

NATIONAL STANDARD OF CANADA NORME NATIONALE DU CANADA

CAN/ULC-60900-14 (CEI/IEC 60900:2012, MOD)

La norme internationale **CEI/IEC 60900:2012, (troisième édition, 2012-06)** a été adoptée avec les exigences propres au Canada (MOD), et porte la désignation **CAN/ULC-60900-14** la troisième Edition. Elle a été approuvée comme Norme nationale du Canada par le Conseil canadien des normes.

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International Standard **CEI/IEC 60900:2012 (Third Edition, 2012-06)** has been adopted with Canadian deviations (MOD) as the Third Edition of **CAN/ULC-60900-14**, which has been approved as a National Standard of Canada by the Standards Council of Canada.

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Travaux sous tension – Outils à main pour usage jusqu'à 1 000 V en courant alternatif et 1 500 V en courant continu

ICS 13.260, 29.240.20, 29.260.99

Live working – Hand tools for use up to 1 000 V a.c. and 1 500 V d.c.

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Numéro de référence
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CEI/IEC 60900:2012

**Commission Electrotechnique Internationale
International Electrotechnical Commission**

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Il est recommandé aux personnes qui ont besoin d'utiliser des normes de se servir des NNC. Ces normes font l'objet d'examen périodiques; c'est pourquoi l'on recommande aux utilisateurs de se procurer l'édition la plus récente de la norme auprès de l'OEN qui l'a publiée.

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Le but premier visé par cette norme est énoncé au paragraphe qui en définit le domaine d'application. Il importe de préciser qu'il incombe à l'utilisateur de décider si la norme convient à ses besoins particuliers.

The intended primary application of this Standard is stated in its scope. It is important to note that it remains the responsibility of the user of the Standard to judge its suitability for this particular application.

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NORME NATIONALE DU CANADA

NATIONAL STANDARD OF CANADA

CAN/ULC-60900-14
(CEI/IEC 60900:2012, MOD)

**Travaux sous tension –
Outils à main pour usage jusqu'à
1 000 V en courant alternatif et 1 500 V
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**Live working – Hand
tools for use up to 1 000 V a.c. and
1 500 V d.c.**

ICS 13.260, 29.240.20, 29.260.99

Préparée par / Prepared by
**International Electrotechnical Commission
Commission Électrotechnique Internationale**



Passé en revue par / Reviewed by
**ULC Standards
Normes ULC**



Approuvée par le / Approved by



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La composition du comité peut avoir changé depuis ce temps-là.

This list represents the membership at the time the Committee balloted on the final text of this edition. Since that time, changes in the membership may have occurred.

CAN/ULC-60900-14

(CEI/IEC 60900:2012, MOD)

Travaux sous tension – Outils à main pour usage jusqu'à 1 000 V en courant alternatif et 1 500 V en courant continu

PRÉFACE ULC

Ce document constitue la troisième édition de la norme, CAN/ULC-60900-14 (CEI/IEC 60900:2012, MOD), Travaux sous tension – Outils à main pour usage jusqu'à 1 000 V en courant alternatif et 1 500 V en courant continu, laquelle constitue une adoption, avec les exigences propres au Canada, de la norme internationale de la Commission Électrotechnique Internationale, CEI/IEC 60900 (troisième édition, 2012-06).

Au Canada, il y a deux langues officielles, le français et l'anglais. Tous les avertissements de sécurité doivent être en français et en anglais. Il importe de signaler que certaines autorités canadiennes peuvent exiger que des marquages et/ou des directives d'installation supplémentaires soient dans les deux langues officielles.

Cette troisième Edition de la norme nationale du Canada remplace désormais la deuxième Edition.

Cette édition de la norme a été approuvée par le Comité ULC sur les travaux sous tension et a été approuvée en tant que Norme nationale du Canada par le Conseil canadien des normes.

Il est possible que certains éléments de la présente norme canadienne soient sujets à des droits en matière de brevet. Normes ULC n'est pas tenu de signaler dans quelles circonstances ces droits en matière de brevet peuvent s'appliquer.

La révision de cette norme débutera dans les 5 ans suivant la date de publication, à moins que la norme soit désignée comme entrant dans une catégorie stabilisée, auquel cas la révision commencera dans le délai approprié défini par Normes ULC.

La présente norme est destinée à être utilisée à des fins d'évaluation de la conformité.

Une grande partie du financement nécessaire au processus d'adoption de cette norme nationale du Canada a été assurée par l'association canadienne de l'électricité (ACE) que nous tenons à remercier.

Mai 2014

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CAN/ULC-60900-14

(CEI/IEC 60900:2012, MOD)

Live working – Hand tools for use up to 1 000 V a.c. and 1 500 V d.c.

ULC PREFACE

This is the Third Edition of the Standard CAN/ULC-60900-14 (CEI/IEC 60900:2012, MOD), Live working – Hand tools for use up to 1 000 V a.c. and 1 500 V d.c. , with Canadian Deviations, of the international standard by International Electrotechnical Commission, CEI/IEC 60900:2012 (Third Edition 2012-06).

In Canada there are two official languages, English and French. All safety warnings must be in French and English. Attention is drawn to the possibility that some Canadian authorities may require additional markings and/or installation instructions to be in both official languages.

The requirements of Third Edition of this National Standard now supersede the Second Edition.

This Edition of the Standard has been formally approved by the ULC Committee on Live Working and has been approved as a National Standard of Canada by the Standards Council of Canada.

Attention is drawn to the possibility that some of the elements of this Canadian standard may be the subject of patent rights. ULC Standards shall not be held responsible for identifying any or all such patent rights.

The initiation of the review of this Standard will commence within 5 years of the date of publication, unless the Standard is identified as fitting within a stabilized category, whereby the review will commence within the appropriate time frame set out by ULC Standards

This Standard is intended to be used for conformity assessment.

Major funding in support of the adoption process of this National Standard of Canada was provided by the Canadian Electricity Association (CEA), whose assistance is acknowledged with thanks.

May 2014

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Exigences propres au Canada

4.1.4 MARQUAGE

[Supprimer le quatrième point avec tiret relatif au « - symbole CEI 60417-5216:2002-10... » et la REMARQUE connexe]

[Réviser le cinquième point avec tiret comme suit :]

« – indication de 1 000 V (c.-à-d. la limite de service électrique pour le courant alternatif). »]

[Supprimer la figure 1 – Marquage de la limite de service électrique adjacent au symbole du double triangle...]

[Supprimer le dernier paragraphe de l'article 4.1.4 indiquant « Le symbole du double triangle... »]

ANNEXE B

[Supprimer l'annexe B.]

