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Second edition
2018-09

Protective clothing for users of hand-held chainsaws —

Part 4: Performance requirements and test methods for protective gloves

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

Partie 4: Exigences de performance et méthodes d'essai pour les gants de protection

Reference number
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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 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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 11393-4:2003), 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 terms and definitions 3.11, 3.12 and 3.13 have been added;

— in Clause 4, two types have been defined and 4.4 has been added;

— in 5.1, Table 3 has been revised;

— the original Clause 7 has been deleted and a new Clause 7 has been specified;

— in Clause 8, 8.2.2 has been added and 8.3 has been revised;

— in 9.2, a test procedure has been added;

— in 5.4 and Clauses 6, 8, 10, 11 and 12 the definitions have been specified;

— A.4 has been added.

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.

In some areas of work with chainsaws, 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 chainsaw. The importance of correct training and proper use of a chainsaw in preventing accidents cannot be underestimated.

In some countries, chainsaw users adopt working practices that, together with training, make the use of chainsaw protective gloves unnecessary. These usually include the instruction to hold the chainsaw 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 chainsaw. 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 document, specifications for the protective coverage and performance of the back of the right-hand glove and the left-hand glove are given.

For certain operations, such as tree surgery from lifts or platforms, chainsaw operators may be assisted by other workers who also require protection from the chainsaw, particularly for their hands. The gloves specified in this document are suitable for these workers too.

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

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. As far as is known, all chainsaws are designed for right-handed use and, therefore, all protective clothing designs and requirements have assumed right-handed use. Protection may not 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 chainsaw 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 chainsaws —

Part 4:
Performance requirements and test methods for protective gloves

1 Scope

This document specifies the performance requirements, test methods, design requirements, identification and marking information for gloves that offer protection against cutting by hand-held chainsaws.

Guidance on chainsaw use and the selection of gloves is given in Annex A.

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 7000, *Graphical symbols for use on equipment — Registered symbols*

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

EN 388:2016, *Protective gloves against mechanical risks*

EN 420:2009, *General requirements for gloves*

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

3.2
chainsaw protective glove
product that protects the *back of the hand* (3.1) against cutting by a hand-held chainsaw

3.3
crotch
deepest point between two fingers

3.4
cuff
portion of a glove that covers the wrist

3.5
cut-through
any visible change on the underside of the innermost layer of the test sample caused by the saw chain

3.6
digit
anatomical designation for fingers and thumb, where digit 1 is the thumb, digit 2 is the index finger, digit 3 is the middle finger, digit 4 is the ring finger and digit 5 is the little finger

3.7
five-finger glove
glove covering both the back and palm of the hand and wrist, and having separate individual coverings for all *digits* (3.6)

3.8
line of longest length of the glove
perpendicular line joining the seam of the *cuff* (3.4) across the back of the glove (or equivalent position if no seam is present) with the tip of digit 3 (or equivalent position in a *mitt* (3.9) or one-finger mitt)

3.9
mitt
glove covering both the back and the palm of the hand and wrist, and having a separate covering of digit 1 and a common covering for the other four *digits* (3.6)

3.10
protective coverage
area of the glove that is covered by *protective material* (3.11)

3.11
protective material
material that is designed to protect the wearer against the cutting effect of a hand-held chainsaw

Note 1 to entry: The protective material may include the outer fabric of the glove.

3.12
specified protective area
required *protective coverage* (3.10)

3.13
three-finger mitt
glove covering both the back and palm of the hand and wrist, and having a separate covering for digit 1, a separate covering for digit 2 and a common covering for the remaining *digits* (3.6)

4 Designs and types

4.1 Designs and types of gloves

Two different types of gloves are specified by this document. Type 1 gloves include cut protection against cutting by hand-held chainsaws in both right- and left-hand gloves. Type 2 gloves include protection against cutting by hand-held chainsaws in the left-hand glove only; the right-hand glove doesn't include protection against hand-held chainsaws.

Within those types, two designs of chainsaw protective gloves are considered: design A and design B. Design A and design B have different specified protective areas as defined in 4.2 and 4.3, respectively.

