INTERNATIONAL STANDARD

ISO 11393-4

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Protective clothing for users of hand-held chain-saws —

Part 4: Test methods and performance requirements for protective gloves

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

Partie 4: Méthodes d'essai et exigences pour les gants de protection

Reference number
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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.

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 11393-4 was prepared by Technical Committee ISO/TC 94, *Personal safety — Protective clothing and equipment*, Subcommittee SC 13, *Protective clothing*.

ISO 11393 consists of the following parts, under the general title *Protective clothing for users of hand-held chain-saws*:

- *Part 1: Test rig driven by a flywheel for testing resistance to cutting by a chain-saw*
- *Part 2: Test methods and performance requirements for leg protectors*
- *Part 3: Test methods for footwear*
- *Part 4: Test methods and performance requirements for protective gloves*
- *Part 5: Test methods and performance requirements for protective gaiters*

Test methods and performance requirements for jackets with protection against cuts by hand-held chain-saws will be the subject of a future part 6 to ISO 11393.

Introduction

This part of ISO 11393 forms part of a series concerned with personal protective equipment designed to reduce the risks arising from the use of hand-held chain-saws. In some areas of work with chain-saws, one third of injuries occur to the hands. However, with different working practices few hand injuries occur. Accidents occur due to a number of complex reasons, but a common factor is incorrect use of the chain-saw. The importance of correct training and proper use of a chain-saw in preventing accidents cannot be underestimated.

In some countries, chain-saw users adopt working practices which together with training makes the use of chain-saw protective gloves unnecessary. These usually include the instruction to hold the chain-saw with both hands and to use the chain brake if it becomes necessary to stop cutting and clear away branches, etc.

All parts of the hand (palm, back and fingers) have been shown to be at risk when using a chain-saw. It is generally accepted for ergonomic and health and safety reasons that protecting the palm and the underside of the fingers is not practicable. Neither is it possible to adequately protect the back of the fingers unless a mitt is used. In this part of ISO 11393, specifications for the protective coverage and performance of the back of the left-hand glove are given, though the same specifications can be applied to right-hand gloves.

Further information is provided in Annex A on risk analysis, glove ergonomics and selection.

No personal protective equipment can ensure a 100 % protection against cutting from a hand-held chain-saw. Nevertheless, experience has shown that it is possible to design personal protective equipment which offers a certain degree of protection. As far as is known, all chain-saws are designed for right-handed use and therefore all protective clothing designs and requirements have assumed right-handed use. Protection cannot be adequate for left-handed use.

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 in chain-saw protective clothing. It should be noted however that none has yet been shown to be fully effective in gloves.

Protective clothing for users of hand-held chain-saws —

Part 4:
Test methods and performance requirements for protective gloves

1 Scope

This part of ISO 11393 specifies the requirements and test methods for gloves that are intended to provide protection against cuts by a hand-held chain-saw, including requirements for identification, marking and information for the user.

The method for measurement of protective coverage, the apparatus and the test method for assessing resistance to cutting, and the ergonomic assessment are specified.

An informative annex on risk analysis, glove ergonomics and glove selection is provided.

2 Normative references

The following referenced documents are indispensable for the application 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 3175-1:1998, *Textiles — Professional care, drycleaning and wetcleaning of fabrics and garments — Part 1: Assessment of performance after cleaning and finishing*

ISO 6330:2000, *Textiles — Domestic washing and drying procedures for textile testing*

ISO 11393-1:1998, *Protective clothing for users of hand-held chain-saws — Part 1: Test rig driven by a flywheel for testing resistance to cutting by a chain-saw*

EN 388:1994, Protective gloves against mechanical risks

EN 420:1994, General requirements for gloves

3 Terms and definitions

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

3.1
chain-saw protective glove
any product which protects a hand against cutting by a hand-held chain-saw

3.2
cuff
that portion of a glove which covers the wrist

3.3
back of the hand
posterior surface of the hand between the wrist and the fingers