ANNEXE G

[Ajouter le texte de l'annexe G (à titre informatif) pour indiquer ce qui suit :]

Annexe G (informative)

Entretien et vérifications périodiques en cours de service

G.1 Généralités

Les éléments suivants visent à orienter les utilisateurs en ce qui a trait à l'inspection des selles, des manchons et des accessoires connexes pendant leur utilisation.

G.2 Choix des caractéristiques appropriées d'un outil

G.2.1 Température d'utilisation

La norme ne contient aucun renseignement quant à la plage de température pour laquelle un outil est conçu ou aux limites de température recommandées relativement à son utilisation.

Les utilisateurs devraient tenir compte des limites de température de travail attendues au moment de choisir les caractéristiques nominales d'un outil.

G.2.2 Facteur de sécurité

La présente norme fournit des exigences essentielles dont doit tenir compte chaque utilisateur en fonction de ses besoins. En conséquence, on considère généralement que le facteur de surcharge de 2,5 indiqué pour les essais (réalisés à la température ambiante du laboratoire d'essai) est la valeur minimale.

Les utilisateurs peuvent examiner la possibilité d'augmenter le facteur de sécurité en cas d'utilisation d'un outil pour lever ou pour protéger le positionnement des travailleurs.

G.3 Vérification préalable à l'utilisation

Il est fortement recommandé d'inspecter visuellement chaque outil avant son utilisation.

G.4 Vérification périodique

G.4.1 Outils au fonctionnement mécanique seulement

Il est recommandé de soumettre ces outils aux essais décrits à la section D.4.3. au moins une fois tous les cinq ans.

G.4.2 Outils utilisés en présence de travailleurs

Lorsque la sécurité des travailleurs est directement liée à l'utilisation de certains types d'outils, il est recommandé de soumettre ces outils aux essais décrits à la section D.4.3. au moins une fois tous les trois ans.

G.4.3 Procédure d'essai périodique

La réalisation par un utilisateur d'essais périodiques des outils en service exige de nombreux montages d'essai différents et coûteux. En pratique, la réalisation des vérifications périodiques suivantes a été jugée appropriée :

- Examens visuel et fonctionnel de l'outil
- Vérification des dimensions de ses caractéristiques essentielles (orifices, boulonnage, etc.)
- Essais non destructifs des soudures, le cas échéant (inspection visuelle, ressuage, rayons X, ultrasons, etc.)
- Examen visuel du caractère lisible du marquage

Canadian Deviations

4.1.4 MARKING

[Delete the fourth dash item regarding “- symbol IEC 60417-5216:2002-10...” and accompanying NOTE]

[Revise the fifth dash item to state:
“– indication 1 000 V (i.e. the electrical working limit for alternating current).”]

[Delete Figure 1 – Marking of the electrical working limit adjacent to the symbol double triangle]

[Delete last paragraph of clause 4.1.4 stating “The symbol double triangle...”]

ANNEX B

[Delete Annex B]

ANNEX G

[Add informative Annex G text to read as follows:]

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Annex G (informative) **In-service care and periodic checking**

G.1 General

The following is to provide guidance to the users for the inspection of saddles, stick clamps and their accessories when in service.

G.2 Selection of the proper characteristics of a tool

G.2.1 Working temperature

No consideration is given in the standard to the range of temperature for which a tool is designed or to the temperature limits recommended for its use.

Users should take into consideration the expected limits of the working temperature when selecting the rated characteristics of a tool.

G.2.2 Safety factor

This standard provides essential requirements that may be supplemented by each user according to its needs. According to that, the overload factor of 2,5 specified for the tests (performed at the ambient temperature of the test laboratory) is understood in general as being a minimum value.

Users may consider increasing the safety factor in case of a tool used to lift or secure the positioning of the workers.

G.3 Check before use

It is strongly recommended that each tool be checked visually before use.

G.4 Periodic checking

G.4.1 Tools with a mechanical function only

It is recommended to submit these tools at least once every 5 years to the tests described in D.4.3.

G.4.2 Tools used when workers are involved

When the safety of the workers is directly associated with the use of some types of tools, it is recommended to submit these tools at least once every 3 years to the test described in D.4.3.

G.4.3 Periodic testing procedure

For a user to perform mechanical periodic tests of the tools in use would ask for numerous different and costly test set-ups. In practice, it has been found appropriate to perform the following checks on a periodic basis:

- Visual and functional check of the tool;
- Dimensional check of its critical characteristics (holes, bolting, etc.);
- Nondestructive tests for welds where relevant (ex: visual inspection, liquid penetrant testing, X rays, ultrasonic, etc.)
- Visual check of the marking for legibility.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Live working – Hand tools for use up to 1 000 V a.c. and 1 500 V d.c.

Travaux sous tension – Outils à main pour usage jusqu'à 1 000 V en courant alternatif et 1 500 V en courant continu



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Live working – Hand tools for use up to 1 000 V a.c. and 1 500 V d.c.

Travaux sous tension – Outils à main pour usage jusqu'à 1 000 V en courant alternatif et 1 500 V en courant continu

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**LIVE WORKING –
HAND TOOLS FOR USE UP
TO 1 000 V AC AND 1 500 V DC****FOREWORD**

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International Standard IEC 60900 has been prepared by IEC technical committee 78: Live working.

This third edition cancels and replaces the second edition, published in 2004. This edition constitutes a technical revision.

It includes the following significant technical changes with regard to the previous edition:

- general review of the requirements and test provisions;
- preparation of the elements of evaluation of defects, and general application of IEC 61318:2007 (Ed.3);
- deletion of Annexes D and E, not applicable according to IEC 61318 Ed.3;
- introduction of a new normative Annex D on chronology of type tests;
- introduction of a new normative Annex F on classification of defects.

The text of this standard is based on the following documents:

FDIS	Report on voting
78/947/FDIS	78/953/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

This International Standard has been prepared in accordance with the requirements of IEC 61477 where applicable.

The product covered by this standard may have an impact on the environment during some or all stages of its life cycle. These impacts can range from slight to significant, be of short-term or long-term, and occur at the global, regional or local level.

This standard does not include requirements and test provisions for the manufacturers of the product, or recommendations to the users of the product for environmental improvement. However, all parties intervening in its design, manufacture, packaging, distribution, use, maintenance, repair, reuse, recovery and disposal are invited to take account of environmental considerations.

... ..

LIVE WORKING – HAND TOOLS FOR USE UP TO 1 000 V AC AND 1 500 V DC

1 Scope

This International Standard is applicable to insulated and insulating hand tools used for working live or close to live parts at nominal voltages up to 1 000 V a.c. and 1 500 V d.c.