4.2 Design A

4.2.1 Description

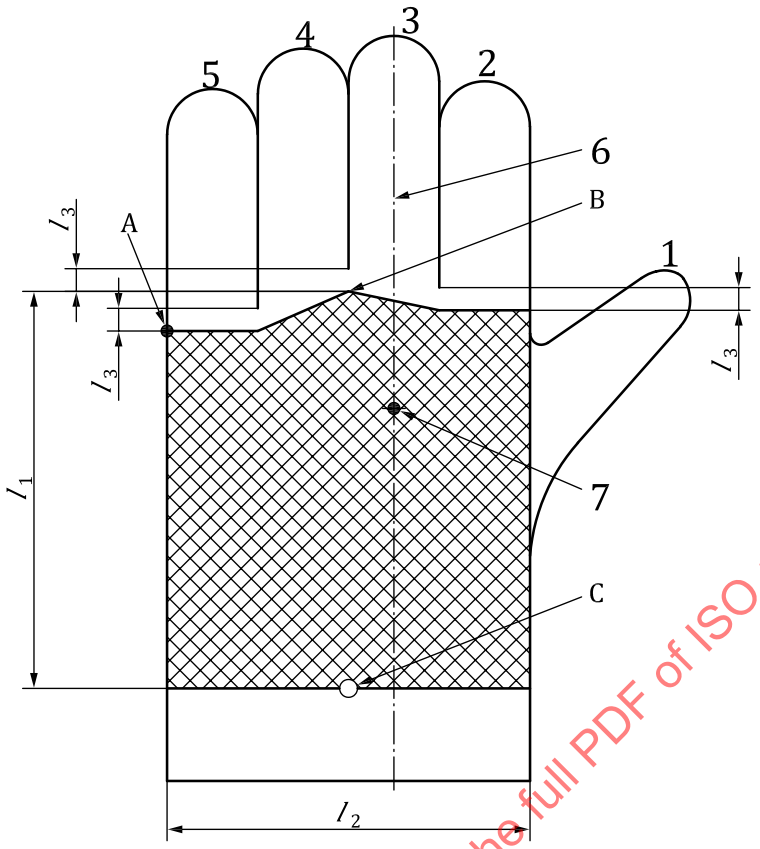
Design A describes five-finger gloves with chainsaw protection at the metacarpus, but without chainsaw protection in the fingers and thumb.

4.2.2 Specified protective area, left- and right-hand gloves

The specified protective area is shown in Figure 1.

Figure 1 shows a left-hand glove. The specified protective area for a right-hand glove is the mirror image to Figure 1. The design A protected area shall cover the entire width of the back of the hand, including 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 according to Clause 7, after the glove has been cleaned according to the manufacturer's instructions.



Key

1 to 5 numbers of the digits
6 line of longest length
7 midpoint of the line of longest length from a fingertip 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 up to point A measured 90° to the long axis
l_3 maximum distance from a crotch to the edge of the protective material
A edge of the protective material at the outside in a level of crotch between digit 4 and 5 minus l_3
B crotch between digits 3 and 4 minus l_3
C beginning of the protective area nearest to the cuff shaded area is protective material

NOTE See Table 1 for dimensions.

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

Table 1 — Requirements for dimensions of zone of protection for design A gloves

Dimension	Glove size as described in EN 420:2009					
	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

4.3 Design B

4.3.1 Description

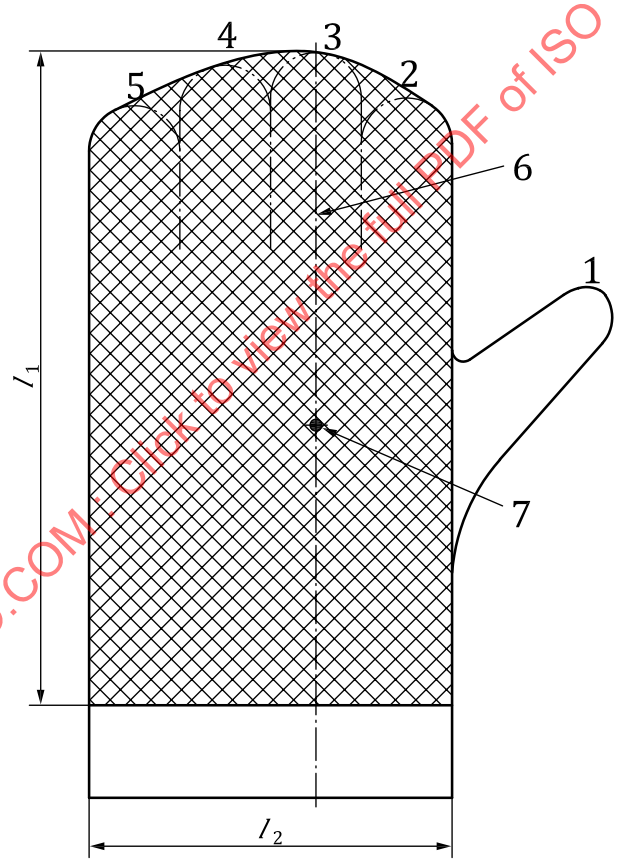
Design B describes protective gloves (five-finger gloves or mitts, or three-finger mitts) with specific chainsaw protection as in design A plus protection at the back of the fingers, but not at the thumb.

4.3.2 Specified protective area, left- and right-hand gloves or mitts

The specified protective area is shown in Figure 2.