3.4
five-finger glove
any glove covering both the back and the palm of the hand and wrist, and having separate individual fingers and thumb

3.5
line of longest length of a glove
perpendicular line joining the seam of the cuff (or equivalent position if no seam is present) with the tip of the second finger (or equivalent position in a mitt or one-finger mitt)

3.6
mitt
any glove covering both the back and the palm of the hand and wrist, and having a separate thumb and a common covering for the fingers

3.7
one-finger mitt
any glove covering both the back and palm of the hand and wrist, and having a separate thumb and a separate forefinger and a common covering for the remaining fingers

3.8
protective material
material which is designed to protect the wearer against the cutting effect of a hand-held chain-saw

NOTE This protective material can include the cloth of the garment.

3.9
protective coverage
that area of the glove which is covered by protective material

3.10
specified protective area
required protective coverage

4 Designs

4.1 Designs of gloves

This part of ISO 11393 defines two designs of chain-saw protective gloves, Design A and Design B. Design A and Design B have different specified protective areas as defined in 4.2 and 4.3.

4.2 Design A

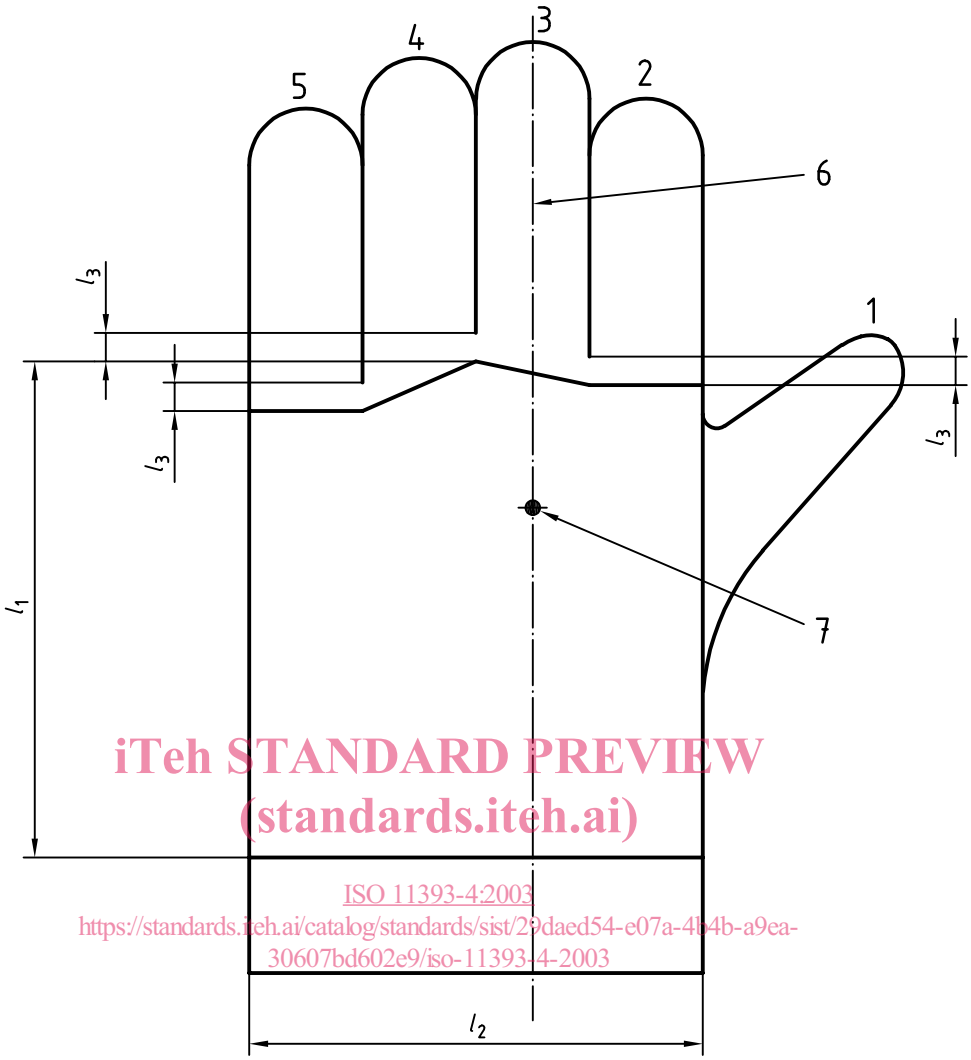
4.2.1 Description

Design A is applicable to five-finger gloves without chain-saw protection in the fingers or thumb.