The products designed and manufactured according to this standard contribute to the safety of the users provided they are used by skilled persons, in accordance with safe methods of work and the instructions for use (where appropriate).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60212, *Standard conditions for use prior to and during the testing of solid electrical insulating materials*

IEC 60417, *Graphical symbols for use on equipment*

IEC 61318, *Live working – Conformity assessment applicable to tools, devices and equipment*

IEC 61477, *Live working – Minimum requirements for the utilization of tools, devices and equipment*

ISO 1174-1, *Assembly tools for screw and nuts – Driving squares – Part 1: Driving squares for hand socket tools*

ISO 9654, *Pliers and nippers for electronics – Single-purpose nippers – Cutting nippers*

ISO 9655, *Pliers and nippers for electronics – Single-purpose pliers – Pliers for gripping and manipulating*

ISO 9656, *Pliers and nippers for electronics – Test methods*

ISO 9657, *Pliers and nippers for electronics – General technical requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61318 and the following apply.

NOTE For the definitions of general terms in this document, reference should be made to the IEC 60050 series or to special definitions laid down in IEC 60743. Nomenclature of hand tools are found in the relevant ISO standards such as ISO 1703, ISO 5742 and ISO 8979.

3.1

hand tool (for live working)

hand held insulated or insulating tool

Note 1 to entry: Hand tools are normally tools such as screwdrivers, pliers, wrenches or knives.

[SOURCE: IEC 60050-651:1999, 651-01-27, modified – The scope of the definition has been enlarged.]

3.2

insulated hand tool

hand tool made of conductive materials, fully or partially covered by insulating materials

[SOURCE: IEC 60050-651:1999, 651-01-25, modified – The definition has been changed to refer specifically to hand tools.]

3.3

insulating hand tool

hand tool made totally or essentially from insulating materials except for inserts made from conductive materials used for reinforcement, but with no exposed conductive parts

[SOURCE: IEC 60050-651:1999, 651-01-26, modified - The definition has been changed to refer specifically to hand tools and its scope has been narrowed.]

4 Requirements

4.1 General requirements

4.1.1 Safety

Insulated and insulating hand tools shall be manufactured and dimensioned in such a way that they protect the user from electric shock.

NOTE Insulated hand tools completely covered by insulating materials and insulating tools minimize the risk of short circuits between two parts at different potentials when they are used in the correct manner.

The following requirements have been prepared in order that the hand tools covered by this standard are designed and manufactured to contribute to the safety of the users, provided they are used by persons skilled for live working, in accordance with safe methods of work and the instructions for use (where appropriate).

4.1.2 Performance under load

The mechanical specifications for insulated hand tools shall comply with the corresponding ISO standards, or, where no ISO standard exists, with a standard specified by the manufacturer or the customer, (for example a national standard). The mechanical specifications for the working parts of the hand tools shall be retained even after application of an insulating layer.

Insulating hand tools specially designed for live working may have lower stress resistance than insulated hand tools, but they shall withstand the expected workloads without failing due to remaining deformation or breaking. These hand tools can be equipped with devices that limit the workloads that can be applied with them, for example by overload slipping clutches (see also Annex A).

4.1.3 Multiple-ended hand tools

Multiple-ended hand tools, such as box wrenches, keys for hexagonal socket screws, double-ended socket-wrenches, double-head open-end wrenches, etc., are not allowed for insulated hand tools but are allowed for insulating hand tools if the design assures that there is no conductive connection between two of the working heads.

4.1.4 Marking

The marking shall be clearly identifiable by persons with normal or corrected sight without further magnification. Each hand tool and/or tool component shall be legibly and permanently marked with the following items of marking:

- on the insulating material or on the metal part:
 - marking of the origin (manufacturer's name or trade mark);
 - on the insulating material:
 - model/type reference;
 - year of manufacture (at least the last two digits of the year);
 - symbol IEC 60417-5216:2002-10 – Suitable for live working; double triangle (see Annex B);
- NOTE For the symbol, the exact ratio of the height of the figure to the base of the triangle is 1,43. For the purpose of convenience, this ratio can be between the values of 1,4 and 1,5.
- indication 1 000 V (i.e. the electrical working limit for alternating current), immediately adjacent to the symbol double triangle (see Figure 1 for an example);



IEC 1042/12

Figure 1 – Marking of the electrical working limit adjacent to the symbol double triangle

- number of the relevant IEC standard immediately adjacent to the symbol double triangle, (IEC 60900);
- for hand tools designed for use at extremely low temperature: letter “C” (see 4.2.2);
- additional marking for hand tools capable of being assembled and designed to be interchangeable between different manufacturers (see 4.3.1.3.2);
- additional marking where specified by the customer (for example ownership mark).

The hand tools shall bear no voltage marking apart from those described above.

NOTE For example, the indication of test voltage may lead to the assumption that the hand tool is suitable for work at that voltage.

Other characteristics or information not needed at the work location, like the year of publication of the standard, shall be associated to the product item by other means, such as coded information (bar codes, microchips, etc.), or shall be associated to its packaging.

The symbol double triangle shall be at least 3 mm high; the letter and the figures of the electrical working limit shall be at least 2 mm (see Figure 1).

4.1.5 Separating of covers

If hand tools have conductive elements (for example: torque adjusting screws, operating direction switches, etc.) which are insulated with covers of insulating materials, these covers shall be well fastened, so that they do not come off during normal use (see 5.7.4).

4.1.6 Instructions for correct adjustment and assembly

Where the manufacturer deems that instructions are necessary for correct adjustment or assembly, then the manufacturer shall provide these in accordance with the general provisions given in IEC 61477 (see also Annex C).

4.2 Requirements concerning insulating materials

4.2.1 General

The insulating material shall be selected according to the electrical, mechanical and thermal stresses to which it may be exposed during use. In addition, the insulating material shall have an adequate resistance to ageing and be flame retardant.

The insulating coating may consist of one or more layers. If two or more layers are adopted, contrasting colours may be used.

The design and construction of the handles shall provide a secure handhold and prevent unintentional hand slipping.

4.2.2 Thermal stability

The service ability of the hand tools shall not be impaired within the temperature range $-20\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$.

The insulating material applied on hand tools shall adhere securely to the conductive part from $-20\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$.

Hand tools intended for use at extremely low temperatures (down to $-40\text{ }^{\circ}\text{C}$) shall be designated "Category C" and shall be designed for this purpose.

4.3 Additional requirements

4.3.1 Hand tools capable of being assembled

4.3.1.1 Retaining devices for hand tools capable of being assembled

Hand tools capable of being assembled shall have suitable retaining devices to prevent unintentional separation of the assembly. The retaining forces shall be tested according to 5.8.4.