Figure 2 shows a left-hand mitt. The specified protective area for a right-hand mitt is the mirror image of Figure 2. The design B protective area shall cover the entire width of the back of the hand, and cover both the backs of the fingers and the wrists. The minimum dimensions of the protective area are shown in Table 2.

The dimensions shall be measured according to Clause 7, after the glove or mitt has been cleaned according to the manufacturer's instructions.



Key

1 to 5	numbers of the digits
6	line of longest length
7	midpoint of the line of longest length from a fingertip 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 90° to the long axis shaded area is protective material

NOTE See Table 2 for dimensions.

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

Table 2 — Requirements for dimensions of zone of protection for design B gloves and mitts

Dimension	Glove size as described in EN 420:2009					
	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

4.4 Attachment of protective material

Where the glove is not made entirely of protective material, the protective insert shall be sewn or otherwise permanently attached to the remainder of the glove (e.g. stitched) along all outer edges of the protection.

5 Performance requirements

5.1 General

All chainsaw protective gloves shall conform to the requirements of EN 420:2009, as specified in Table 3.

Table 3 — General requirements

Subclause in EN 420:2009	Mandatory	Optional
4.1 Glove design and construction — General	X	
4.2 Resistance of glove materials to water penetration		X
4.3 Innocuousness of protective gloves	X	
4.4 Cleaning	X	
5.1 Sizing	X	
5.2 Dexterity	Hand dexterity is tested according to the hand grip test (see 9.2) for gloves of type 1 and the left-hand glove of type 2	Test of finger dexterity in accordance with EN 420:2009 is optional for types 1 and 2
5.3 Water vapour transmission and absorption	X for coated leather and coated textile gloves	X for uncoated textile and uncoated leather gloves

5.2 Protection against general mechanical risks

Both left- and right-hand gloves of types 1 and 2 shall conform to the requirements of EN 388:2016, Table 1, as specified in Table 4.

Table 4 — Performance requirements — Mechanical risks

Test	Test method	Minimum requirement
Abrasion resistance	EN 388:2016, 6.1	500 cycles[a,b]
Blade cut resistance	EN 388:2016, 6.2	Index 1,2[c]
Tear resistance	EN 388:2016, 6.4	25 N[b]
Puncture resistance	EN 388:2016, 6.5	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 chainsaw protective material.

[b] Performance level 2 in EN 388:2016, Table 1.

[c] Performance level 1 in EN 388:2016, Table 1.

5.3 Protection against chainsaw cutting

5.3.1 Classification according to chain speed

Protection against chainsaw cutting shall be assessed according to 8.3 with one of the following chainsaw 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 according to 8.3, no cut-through is allowed in any tested specimen.

The final classification shall be based on the lowest performance class achieved across the size range if more than one size is tested.

5.4 Ergonomic requirements

Chainsaw protective gloves shall be designed to minimize the discomfort and inconvenience of wearing them. They shall not have rough or hard material or edges that will be in contact with the hand, nor an outside contour likely to catch on branches or interfere with the operation of the chainsaw.

They shall be adequately flexible and allow a firm grip to be maintained on the chainsaw handle. Gloves shall be assessed as specified in Clause 9.

When tested in accordance with 9.2, the grip factor shall be not less than 80 for each test person.

NOTE Risk analysis shows that the main risk when using chainsaw protective gloves is the manual dexterity while operating chainsaws. Beside the regular risks, covered by EN 388, it is necessary to keep the chainsaw safely in the operator's hand. This test is designed to evaluate the performance of the gloves for this risk.

6 Test specimens

One pair each of the specimens for testing according to Clause 7, 8.3 and 9.1 shall be of the smallest size, the largest size and size 9 as provided by the manufacturer. For the tests according to 9.2, additional samples with different sizes can be required by the test laboratory. The complete glove is used as test specimen.

The total number of test specimens required shall be in accordance with the related requirements given in Table 6.

Mandatory tests for type 1:

— for design A gloves: four complete pairs of gloves for each cleaning applied;

— for design B gloves: five pairs of gloves.

Mandatory tests for type 2:

— for design A gloves: four complete pairs of gloves for each cleaning applied;

— for design B: five complete pairs of gloves.

7 Assessment of protective coverage

Measure the coverage on one pair of gloves of the smallest size, the largest size and size 9 for each cleaning treatment used.

Flatten the glove on a suitable flat surface, then mark and measure the dimensions of the protective material. Compare the results with the requirements specified in Clause 4.

a) For design A (see Figure 1) measure:

   1) the length of the protective material parallel to the long axis between the edge of the protective material nearest to the cuff (point C) and nearest to the crotch between digits 3 and 4 (point B);

   2) the width of the protective material l_2 in the direction of 90° to the l_1;

   3) the distance of the protective material to each crotch point l_3.

b) For design B (see Figure 2) measure:

   1) the length of the protective material along the line of longest length of the glove;

   2) the width of protective material l_2 in the direction of 90° to the l_1.