4.2.2 Specified protective area — Left-hand gloves

The specified protective area is shown in Figure 1. The Design A protected area shall reach across the entire width of the back of the hand and cover both the knuckles and the wrist. Table 1 contains minimum values for dimensions l_1 and l_2, and the maximum value for dimension l_3.

The dimensions shall be measured on one glove from each pre-treatment in accordance with Clause 8.



Key

1 to 5	numbers of the digits
6	line of longest length
7	midpoint of the line of longest length from a finger tip to the cuff seam
l_1	minimum length of protective material measured parallel to the long axis
l_2	minimum width of the protective material
l_3	maximum distance from a crotch to the edge of the protective material

NOTE See Table 1 for dimensions.

Figure 1 — Design A — Specified protective area left-hand glove (back uppermost)

Table 1 — Dimensions of Design A gloves

Dimension	Size					
	6	7	8	9	10	11
l_1	105 mm	110 mm	115 mm	120 mm	125 mm	130 mm
l_2	80 mm	90 mm	100 mm	110 mm	120 mm	130 mm
l_3	8 mm	8 mm	8 mm	8 mm	8 mm	8 mm

4.2.3 Protective coverage — Right-hand gloves

No protective coverage is required. If protection is offered, however, then it shall at least equal that specified for left-hand gloves.

4.3 Design B

4.3.1 Description

Design B is protective gloves or mitts with specific chain-saw protection as in Design A and on the backs of the fingers, but not on the thumb.

4.3.2 Specified protective area — Left-hand gloves

The specified protective area is shown in Figure 2. The Design B protective area shall reach across the entire width of the back of the hand and cover both the backs of the fingertips and the wrists. The minimum dimensions of the protective area are shown in Table 2.

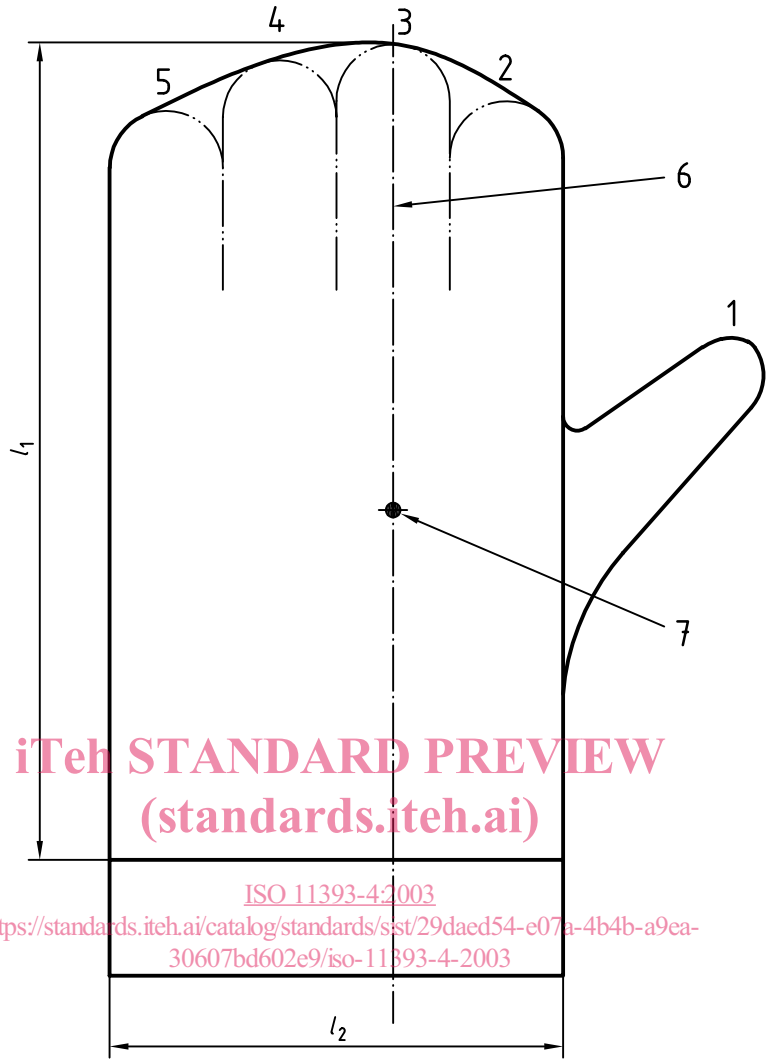
The dimensions shall be measured on one glove from each pre-treatment in accordance with Clause 8.