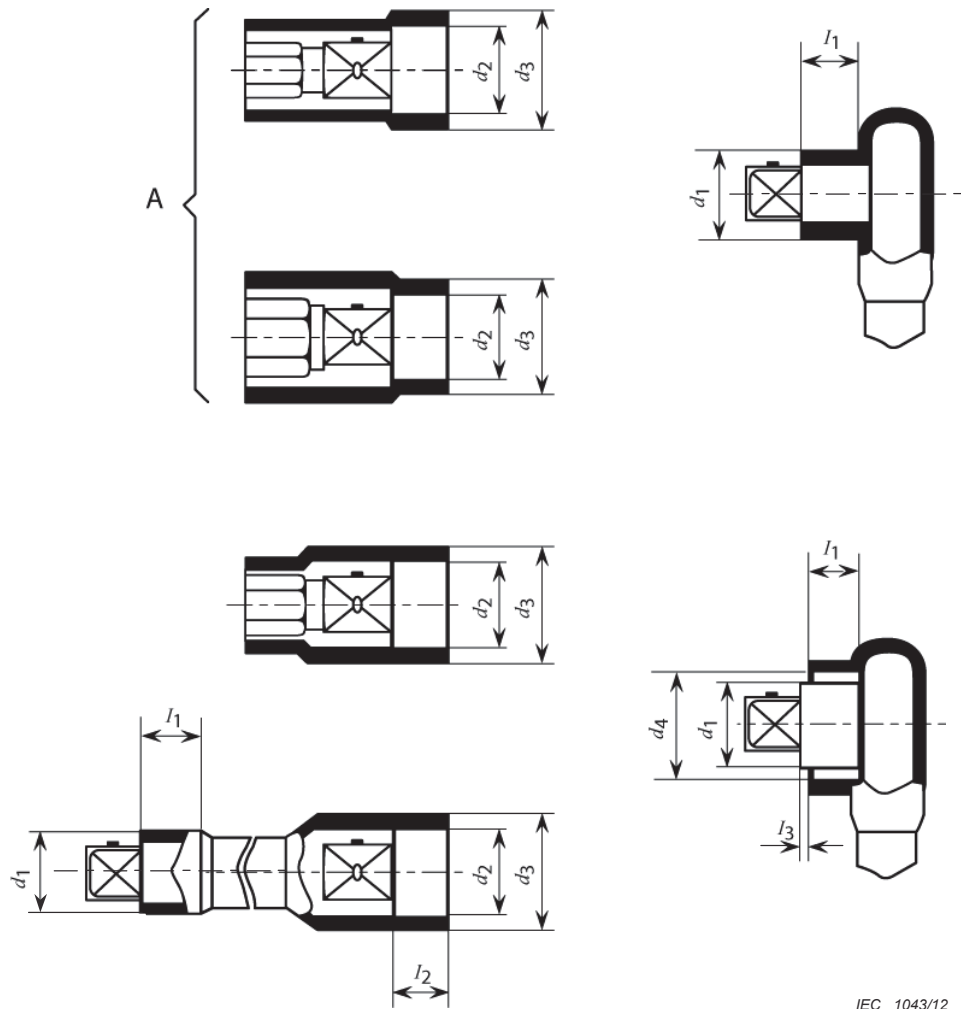
4.3.1.2 Insulation design for hand tools capable of being assembled

In the case of connecting parts of hand tools capable of being assembled, the insulation shall be applied in such a manner that if any part becomes detached during use by exceeding the retaining forces according to 5.8.4, no conductive part, which may still be live, can be inadvertently touched or cause a disruptive discharge.

4.3.1.3 Hand tools capable of being assembled with square drives

4.3.1.3.1 General

Hand tools capable of being assembled with square drives shall have square drives and square sockets in accordance with ISO 1174-1 (for separating forces, see 5.8.4.2). To ensure compatibility of insulation between different manufacturers, these hand tools shall be designed with overlapping elements described in Figure 2. Their dimensions and tolerances shall be in accordance with Table 1.



Key

A admitted shapes

Figure 2 – Description of the insulating overlapping element and different assembly configurations for hand tools capable of being assembled with square drives

Table 1 – Dimensions and tolerances of the insulating overlapping element

Nominal size of the square drive	Dimensions in millimetres						
	I_1 min.	I_2 $^{+2}_0$	I_3 $^{+0,5}_{-0,5}$	d_1 $^0_{-1,5}$	d_2 $^{+1,5}_0$	d_3 $^0_{-1,5}$	d_4 $^{+1,5}_0$
6,3	19	16	2	12,5	13	18	19
10	19	16	2	17,5	18	23	24
12,5	19	16	2	21,5	22	27	28
20	19	16	2	32	33	38	39

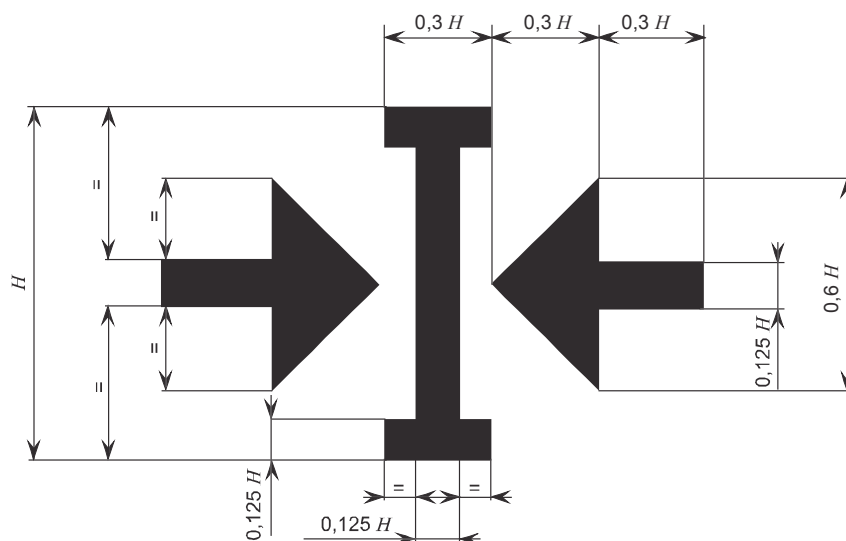
$I_1, I_2, I_3, d_1, d_2, d_3$ and d_4 are described in Figure 2.

4.3.1.3.2 Interchangeability of components made by different manufacturers

Hand tools capable of being assembled and designed to be interchangeable between different manufacturers shall be specifically marked as such.

The marking symbol and the dimensions are given in Figure 3. The dimension H shall be greater than or equal to 5 mm.