Record the measurements and check that the requirements given in Clause 4 have been fulfilled.

8 Testing resistance to cutting by chainsaw

8.1 Test rig

Set up the test rig as described in ISO 11393-1.

It is recommended that the test rig is fitted with a stop to prevent cutting too deeply into the artificial hand in case the test glove is cut-through. This stop shall not affect the test result; it shall be just a limit of the movement of the guide bar.

8.2 Chainsaw–protective glove mounting device

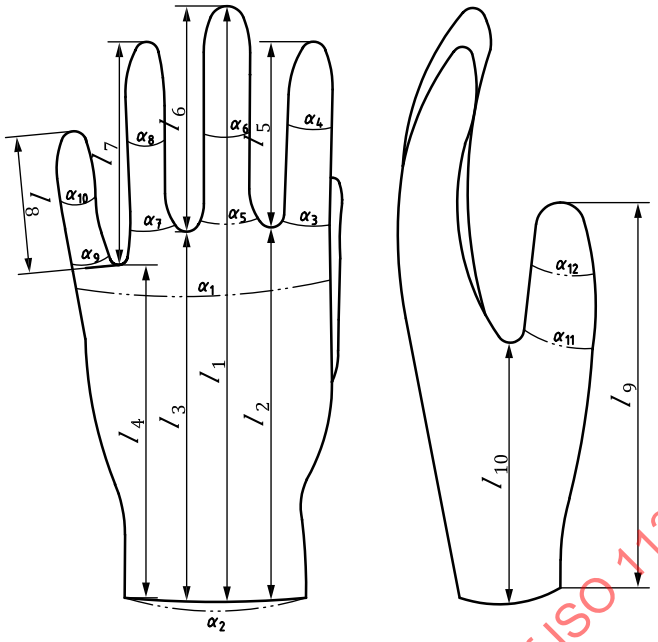
8.2.1 Left and right artificial hands

Artificial hands shall be moulded from a rigid polymer such as polyurethane or ABS.

Hardness = between 90 Shore A and 98 Shore A.

The shapes and dimensions of the larger sized artificial hand are shown in Figure 3 and Table 5. Artificial hands shall be constructed with a tolerance of ±5 % for each dimension. The artificial hand shall be used to test gloves of size 7 or larger. For smaller sized artificial hands, the dimensions of the artificial left and right hands shall be proportionally smaller (83 % of the below mentioned dimensions for the length measurements and 77 % for circumference measurements).

NOTE The details given refer to a left hand. Right hands have the same shape and dimensions but are mirror images.



NOTE See Table 5 for dimensions.

Figure 3 — Artificial left hand (the right hand is a mirror image)

Table 5 — Dimensions of an artificial left hand

Dimension	Length	Dimension	Circumference
l_1	190 mm	a_1	197 mm
l_2	120 mm	a_2	164 mm
l_3	116 mm	a_3	60 mm
l_4	104 mm	a_4	55 mm
l_5	60 mm	a_5	69 mm
l_6	78 mm	a_6	57 mm
l_7	65 mm	a_7	60 mm
l_8	45 mm	a_8	54 mm
l_9	135 mm	a_9	51 mm
l_{10}	89 mm	a_{10}	50 mm
—	—	a_{11}	70 mm
—	—	a_{12}	63 mm

8.2.2 Base

The base shall consist of a means of mounting the artificial hand horizontally so that it remains rigid and immovable when impacted by the chainsaw.

8.3 Test procedure for chainsaw cut tests

8.3.1 General

Arrange the chainsaw unit as specified in ISO 11393-1, except that the horizontal distance from the point of contact to the centre of the sprocket shall be (300 ± 2) mm (see ISO 11393-1:2018, Figure 4) and the load shall be (15,0 ± 0,5) N at this contact point (see ISO 11393-1:2018, 5.3.5).

8.3.2 Cleaning

Pre-treat by cleaning the test specimens in accordance with the care instructions provided by the manufacturer.

8.3.3 Mounting of glove on artificial hand

Fit the glove onto the appropriate (i.e. either left or right) artificial hand of the small or regular size in the same manner as it would be in wear. Fasten any fastening devices (e.g. straps, buckles) as in wear. Fix the glove to the artificial hand using staples or other fixings in the palm or nearest to the edge of protection, but not into the protective material, so as to prevent rotation of the glove during testing.

NOTE Experience indicates that it is suitable to fix the glove with a line of staples (at least one staple every 30 mm) that pass through the unprotected part of the glove as close as possible to the edge of the glove situated furthest from the pivot of the test rig.

8.3.4 Cutting

8.3.4.1 General

Make test cuts on both design A and design B in the positions shown in Figures 4, 5, 6, 7 and 8 and described in Table 6.