4.3.3 Protective coverage — Right-hand gloves

No protective coverage is required. If protection is offered, however, then the coverage shall at least equal that specified for left-hand gloves.

4.4 Attachment of protective material

Where the glove is not made entirely of protective material, all the protective materials used shall be sewn or otherwise permanently attached to the remainder of the glove.



Key

1 to 5 numbers of fingers
6 line of longest length
7 midpoint of the line of longest length from a finger tip to the cuff seam
l_1 minimum length of protective material measured parallel to the long axis
l_2 minimum width of the protective material

NOTE See Table 2 for dimensions.

Figure 2 — Design B — Protective area left-hand glove or mitt (back uppermost)

Table 2 — Dimensions of Design B gloves and mitts

Dimension	Size					
	6	7	8	9	10	11
l_1	160 mm	170 mm	180 mm	190 mm	200 mm	210 mm
l_2	80 mm	90 mm	100 mm	110 mm	120 mm	130 mm

5 Performance requirements

5.1 General

All chain-saw protective gloves shall conform to the requirements of EN 420:1994, as specified in Table 3.

Table 3 — General requirements

Subclause in EN 420:1994	Mandatory	Optional
4.1 Design principle	X	
4.2 Glove construction	X	
4.3 High visibility gloves		X
4.4 Innocuousness	X	
4.5 Cleaning		X
5.1 Sizing	X	
5.2 Dexterity		X
5.3 Water vapour transmission and absorption		X

5.2 Protection against general mechanical risks

Both left-hand and right-hand gloves shall conform to the requirements of Table 1 of EN 388:1994, as specified in Table 4.

Table 4 — Performance requirements — Mechanical risks

Test	Test method	Minimum requirement
Abrasion resistance	6.1 of EN 388:1994	500 cycles[a] [b]
Blade cut resistance	6.2 of EN 388:1994	index 1,2[c]
Tear resistance	6.3 of EN 388:1994	25 N[b]
Puncture resistance	6.4 of EN 388:1994	60 N[b]

[a] The abrasion test is only carried out on material taken from the outer layer(s) of the glove; not on the chain-saw protective material.

[b] Performance Level 2 in Table 1 of EN 388:1994.

[c] Performance Level 1 in Table 1.

5.3 Protection against chain-saw cutting

5.3.1 Classification according to chain speed

Protection against chain-saw cutting shall be assessed in accordance with Clause 9 with one of the following chain-saw speed classes designated as follows:

— class of protection 0: 16 m/s ± 0,2 m/s;

— class of protection 1: 20 m/s ± 0,2 m/s;

— class of protection 2: 24 m/s ± 0,2 m/s;

— class of protection 3: 28 m/s ± 0,2 m/s.

5.3.2 Requirements for cut resistance

When tested in accordance with Clause 9, no cut through is allowed in any tested specimen.