Dimensions in millimetres



IEC 1044/12

Figure 3 – Marking symbol for hand tools capable of being assembled and designed to be interchangeable between different manufacturers

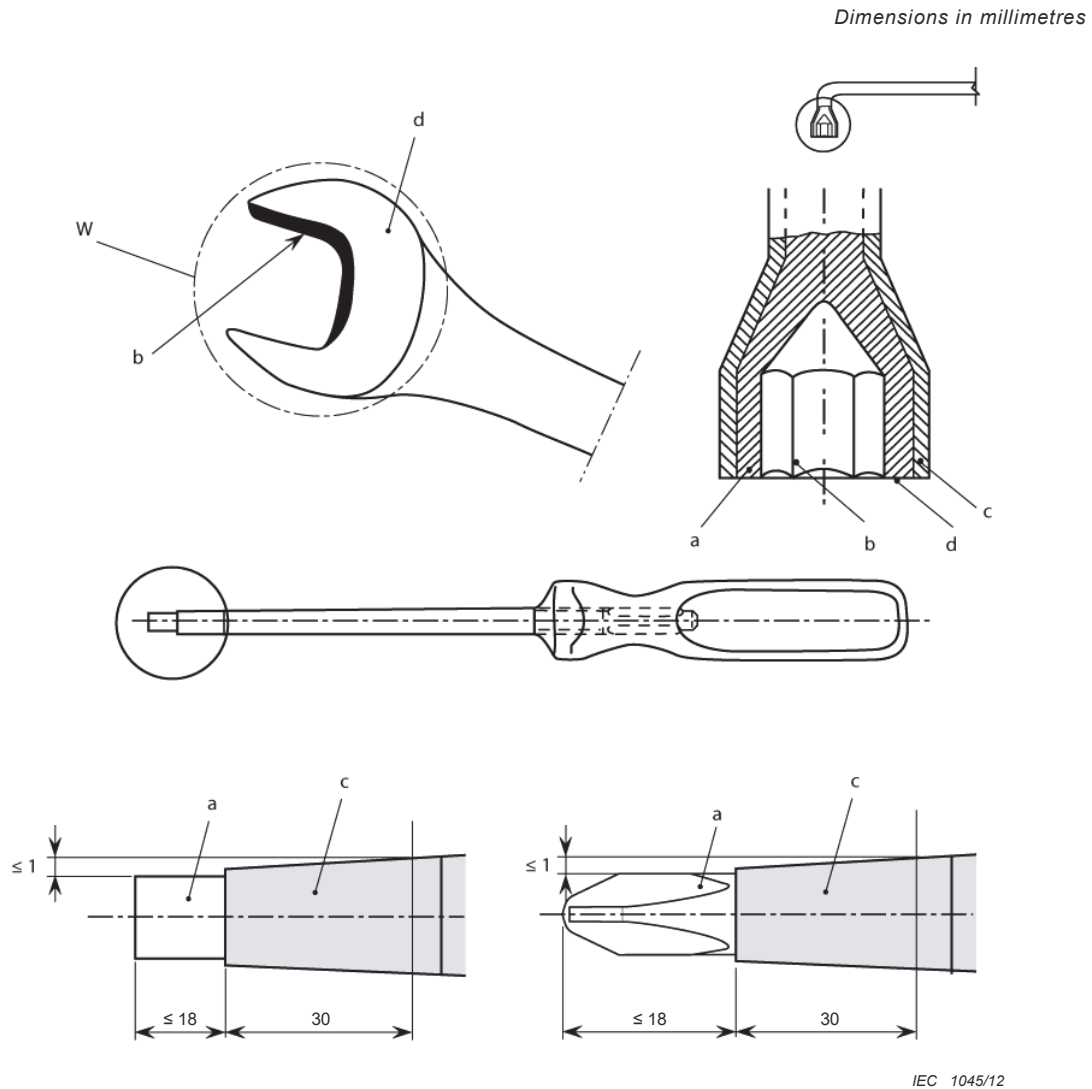
The reliable function of locking systems used for those hand tools shall be tested by applying a separation test in accordance with 5.8.4 with a corresponding dummy.

For this kind of hand tools, instructions for correct assembly are mandatory. The manufacturer shall include the following information: “To assure that the complete assembly of insulated hand tool components from different manufacturers will withstand separating forces that are expected during the intended use, prior to the use of any assembly the user shall assure, by pulling by hand in a separating direction, that the retaining devices of all used elements are working efficiently”.

4.3.2 Screwdrivers

4.3.2.1 Uninsulated areas

For screwdrivers, an uninsulated conductive area having a maximum length of 18 mm is permissible on the working head (see Figure 4).



Key

- a conductive part
- b working surface
- c insulation
- d contact area
- W working head

Figure 4 – Illustration of insulation of typical hand tools

4.3.2.2 Shape of shaft insulation

The shaft insulation of screwdrivers shall be bonded to the handle. The outer diameter of the insulation, over a length of 30 mm, in area c of Figure 4, shall not exceed by more than 2 mm

the width of the shaft at the tip or the width of the tip, whatever is the larger dimension. This area may be parallel or tapered towards the tip.

This requirement does not apply to insulated bit sockets (or insulated socket drivers).

4.3.2.3 Screwdrivers with exchangeable working heads

Screwdrivers with exchangeable working heads are regarded as hand tools capable of being assembled. They shall meet the relevant requirements. The outer diameter of the insulation may exceed the dimensions of 4.3.2.2.

4.3.2.4 Screwdrivers with screw retaining devices

If a screwdriver has a screw retaining device, the screwdriver itself shall meet the requirements of this standard. The outer diameter of the retaining device may exceed the dimensions of 4.3.2.2. The retaining device shall be made from insulating material.

4.3.3 Wrenches – uninsulated areas

The following uninsulated areas and lengths on the working head are permissible (see Figure 4):

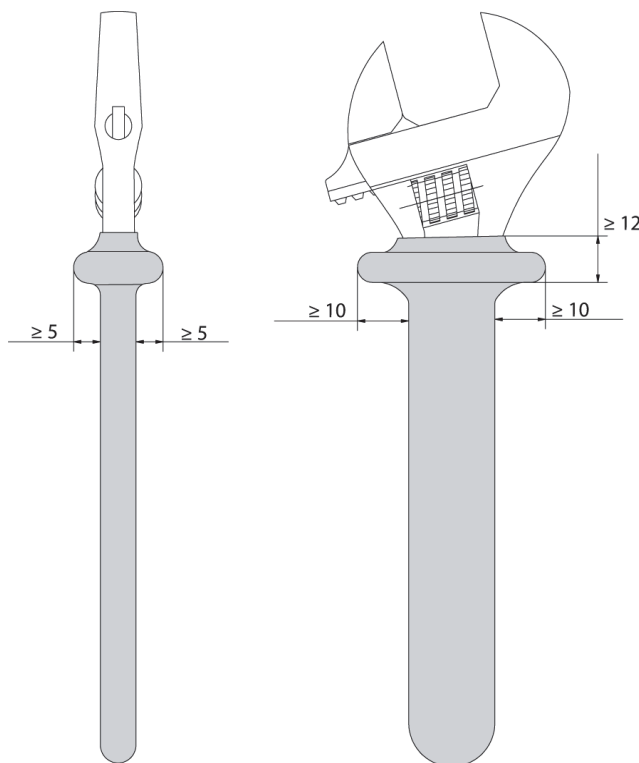
- engineers' wrenches: the working surface;
NOTE At the request of the customer, the uninsulated area may be extended to the working head.
- box wrenches, socket-wrenches, tee wrenches: the working surface and the contact area.