Avoid cutting into any fastenings fitted to the glove, as this could lead to anomalous results. The cut test shall include the smallest size, the largest size and size 9.

No more than one cut may be made on any one glove.

Table 6 — Total number of cuts

Type	Design	
	A	B
1	Position 1: two left-hand gloves Position 2: two left-hand gloves Position 3: one right-hand glove Position 4: one right-hand glove	Position 5: two left-hand gloves Position 6: two left-hand gloves Position 7: one right-hand glove Position 8: one right-hand glove Position 9: one right-hand glove Position 10: one left-hand glove
2	Position 1: two left-hand gloves Position 2: two left-hand gloves	Position 1: two left-hand gloves Position 2: two left-hand gloves Position 10: one left-hand glove

8.3.4.2 Cuts across the back of gloves

8.3.4.2.1 Preparation of sample

Fit the glove first onto the artificial hand as specified in 8.2, and then attach the combined assembly securely to the mounting device of the test rig.

Orient the artificial hand in such a manner that:

a) the back of the artificial hand is uppermost;

b) the thumb of the left-hand glove shall be nearest the pivot of the test rig and the little finger (digit 5) of the right-hand glove shall be nearest to the pivot.

8.3.4.2.2 Cut at an angle of 45°

Perform the test in the positions shown in Figures 4 a), 5 a), 6 a) and 7 a) across the back of the glove at an angle of 45° to the line of longest length of the glove.

For design A gloves [Figures 4 a) and 5 a)], make the test cut at a distance of (60 ± 10) mm from a line level with the edge of the protective coverage at the crotch between digits 3 and 4.

For design B gloves and mitts [Figures 6 a) and 7 a)], make the test cut at a distance of (130 ± 10) mm from the tip of digit 3 for the left hand and digit 4 for the right hand.

8.3.4.2.3 Cut at an angle of 90°

Perform this test in positions shown in Figures 4 b), 5 b), 6 b) and 7 b) across the back of the glove at an angle of 90° to the line of longest length of the glove.

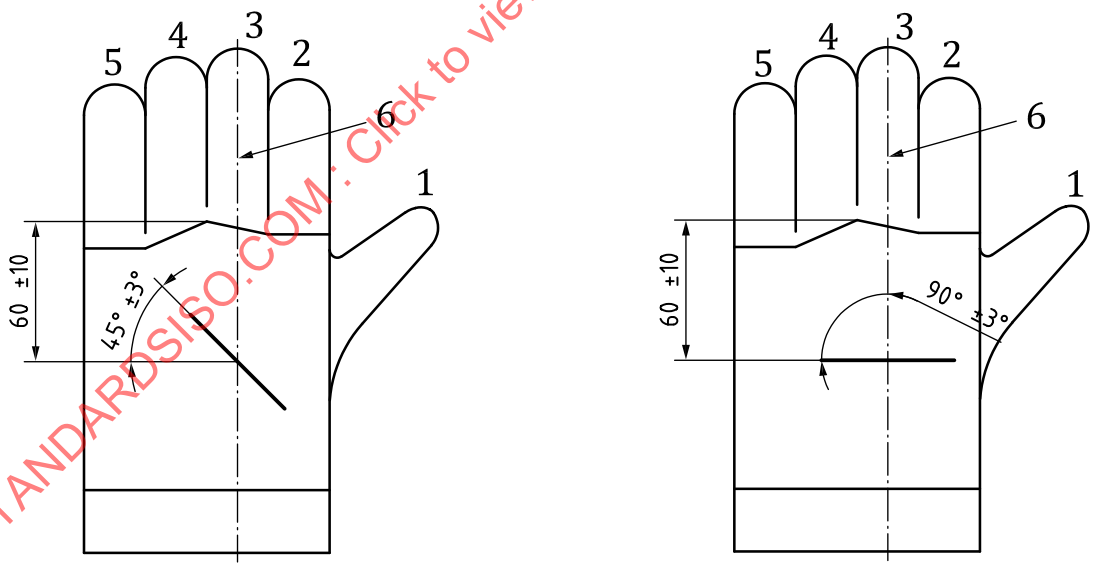
For design A gloves [Figures 4 b) and 5 b)], make the test cut at a distance of (60 ± 10) mm from a line level with the edge of the protective coverage at the crotch between digits 3 and 4.

For design B gloves and mitts [Figures 6 b) and 7 b)], make the test cut at a distance of (130 ± 10) mm from the tip of digit 3 for the left hand and digit 4 for the right hand.

8.3.4.3 Cuts across the back of the fingers of design B gloves

Make the test cuts in positions 9 and 10 as shown in Figure 8 across the back of the finger region of the glove at an angle of 90° to the line of longest length of the glove and at a distance of (50 ± 10) mm from the tip of the second finger or at an equivalent position.

