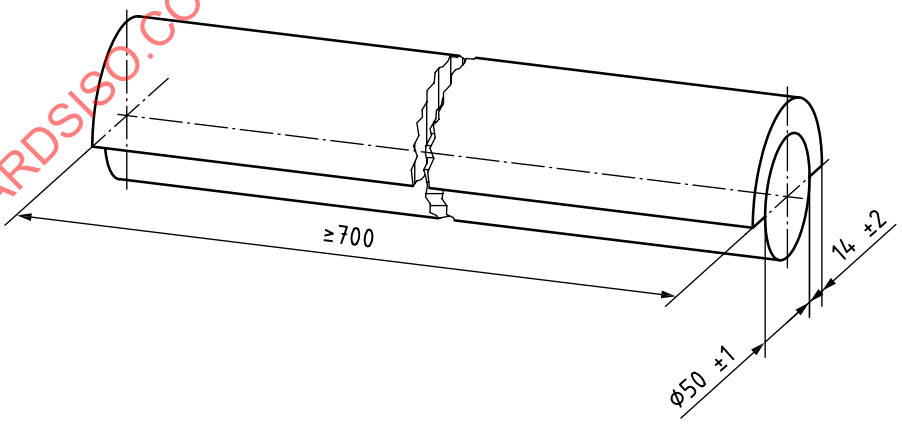


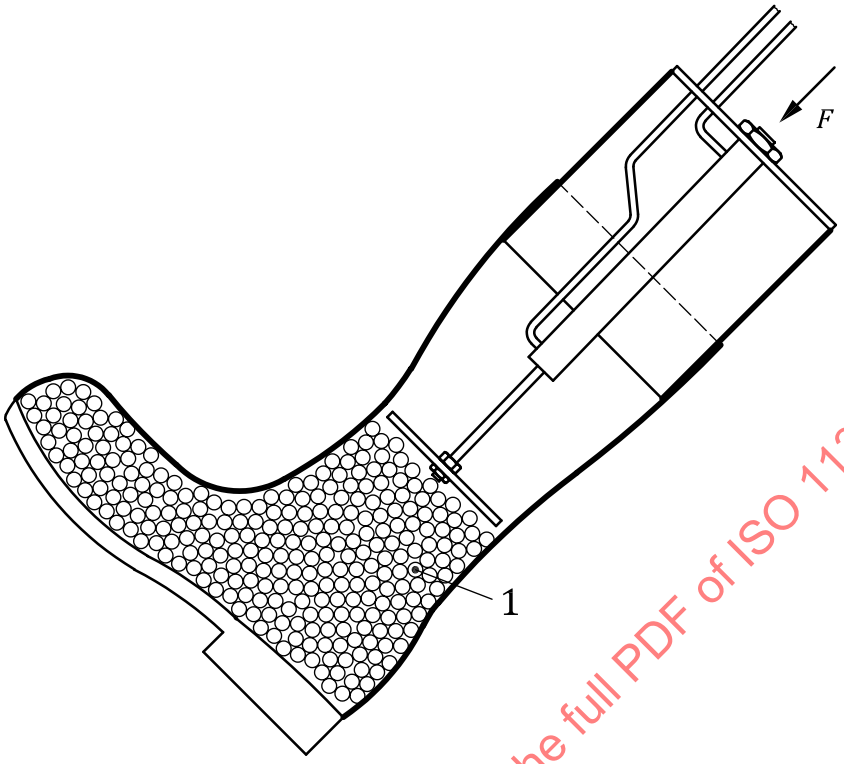
Figure 2 — Test mount

6.1.3 Material for filling footwear

The material for filling footwear comprises:

— dry peas;

— an air piston or equivalent system that applies a force of (40 ± 2) N in the direction of the bootleg onto the peas, as shown in Figure 3.



Key

1 dry peas

F = force

Figure 3 — Air piston which applies a force of (40 ± 2) N

6.2 Test procedure

6.2.1 General

Calibration procedures shall be in accordance with ISO 11393-1:2018, Clause 7.

After calibration, the following changes to the procedure described in ISO 11393-1 are introduced:

a) the chainsaw unit is arranged in accordance with ISO 11393-1, but the load shall be (30 ± 0,5) N instead of 15 N (see ISO 11393-1:2018, 5.3.5), without changing the moment of inertia;

b) the horizontal distance from the point of contact to the centre of the sprocket shall be (300 ± 2) mm instead of 230 mm (see ISO 11393-1:2018, Figure 4).

Test cuts are performed on both right and left footwear at the positions shown in Figure 4, i.e.