4.3.4 Adjustable wrenches

The insulation of adjustable wrenches shall be applied as far as possible towards the working head.

The uninsulated area may be extended to the working head. If the working head remains uninsulated, a guard shall be applied so that the hand is prevented from slipping towards the uncovered conductive parts of the head (see an example in Figure 5).

Dimensions in millimetres



IEC 1046/12

Figure 5 – Insulated adjustable wrench

4.3.5 Pliers, strippers, cable scissors, cable-cutting hand tools

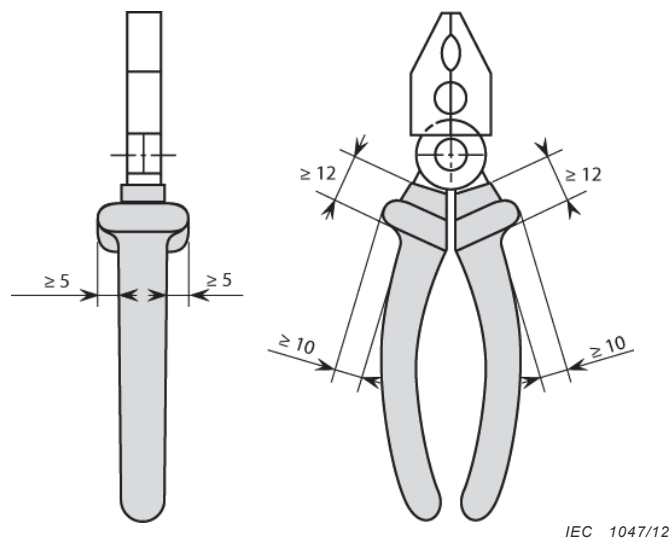
The handle insulation shall have a guard so that the hand is prevented from slipping towards the uncovered conductive parts of the head (see Figure 6 as an example).

The height of the guard shall be sufficient to prevent the slipping of the fingers towards the uncovered conductive parts during the work.

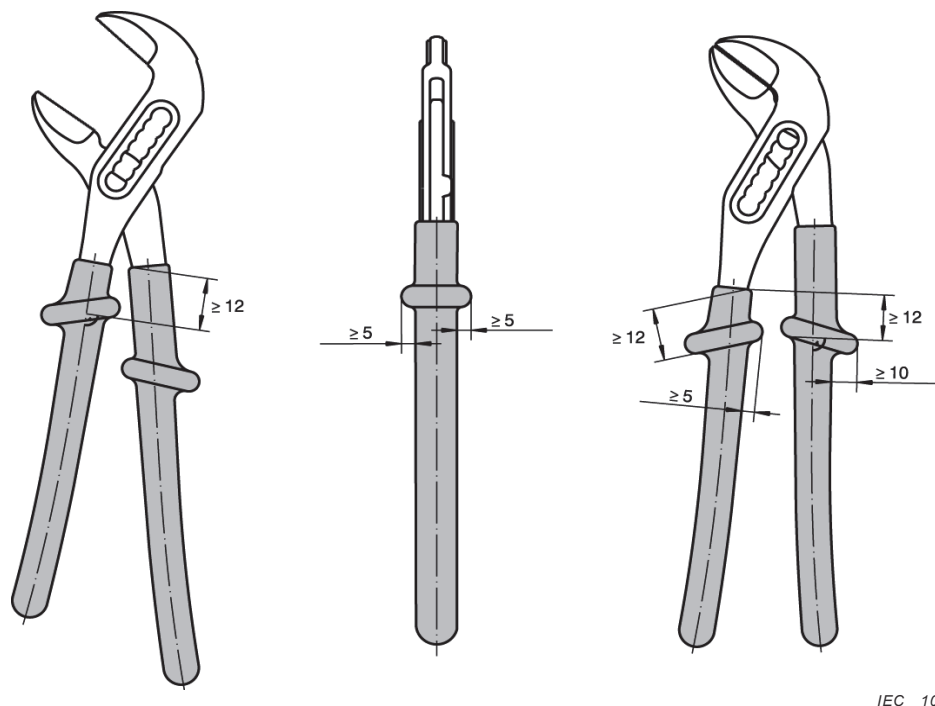
For pliers, the minimum dimensions of the guard shall be (see Figure 6 as an example):

- 10 mm on the left and on the right of the pliers held on a flat surface;
- 5 mm on the upper and lower part of the pliers held on a flat surface.

The minimum insulated distance between the inner edge of each guard and any non-insulated parts shall be 12 mm (see Figure 6). The insulation portion in front of the guard shall extend as far as possible towards the working head.

Dimensions in millimetres**Figure 6 – Insulation of pliers**

In the case of a slip joint, a guard of 5 mm shall be provided for the inner part of the handles. Refer to Figure 7 for further dimensioning.

Dimensions in millimetres**Figure 7 – Insulation of multiple slip joint pliers**

Where there is a functional surface below the joint, an inner guard shall be provided (as used with multiple slip joint pliers). See Figure 8.