Dimensions in millimetres



a) Position 1 **b) Position 2**

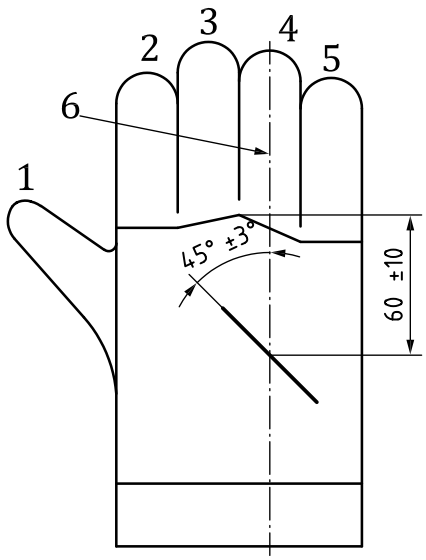
Key

1 to 5 numbers of digits

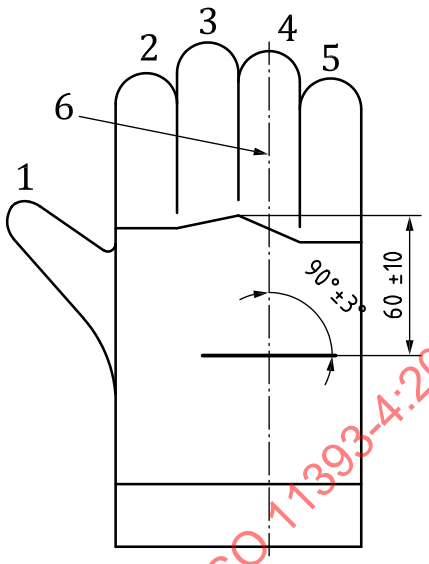
6 line of longest length

Figure 4 — Cuts across the back of the left-hand glove of design A

Dimensions in millimetres



a) Position 3



b) Position 4

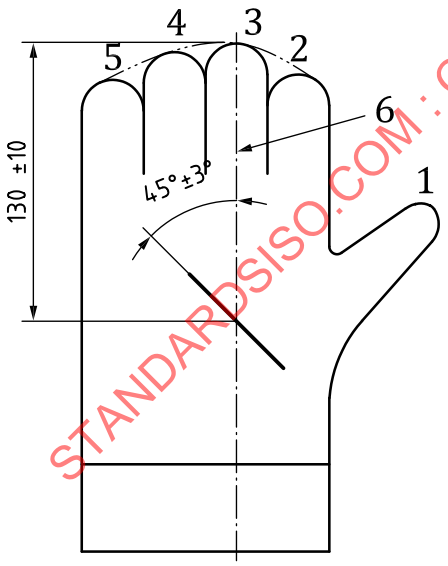
Key

1 to 5 numbers of digits

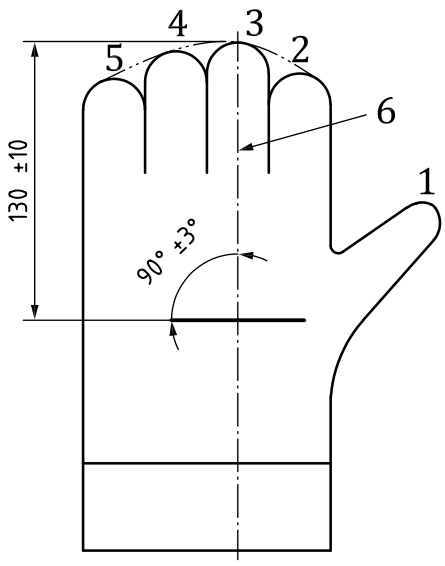
6 line of longest length

Figure 5 — Cut across the back of the right-hand glove of design A

Dimensions in millimetres



a) Position 5



b) Position 6

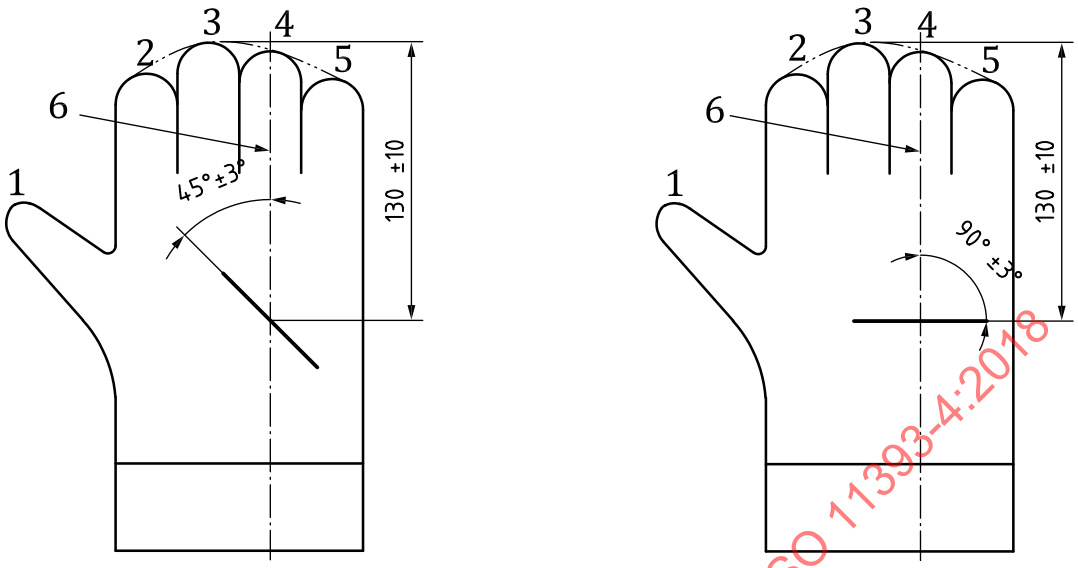
Key

1 to 5 numbers of digits

6 line of longest length

Figure 6 — Cuts across the back of the left-hand glove of design B

Dimensions in millimetres



a) Position 7 **b) Position 8**

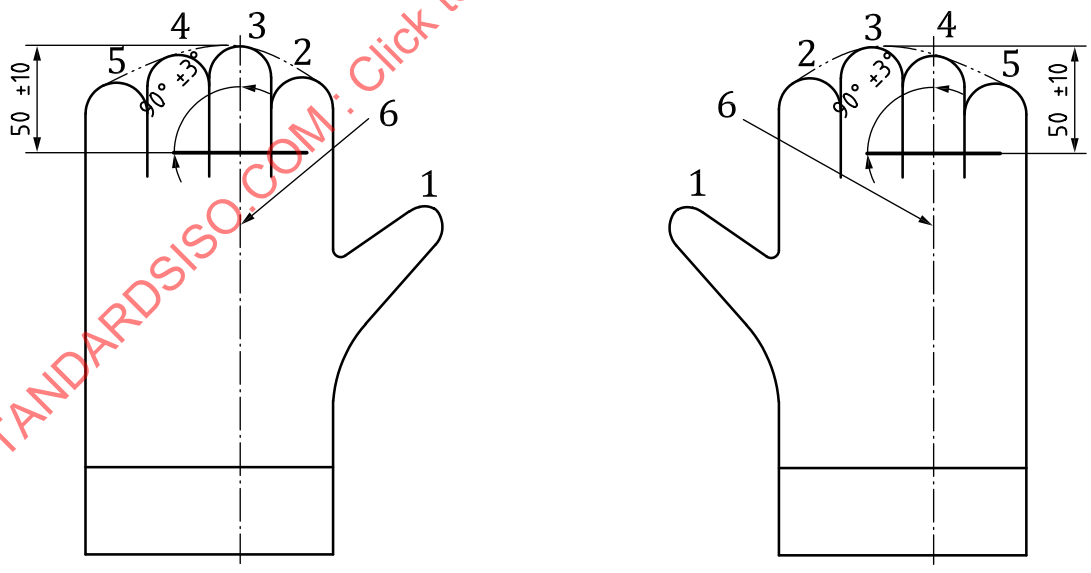
Key

1 to 5 numbers of digits

6 line of longest length

Figure 7 — Cuts across the back of the right-hand glove of design B

Dimensions in millimetres



a) Position 9 **b) Position 10**

Key

1 to 5 numbers of digits

6 line of longest length

Figure 8 — Cuts across the back of the fingers of the left- and right-hand gloves of design B

9 Ergonomic assessment and hand dexterity

9.1 General requirements

Examine the gloves visually and manually to identify rough or hard material or edges. Examine the outsides of the gloves to identify components that might catch on branches or chainsaw controls. Take into consideration the flexibility, dexterity and tactility of the gloves.

Assess the potential suitability of the gloves for the use(s) indicated in the manufacturer's information for users.

9.2 Hand grip test

9.2.1 General

The purpose of this grip test is to determine whether the wearing of a glove will significantly impair the grip.

The test is performed using human subjects who are required to grip a test bar both with their bare hand and while wearing a glove. The average compression force exerted by the wearers on the bar is measured under both conditions and any change caused by the wearing of the glove is noted. This is expressed as the grip factor.

If the first test fails, two further test people shall carry out the procedure. If one of the additional tests fails, the complete test shall be considered as failed. The lowest value of the passed test shall be reported.