— at the vamp position (position 1): one cut on the left side of the left boot with the smallest size, one cut on the left side of the left boot with the largest size, and two cuts on the left side of the right boot with the medium size;

— at the throat (position 2): two test cuts of the boots with the medium size;

— at the leg front (position 3): two test cuts, each one of the boots with the smallest and the largest size;

— on the toecap (position 4): for footwear with non-steel toecaps, two test cuts of the boots with the medium size;

If the protection is not homogenous, additional cuts shall be carried out.

Footwear shall be covered to prevent contamination of the surface from lubricating oil. The covering shall be removed immediately before each test cut.

Where possible, avoid cutting into any fastenings that are fitted to the footwear, as this could lead to anomalous results. Should this not be possible, such cutting should be recorded in the test report.

A total of eight cuts, or ten cuts for footwear with non-steel toecaps, should be made for each complete test, with no more than one cut being made on any one sample.

Test cuts may be carried out with the following chain speeds depending of the level of performance expected for the footwear:

— level of performance 1: (20 ± 0,2) m/s;

— level of performance 2: (24 ± 0,2) m/s;

— level of performance 3: (28 ± 0,2) m/s.

After each test, check the specimen for cut-through and report the result.

Dimensions in millimetres

Key

1 to 4 positions for test cuts

Figure 4 — Cut test positions

6.2.2 Cuts on vamp area

First, securely fix the footwear to the base in such a way that:

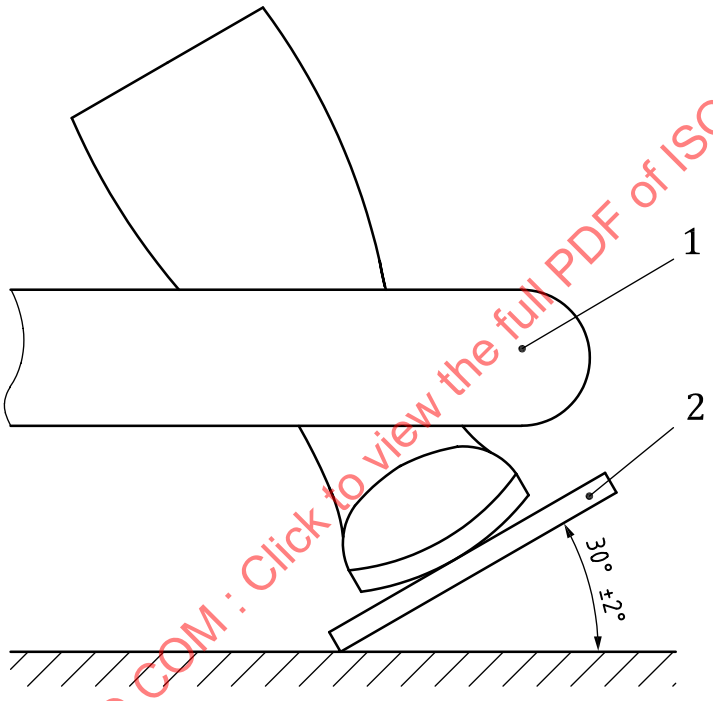
a) the sole of the footwear is in contact with the base at both the heel and forepart without changing the natural shape of the footwear;

b) the test axis as defined in ISO 20344:2011, 5.4.2.1, coincides with that of the base.

The base is then tilted at (30 ± 2)° to the horizontal in such a manner that the right side of the footwear is lowermost and nearest the pivot of the test rig, and the test axis of the footwear is at an angle of (90 ± 3)° to the guide bar (see Figure 5). Fastening devices (e.g. laces or straps) shall be fastened.

Dry peas (see 6.1.3) are poured into the footwear to completely fill the foot section and at least half of the leg. The boot shall be standing upright while being filled to exclude any cavities. A force of (40 ± 2) N shall be applied to the peas to ensure that the peas completely fill the foot section and that there are no voids under the test positions.

The peas are kept in place using an air piston, which applies a force of 40 ± 2 N as shown in Figure 3, or using an equivalent system that can apply the same force on the peas in the direction of the bootleg. Perform test cuts at the positions indicated in Figure 4 as position 1 [i.e. on the left side of the footwear, (15 ± 5) mm to the rear of the toecaps].



Key

1 chainsaw

2 base

Figure 5 — Arrangement for cuts on vamp area

6.2.3 Cuts on throat area

Securely fix the footwear to the base as in 6.2.2. Fastening devices (e.g. laces or straps) shall be fastened.

The base is then tilted (45 ± 2)° to the horizontal in such a manner that the heel of the footwear is lowermost, and the test axis of the footwear is vertical and at an angle of (90 ± 3)° to the guide bar of the test rig. The right side of the footwear shall be nearest to the pivot (see Figure 6).

Perform test cuts at the positions indicated in Figure 4 as position 2.