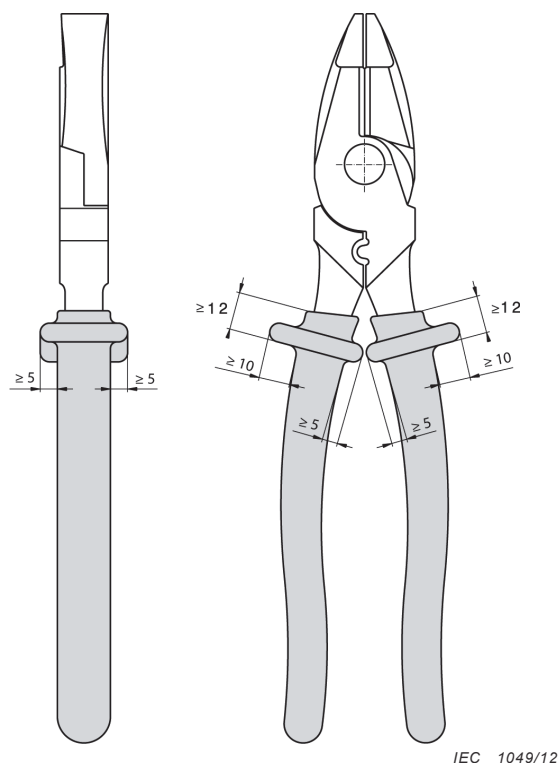


Figure 8 – Insulation of pliers with a functional area below the joint

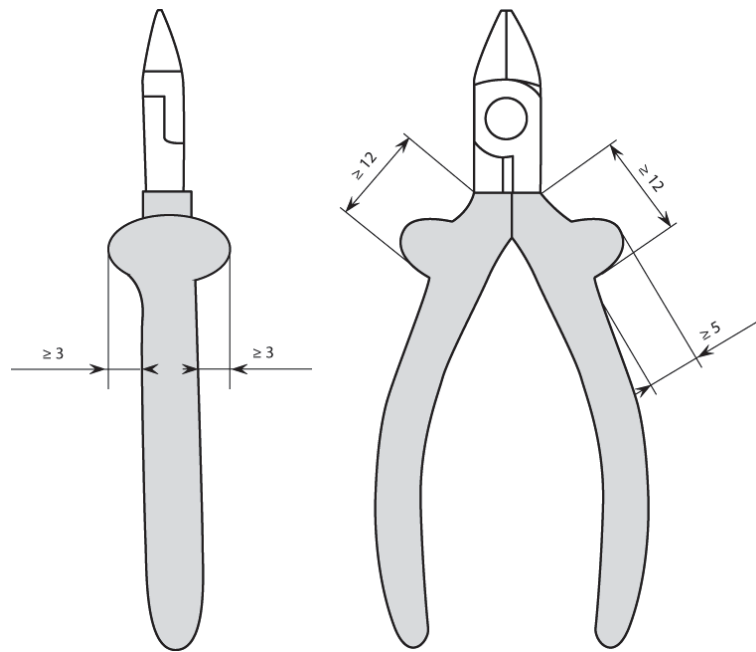
Where the handles of the hand tools are longer than 400 mm, a guard is not required.

In case of insulated pliers and nippers for electronics, the dimensions of the guard shall be at least:

- 5 mm on left and right of the pliers held on a flat surface;
- 3 mm on the upper part and the lower part of the pliers held on a flat surface.

The minimum insulated distance between the inner edge of the guard and the non-insulated part shall be 12 mm. The insulation portion in front of the guard shall extend as far as possible towards the working head (see Figure 9).

Pliers and nippers for electronics shall be in accordance with ISO 9656 and ISO 9657 and, where relevant, with ISO 9654 or ISO 9655

Dimensions in millimetres

IEC 1050/12

Figure 9 – Illustration of insulation of pliers and nippers for electronics**4.3.6 Scissors**

A typical insulation of scissors is shown in Figure 10.

The shackles of the scissors shall have one of both designs presented in Figures 10a and 10b.

The maximum length of the uninsulated parts of scissors shall not exceed 100 mm.

The insulation portion in front of the guard shall extend as far as possible towards the working head. If the insulated length in front of the shackle is less than 50 mm, at least one guard is required.

Dimensions in millimetres

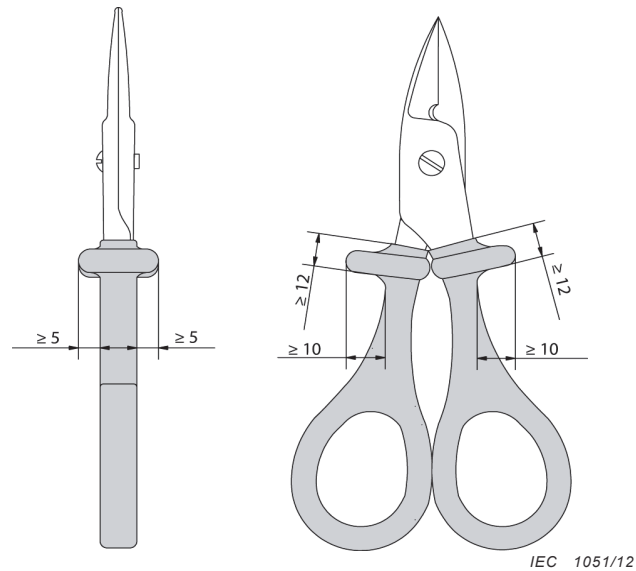


Figure 10a

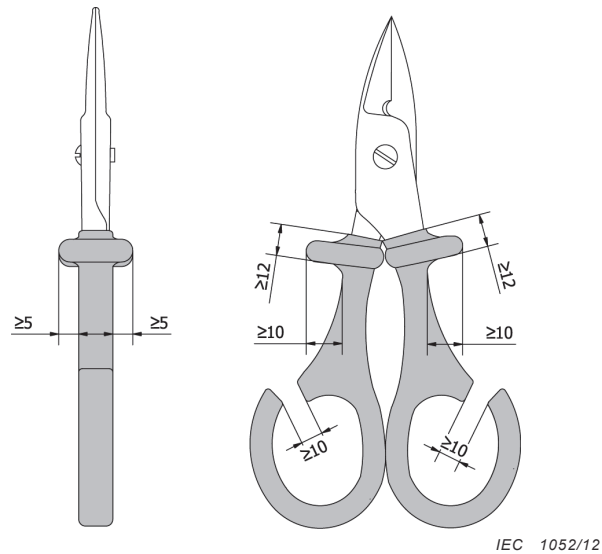


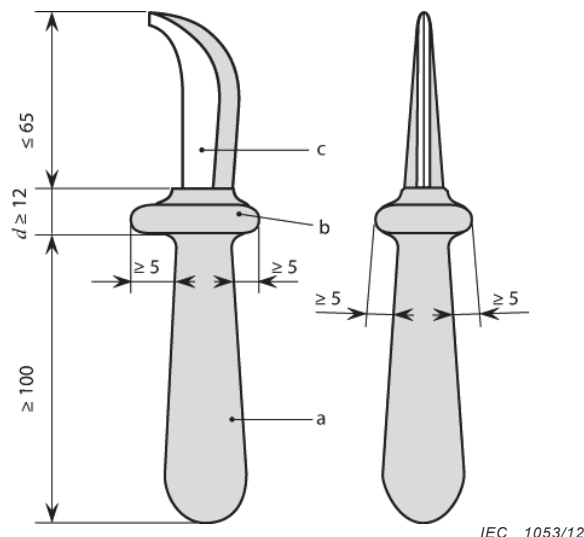
Figure 10b

Figure 10 – Insulation of scissors

4.3.7 Knives

Figure 11 shows an example for the application of the insulation of knives. The dimensions of insulated knives shall be in accordance with Figure 11.