9.2.2 Apparatus

9.2.2.1 Test bar

This comprises two solid metal bars of semi-circular cross section, joined together along their length by means of a compression strain gauge (or similar) so as to form one unit of approximately circular cross section with the following overall specification:

— length = (200 ± 10) mm;

— diameter = (30 ± 1) mm.

9.2.2.2 Compression force recording system

This shall be capable of providing a continuous read-out of compression force for at least 15 s and with an accuracy of ±2 %.

9.2.3 Test procedure

9.2.3.1 Selection of wearers

Two wearers shall be selected. The test person shall select the appropriate size according to the instructions supplied by the manufacturer. In addition, the average naked-hand grip force of each wearer (as measured in 9.2.3.2) shall be in the range of 300 N to 650 N.

9.2.3.2 Testing

Each wearer shall first be required to stand upright. Still bare handed, the wearer shall take the test bar in their left hand and hold it in such a way that both the test bar and the wearer's forearm is horizontal. In addition, the wearer's upper arm shall be kept as near as vertical and as close to the body as is felt comfortable.

The wearer shall then grip the test bar as strongly as possible for a period of (5 ± 1) s and the average compression force according to 9.2.3.3 exerted on the test bar is recorded.

The wearer is then allowed to relax for a period of at least 1 min before repeating the test, this time wearing a glove. After a second rest period of at least 1 min, the whole process is then repeated a further two times with the same wearer, plus a further three times for each of the other wearers.

Right-hand gloves of type 1 shall be tested as for left-hand gloves, but with the test performed with the right hand.

9.2.3.3 Expression of results

For each gripping test, the average grip force exerted on the test bar shall be calculated. In order to prevent any initial peak force from skewing the average, the forces recorded during the first second of each test shall be excluded when calculating the average force.

Based upon these average compression forces, the following additional figures shall also be calculated for each wearer:

a) average grip force *a* in Newton (ungloved);

b) average grip force *b* in Newton (gloved);

c) grip factor ($b/a \times 100$) as the final result of this test.

10 Test report

The test report shall include the following information:

a) a reference to this document and the year, i.e. ISO 11393-4:2018;

b) an identification of the test specimen, e.g. manufacturer, style number, type, design, size;

c) details of the washing or cleaning procedure applied to the test samples;

d) the results of the assessment of protective coverage;

e) the grip factor;

f) the test result for each individual cut test (i.e. whether or not cut-through occurred);

g) the chain speed/class of protection (see 5.3.1);

h) any deviations from the procedure;

i) any unusual features observed;.

j) the date of the test.

The test report shall also include information required in Clause 5.

11 Marking

Protective gloves for users of hand-held chainsaws shall be durably marked with at least the following information, which can be situated inside the glove in conjunction with other product marking:

a) the name, trademark or other means of identification of the manufacturer or their authorized representative;

b) the designation or style number (company identification of model);

c) the design and type according to Clause 4;

d) the number of this document and the year, i.e. ISO 11393-4:2018;

e) the size designation in accordance with EN 420:2009;

f) the class of protection (see 5.3.1): this information shall be given outside the frame of the pictogram showing a chainsaw, preferably on the bottom of the frame; type 2 right-hand gloves shall not include this pictogram in their marking;

g) the date of manufacture (year and month).

12 Pictogram

Chainsaw protective gloves fulfilling the requirements of this document shall be marked with the pictogram ISO 7000–2416, as shown in Figure 9. The pictogram shall either be printed on the outside of the glove or incorporated as part of a label. If the latter, the label shall be sewn to the inside of the glove.

The pictogram shall have minimum size of 10 mm × 10 mm. It shall be durable as assessed during the cleaning according to 8.3.2, if applicable.

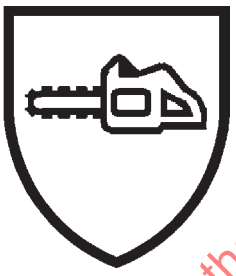


Figure 9 — Protection against chainsaw pictogram (ISO 7000–2416)

13 Information to be supplied by the manufacturer

Chainsaw protective gloves shall be supplied with unambiguous instructions. The instructions for the user shall contain at least the following:

b) the type designation or style number;

c) information about which gloves provide protection against chainsaws (both the left- and right-hand gloves, or only the left-hand glove);

d) a figure showing the protective coverage for left- and right-hand gloves, with the related class;

e) washing/cleaning instructions;

f) the size designation in accordance with EN 420:2009;

g) a description of the adjustment and attachment systems for adaptation to user morphology, if applicable;

h) information about ageing, including the obsolescence date, if applicable, and information to enable the user to recognize when the gloves shall be discarded and other criteria for discarding the gloves;

i) the statement “Does not offer protection against all risks of cutting by a hand-held chainsaw” or similar wording;

j) the statement “The chainsaw shall be used correctly using both hands according to the instructions from the chainsaw manufacturer”;

k) information given in the marking;