Dimensions in millimetres

**Key**

- a insulated handle or leg
- b guard
- c working head (not insulated)
- d distance between the inner edge of the guard and the non-insulated part

Figure 11 – Insulation of knives**4.3.8 Tweezers**

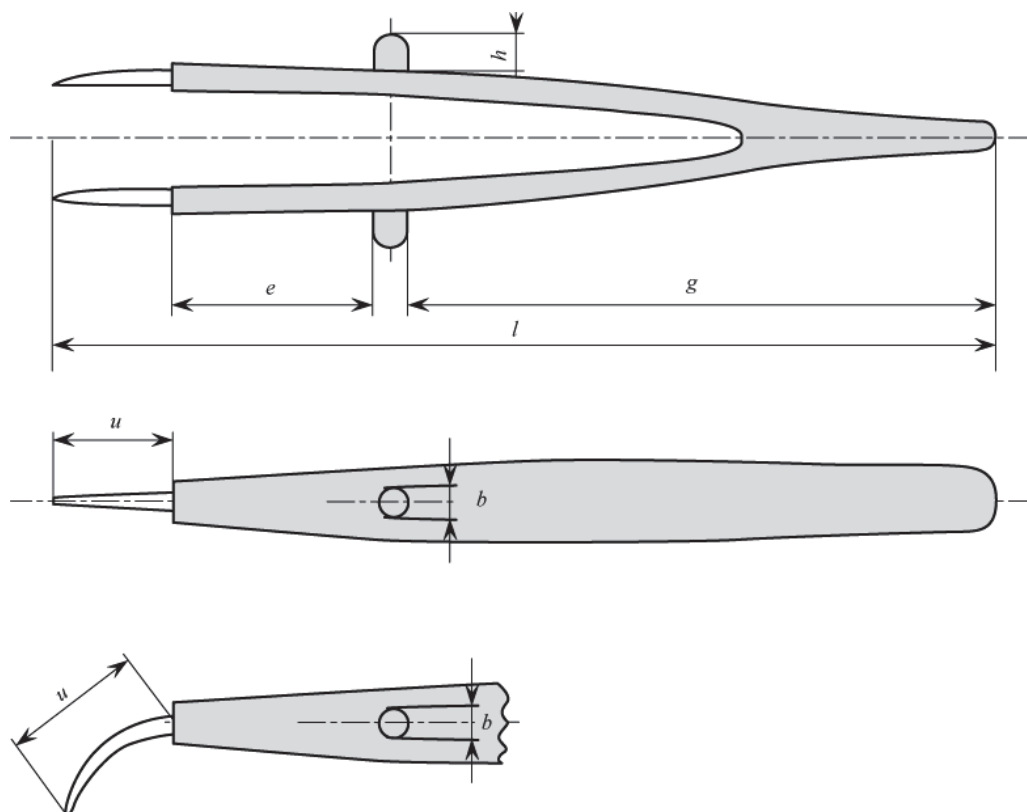
The total length l shall be 130 mm minimum and 200 mm maximum. The length of the handles g shall be 80 mm minimum (see Figure 12).

Both handles of the tweezers shall have a guard towards the working head. The guard shall not be movable. Its height h and width b shall be sufficient (5 mm minimum) to prevent any slipping of the fingers during the work towards the uninsulated length u of the working head. On both handles, the insulated length e between the guard and the working head shall be 12 mm minimum and 35 mm maximum (see Figure 12).

The uninsulated length u of the working head shall not exceed 20 mm (see Figure 12).

In the case of tweezers with a metallic working head, the metallic part shall have a minimum hardness of 35 HRC at least from the working head up to the handles.

Insulating tweezers shall not have exposed conductive parts.



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Key

- l total length of the tweezers
- g length of the handle (grip)
- b width of the guard
- h height of the guard
- e insulated part of the handle between the guard and the working head
- u uninsulated part of the working head

Figure 12 – Example of insulation of the handles of tweezers

5 Tests

5.1 General

The present standard provides testing provisions to demonstrate compliance of the product to the requirements of Clause 4. These testing provisions are primarily intended to be used as type tests for validation of the design input. Where relevant, alternative means (calculation, examination, tests, etc.), are specified within the test subclauses for the purpose of hand tools having completed the production phase.

The type tests specified in 5.2 to 5.10 shall be carried out on at least three hand tools of the same design and in the sequence specified in Annex D.

Should a hand tool fail any part of the type test, the type test shall be repeated on at least six further hand tools of the same design. Should any one of these six hand tools fail any part of the type test, the whole test shall be regarded as having been failed.

All hand tools that have failed the type test shall be either destroyed or rendered unsuitable for use in live working.

Unless otherwise stated, the type tests shall be carried out after a minimum storage time of 16 h under IEC climatic conditions, 23 °C ± 5 °C, relative humidity 45 % to 75 %.

Unless otherwise stated, tolerances of ± 5 % from any type test values required are permissible.

5.2 Visual check

The hand tool (in particular the insulation) shall be visually checked and shall be free from external defects.

The marking shall be checked for legibility and completeness in accordance with 4.1.4.

The compliance with the relevant complementary requirements of the following subclauses shall be checked by visual inspection:

- subclause 4.3.1.2, in the case of connecting parts of hand tools capable of being assembled;
- subclause 4.3.1.3.2 for instructions for use in the case of hand tools capable of being assembled and designed to be interchangeable between different manufacturers;
- subclause 4.3.2.4 for the type of material of the screw retaining devices of screwdrivers;
- subclause 4.3.3 for uninsulated areas of wrenches.

5.3 Dimensional check

The dimensional requirements of 4.3 shall be checked. The dimensions of certain elements of marking shall be checked according to 4.1.4.

5.4 Impact tests

5.4.1 Type test

5.4.1.1 General

The test shall be carried out according to one of the two methods shown in Figures 13 and 14. In any doubt, method “B” applies (see Figure 14).

In case of hand tools capable of being assembled, the tool components shall be tested separately.

The hammer used in the apparatus of Figure 13 and the hammer and intermediate piece used in apparatus of Figure 14 shall be made of steel with a hardness between 20 HRC and 46 HRC.

At least three points of the insulating material or insulating layer shall be selected as testing points, these being points which could be damaged when the hand tool drops on a flat surface.

The test shall be considered as passed if the insulating material shows no breaks, exfoliations, or cracks penetrating the insulating layer of the insulated hand tool or likely to reduce the solidity of the insulating hand tool.